
[Accelerators & Beams --- Research areas]

Beam dynamics

- Beam code development & simulation techniques

- Beam countermeasures

- Beam impedance

- Beam instabilities

- Beam optics

 - Beam optics correction schemes

 - Beam optics transport

 - Lattices in beam optics

- Beam processes

- High intensity beam dynamics

 - Beam cooling

 - Beam halos

 - Incoherent beam instabilities

 - Space charge in beams

- Low-energy multiple-particle dynamics

- Nonlinear beam dynamics

 - Beam resonances

 - Beam tracking

 - Higher order beam dynamics

- Relativistic multiple-particle dynamics

- Single-particle dynamics

Beam techniques

- Accelerator/storage ring control systems

- Beam control

 - Beam cooling

 - Beam polarization

 - Damping rings

- Beam diagnostics

- Beam injection, extraction & transport

- Beam loss

- Collimation

- Secondary beams

Cryogenics & vacuum technology

- Cryogenic technology

- Vacuum technology

Electromagnetic field calculations

- Room-temperature magnet calculations

Superconducting magnet calculations

Radio frequency techniques

Radio frequency calculations

Radio frequency power sources

Room temperature RF

Superconducting RF

[Accelerators & Beams --- Physical systems]

Accelerator applications

Materials analysis & modification by accelerators

Medical applications of accelerators

Security applications of accelerators

Transmutation & power generation with accelerators

Accelerator subsystems

Alignment & survey

Infrastructures & instrumentation

Lasers

Air lasing

Frequency combs & self-phase locking

Laser applications

Laser dynamics

Laser spectroscopy

Laser-system design

Spatial profiles of optical beams

Machine protection

Power supplies

Radiation monitoring & safety

Reliability & operability

Targets

Timing & synchronization

Accelerators & storage rings

Energy efficient accelerators & components

High-energy accelerators & colliders

Circular accelerators

Fixed-field alternating gradient accelerators

Storage rings

Colliders

Hadron colliders

Lepton colliders

- Lepton-hadron colliders
 - Linear colliders
 - Linear accelerators
 - Conventional linacs
 - Energy recovery linacs
 - Muon accelerators & neutrino factories
- Low- & intermediate-energy accelerators
 - Cyclotrons
 - Electrostatic accelerators
 - High-intensity accelerators
 - Neutron spallation facilities
 - Rare-isotope facilities
- Plasma acceleration & new acceleration techniques
 - Fast particle effects in plasmas
 - Free-electron laser acceleration
 - Laser driven electron acceleration
 - Laser driven ion acceleration
 - Laser wakefield acceleration
 - Particle acceleration in plasmas
 - Radiation pressure acceleration
 - Target normal sheath acceleration
- Pulsed-power accelerators
- Sustainable accelerators
- Synchrotron radiation & free-electron lasers
 - Free-electron lasers
 - Radiation from moving charges
 - Synchrotron radiation facilities
 - Undulators & wigglers

Advanced accelerator test facilities

Particle accelerator facilities

Particle-beam sources

- Electron sources
- Proton & ion sources

[Atomic, Molecular & Optical --- Research areas]

Atomic & molecular collisions

- Atom or molecule scattering from surfaces
- Chemical reactions
 - Chemical charge transfer

- Electron & positron scattering
- Electronic excitation & ionization
 - Charge migration
- Interatomic & molecular potentials
 - Electric dipole-dipole interactions
- Scattering of atoms, molecules, clusters & ions
 - Charge-transfer collisions
 - Ion & atom channeling
 - Stopping power
- Scattering theory
 - Phase shift
- Ultracold collisions

Atomic & molecular processes in external fields

- Atomic, optical & lattice clocks
- Autoionization & Auger processes
- Coherent control
- Cooling & trapping
 - Atom & ion cooling
 - Atom & ion trapping & guiding
 - Molecule trapping & guiding
 - Optical lattices & traps
 - BCS-BEC crossover
 - Penning traps
- Electro-optical spectra
- Laser-cluster interaction
- Magneto-optical spectra
- Molecular dissociation
- Multiphoton or tunneling ionization & excitation
 - High-order harmonic generation
- Nuclear & electron resonance
- Optical pumping
- Optical transient phenomena
- Photoassociation
- Photodetachment
- Photodissociation
- Photoemission
 - Inner-shell processes
- Single- and few-photon ionization & excitation
 - Laser-modified scattering
 - Nonsequential double (or multiple) ionization
- Spontaneous emission
- Stark effect
- Strong electromagnetic field effects

- Strong field ionization & excitation
 - XUV generation
- Strong-field-induced spectra
- Ultrashort pulses
 - Few-cycle light pulses
 - Pulse characterization
- Ultrafast phenomena
 - Pulse shaping
 - XUV generation
- Zeeman effect

Atomic & molecular structure

- Atomic & molecular clusters
 - Collective effects in clusters
 - Diffusion & dynamics of clusters
 - Electronic & magnetic properties of clusters
 - Optical properties of clusters
 - Phase transitions in clusters
 - Reactivity of clusters
 - Spectroscopy of clusters
 - Stability of clusters

Atomic orbital

Atomic spectra

- Lifetimes & widths
 - Lifetime of molecular or ionic species
- Lineshapes & shifts
- Oscillator strength

Casimir effect & related phenomena

Chemical binding

Electron correlation calculations for atoms & ions

Electronic structure of atoms & molecules

- Isotope shift

Electronic transitions

Fine & hyperfine structure

Long-range interactions

Molecular spectra

- Renner-Teller effect

Potential energy surfaces

Relativistic & quantum electrodynamic effects in atoms, molecules,& ions

Rotational states

Vibrational states

- Vibronic effects

van der Waals interaction

Cold atoms & matter waves

- Anderson localization

- Atom interferometry

 - Mach-Zehnder atom interferometry

- Atom lasers

- Atom optics

- Atomtronics

- Bose gases

- Bose-Einstein condensates

 - BEC tunneling

 - Spinor Bose-Einstein condensates

- Cold and ultracold molecules

- Cold gases in optical lattices

- Decoherence in quantum gases

- Dipolar gases

 - Dipolar Rydberg atoms

 - Dipolar atoms

 - Dipolar molecules

- Electron wave interferometry

- Entanglement in quantum gases

- Fermi gases

- Fermionic condensates

- Mixtures of atomic and/or molecular quantum gases

 - Bose-Bose mixtures

 - Bose-Fermi mixtures

- Rydberg gases

- Spin-orbit coupling

 - Dresselhaus coupling

 - Dzyaloshinskii-Moriya interaction

 - Rashba coupling

- Synthetic gauge fields

Collective effects in atomic physics

Optics & lasers

- Angular momentum of light

 - Optical vortices

- Classical optics

 - Geometrical & wave optics

 - Light propagation in random media

 - Imaging & optical processing

 - Ghost imaging

 - Holography

 - Lidar

- Radar
- Tomography
- Interference & diffraction of light
- Light propagation, transmission & absorption
 - Evanescent waves
 - Non-diffracting waves
- Optical interferometry
 - Nonclassical interferometry
- Polarization of light
- Transformation optics
- Effects of atomic coherence on light propagation
 - Coherent population trapping
 - Electromagnetically induced transparency
 - Lasing without inversion
 - Stimulated Raman adiabatic passage
- Electron beams & optics
- Gain properties of lasers
- Lasers
 - Air lasing
 - Frequency combs & self-phase locking
 - Laser applications
 - Laser dynamics
 - Laser spectroscopy
 - Laser-system design
 - Spatial profiles of optical beams
- Light-matter interaction
 - Abraham-Minkowski debate
 - Atoms, ions, & molecules in cavities
 - Cavity magnonics
 - Cherenkov radiation
 - Compton scattering
 - Dispersion engineering
 - Light stopping & storage
 - Mechanical effects of light on material media
 - Remote sensing
 - Mie scattering
 - Optical interactions with surfaces
 - Quantum description of light-matter interaction
 - Minkowski momentum
 - Semiconductor Bloch equations
- Masers
- Metamaterials
 - Acoustic metamaterials
 - Metagratings

- Phononic crystals
- Hyperbolic metamaterials
- Magnonic crystals
- Mechanical metamaterials
- Metasurfaces
- Optical metamaterials
 - Negative refraction
 - Optical cloaking
 - Periodic gratings
- Split-ring resonators
- Thermal metamaterials
- Topological metamaterials
- Wire medium
- Near-field optics
- Non-reciprocal propagation
- Non-reciprocal transmission
- Nonlinear optics
 - Autocorrelation
 - Brillouin scattering & spectroscopy
 - Cross-phase modulation
 - Dispersion engineering
 - Electro-optic effects
 - Electronic polarizability
 - Electronic susceptibility
 - Frequency conversion
 - High-order harmonic generation
 - Modulation instability
 - Nonlinear optical susceptibility
 - Nonlinear resonance
 - Nonlinear waveguides
 - Optical bistability
 - Optical chaos
 - Dynamics of nonlinear optical systems
 - Optical instabilities
 - Optical solitons
 - Optical rogue waves
 - Parametric resonance
 - Photorefractive & Kerr effects
 - Optical activity
 - Pulse compression
 - Rayleigh scattering
 - Second order nonlinear optical processes
 - Self-focusing
 - Spectral shaping

Stimulated Raman scattering

Impulsive stimulated Raman scattering

Supercontinuum generation

Third order nonlinear optical processes

Upconversion

Optical coherence

Optical materials & elements

Bragg structures

Crystal optics

Lenses

Nonlinear optical materials

Nonlocal nonlinear media

Optical fibers

Optical isolators

Optical microcavities

Optical parametric oscillators & amplifiers

Optical sources & detectors

Organic microcavities

Photodetectors

Quantum cavities

Semiconductor microcavities

Spatial light modulators

Waveguides

Waveguide arrays

Optomechanics

Rotation sensing

Sagnac effect

Photonic crystals

Photonic crystal waveguide

Photonics

Fano resonance

Integrated optics

Nanophotonics

Topological effects in photonic systems

Plasmonics

Quantum optics

Cavity quantum electrodynamics

Circuit quantum electrodynamics

Collective effects in quantum optics

Superradiance & subradiance

Hybrid quantum systems

Optical tests of quantum theory

Photon pairs & parametric down-conversion

Photon statistics

- Quantum fluctuations & noise
- Quantum measurements
 - Quantum nondemolition measurement
- Quantum optics with artificial atoms
- Quantum state engineering
- Quantum states of light
 - Non-gaussian quantum states
- Semiconductor quantum optics
- Single photon sources
- Squeezing of quantum noise
- Superconducting quantum optics
- Ultrafast optics
- X-ray beams & optics

Structured light

[Atomic, Molecular & Optical --- Physical systems]

Atomic systems

- Antihydrogen
- Atomic & molecular beams
- Atomic ensemble
- Atomic gases
 - Bose gases
 - Fermi gases
- Atoms
- Clusters
- Exotic atoms & molecules
- Ions
- Molecules
 - Ionized molecules
- Muonic atoms & molecules
- Muonium
- Positronium
- Rare-earth ions
- Rydberg atoms & molecules
- Trapped atoms
- Trapped ions

Complex media

- Random & disordered media

Laser systems

- Chemical lasers
- Dye lasers
- Fiber lasers
- Gas lasers
- Liquid crystal lasers
- Microcavity & microdisk lasers
- Photonic crystal lasers
- Raman lasers
- Random lasers
- Solid state lasers
 - Diode lasers
 - Semiconductor lasers
 - Quantum cascade lasers
 - VCSELs
- Tunable lasers
- X-ray lasers

Micromechanical & nanomechanical oscillators

Nitrogen vacancy centers in diamond

Optical materials & elements

- Bragg structures
- Crystal optics
- Lenses
- Nonlinear optical materials
- Nonlocal nonlinear media
- Optical fibers
- Optical isolators
- Optical microcavities
- Optical parametric oscillators & amplifiers
- Optical sources & detectors
- Organic microcavities
- Photodetectors
- Quantum cavities
- Semiconductor microcavities
- Spatial light modulators
- Waveguides
 - Waveguide arrays

Quantum dots

- Double quantum dots
- Quantum dot molecules

Quantum fluids & solids

- Bose-Einstein condensates
 - BEC tunneling
 - Spinor Bose-Einstein condensates
- Fermionic condensates
- Molecular condensates
- Polariton condensate
- Solid hydrogen
- Superfluids
 - Helium-3 superfluids
 - Helium-4 superfluids
 - Mixtures of ^3He & ^4He
 - Mott superfluids
- Supersolids
- Ultracold gases

Rare-earth doped crystals

[Atomic, Molecular & Optical --- Properties]

Atomic Properties

- Electric moment
- Electron affinity
- Magnetic moment
- Polarizability
- Polarization

[Atomic, Molecular & Optical --- Techniques --- Computational Techniques]

First-principles calculations

- Density functional theory
 - Density functional approximations
 - DFT+DMFT
 - DFT+U
 - GGA
 - Hybrid functionals
 - LDA
 - Meta-GGA
 - Pseudopotentials
 - Time-dependent DFT
 - Density functional calculations
 - Density functional perturbation theory

- Density functional theory development
- GW method
- High-throughput calculations
- Quantum chemistry methods
 - Configuration interaction
 - Coupled cluster
 - Hartree-Fock methods
 - Molecular orbital theory

- Molecular dynamics
 - Ab initio molecular dynamics
 - Deep potential molecular dynamics

- Quantum Monte Carlo
 - Diffusion quantum Monte Carlo

[Atomic, Molecular & Optical --- Techniques --- Experimental Techniques]

- Atom interferometry
 - Mach-Zehnder atom interferometry

- Cooling & trapping
 - Atom & ion cooling
 - Atom & ion trapping & guiding
 - Molecule trapping & guiding
 - Optical lattices & traps
 - BCS-BEC crossover
 - Penning traps

- Optical techniques
 - Bolometers
 - Brillouin-Mandelstam spectroscopy
 - Capacitance spectroscopy
 - Cavity resonators
 - Dipole quantum emitters
 - Whispering gallery mode resonators
 - Coherent control
 - Confocal imaging
 - Electroluminescence
 - Ellipsometry
 - Fluorescence spectroscopy
 - Four-wave mixing
 - High-harmonic generation

- Chirp
- Optical second-harmonic generation
- Spectro-temporal characterization
- Homodyne & heterodyne detection
- Imaging & optical processing
 - Ghost imaging
 - Holography
 - Lidar
 - Radar
 - Tomography
- Kerr effect
 - Magneto-optical Kerr effect
 - Surface magneto-optical Kerr effect
- Laser techniques
 - Attosecond laser irradiation
 - Attosecond laser spectroscopy
 - Femtosecond laser irradiation
 - Femtosecond laser spectroscopy
 - Laser ablation
 - Laser-beam impact phenomena
 - Optical pumping
 - Optical tweezers
 - Tractor beams
 - Pump-probe spectroscopy
 - Transient absorption spectroscopy
 - Ultrafast femtosecond pump probe
 - Ultrafast pump-probe spectroscopy
 - Two-photon polymerization
- Light scattering
 - Diffusive wave spectroscopy
 - Inelastic light scattering
 - Photon correlation spectroscopy
 - Static light scattering
 - Time-resolved light scattering spectroscopy
- Luminescence
- Nonlinear optical techniques
 - Sum-frequency generation
- Optical computing
- Optical desorption spectroscopy
- Optical interferometry
 - Nonclassical interferometry
- Optical metallography
- Optical microscopy
 - Annular dark-field imaging

- Dark-field microscopy
- Phase contrast optical microscopy
- Polarized optical microscopy
- Optical nanoscopy
- Photoexcitation
- Photoionization
 - Photoionization of molecules
- Photoluminescence
 - Fluorescence
 - Fluorescence recovery after photobleaching
 - Light sheet fluorescence microscopy
 - Phosphorescence
 - Time-resolved photoluminescence
- Photon counting
- RF, microwave, & terahertz sources
 - Terahertz sources
- Radiofrequency reflectometry
- Raman spectroscopy
- Reflectivity
- Resonant piezoelectric spectroscopy
- Single-photon detectors

Resonance techniques

- Cyclotron resonance
- Dynamic nuclear polarization
- Electron nuclear double resonance
- Electron paramagnetic resonance
- Electron spin resonance
 - Electron dipole spin resonance
- Ferromagnetic resonance
- Muon spin resonance
- Mössbauer spectroscopy
 - Mössbauer emission spectroscopy
- Nuclear magnetic resonance
 - Beta-detected nuclear magnetic resonance
 - Functional magnetic resonance imaging
 - Magnetic resonance imaging
 - Nuclear magnetic resonance relaxation rate
- Nuclear quadrupole resonance
- Nuclear spin resonance
- Optically detected magnetic resonance
- Tunnel diode resonance

Velocimetry

Coherent Raman in a low pressure gas

Correlation function measurements

Photoemission

Inner-shell processes

Spectroscopy

Bragg spectroscopy

High-order harmonic spectroscopy

Optical spectroscopy

Dark-field optical spectroscopy

Dielectric spectroscopy

Femtosecond laser spectroscopy

Near-field optical spectroscopy

Optical absorption spectroscopy

Pump-probe spectroscopy

Transient absorption spectroscopy

Ultrafast femtosecond pump probe

Ultrafast pump-probe spectroscopy

Time-resolved light scattering spectroscopy

Time-resolved reflection spectroscopy

Two-dimensional coherent spectroscopy

Photocurrent spectroscopy

Vibronic spectroscopy

Weak measurements

Confinement-induced resonance

Feshbach resonance

Resonance fluorescence

Super-resolution techniques

X-ray techniques

Energy spectroscopy for chemical analysis

Energy-dispersive x-ray spectroscopy

Hard x-ray photoelectron spectroscopy

X-ray absorption spectroscopy

X-ray absorption fine structure spectroscopy

X-ray absorption near-edge spectroscopy

- X-ray diffraction
 - Dynamical diffraction
 - Grazing-incidence X-ray diffraction
 - X-ray diffraction topography
 - X-ray powder diffraction
- X-ray emission spectroscopy
- X-ray fluorescence holography
- X-ray holography
- X-ray imaging
- X-ray magnetic circular dichroism
- X-ray magnetic linear dichroism
- X-ray pair-distribution function analysis
- X-ray photoelectron diffraction
- X-ray photoelectron spectroscopy
- X-ray photoemission electron microscopy
- X-ray photon correlation spectroscopy
- X-ray reflectivity
- X-ray scattering
 - Coherent X-ray scattering
 - Grazing-incidence small-angle x-ray scattering
 - Inelastic X-ray scattering
 - Nonresonant inelastic x-ray scattering
 - Resonant inelastic x-ray scattering
 - Resonant elastic x-ray scattering
 - Small-angle x-ray scattering
 - X-ray diffuse scattering
 - X-ray resonant magnetic scattering
- X-ray standing waves
- X-ray thermal diffuse scattering
- X-ray tomography

[Atomic, Molecular & Optical --- Techniques --- Theoretical Techniques]

Adiabatic approximation

- Closed-orbit theory
 - Periodic-orbit theory

Dipole approximation

Hartree-Fock methods

Nonperturbative methods

Perturbative methods

Phase space methods

Quantum orbits theory

Random phase approximation

Rotating wave approximation

Schroedinger equation

Semiclassical methods

Stochastic differential equations

Strong-field approximation

Two-level models

Dicke model

Jaynes-Cummings model

Rabi model

Tavis-Cummings model

[Condensed Matter, Materials & Applied Physics --- Research areas]

Continuum mechanics

Electrical properties

Antiferroelectricity

Capacitance

Charge

Charge density waves

Charge dynamics

Dielectric properties

Electric polarization

Electrical conductivity

Electromigration

Ionic conductivity

Electrocaloric effect

Electrochemical properties

Electron emission

- Electronic phase separation
- Electrostriction
- Ferroelectricity
 - Electroresistance
 - Tunneling electroresistance
 - Ferroelectric domains
 - Polarization vortices
 - Sliding ferroelectricity
- Field emission
- Flexoelectricity
- Impedance
- Mixed ionic electronic conduction
- Permittivity
- Piezoelectricity
- Pyroelectricity
- Resistive switching
- Skin effect
- Thermionic emission
- Wireless power transfer

Electronic structure

- Density of states
 - Band gap
 - Local density of states
 - Van Hove singularity
- Edge states
 - Hinge states
- Fermi surface
 - Luttinger's theorem
 - Nesting
 - Shubnikov-de Haas effect
 - de Haas-van Alphen effect
- Flat bands
- Landau levels
- Landau-Zener effect
- Slidetronics
 - Sliding ferroelectricity
- Spin-orbit coupling
 - Dresselhaus coupling
 - Dzyaloshinskii-Moriya interaction
 - Rashba coupling
- Spin-phonon coupling
- Surface states
- Twistronics

Valley degrees of freedom

Valleytronics

Magnetism

Demagnetization

Laser-induced demagnetization

High magnetic fields

Kondo effect

Magnetic anisotropy

Magnetic coupling

Magneto-optical effect

Magnetocaloric effect

Magnetoelastic effect

Flexomagnetism

Magnetoelectric effect

Magnetostriction

Magnetic interactions

Dipolar interaction

Exchange bias

Exchange interaction

RKKY interaction

Magnetic order

Altermagnetism

Antiferromagnetism

Asperomagnetism

Diamagnetism

Ferrimagnetism

Ferromagnetism

Frustrated magnetism

Spin ice

Artificial spin ice

Spin liquid

Quantum spin liquid

Valence bond solid

Metamagnetism

Paramagnetism

Sperimagnetism

Speromagnetism

Superparamagnetism

Magnetic phase transitions

Spin state transition

Magnetic susceptibility

Magnetic texture

Domain walls

- Domain wall motion
- Helicoidal magnetic texture
- Magnetic domains
- Magnetic vortices
- Magnetization switching
- Skyrmions
- Spin density waves
- Spin texture
 - Spin spiral
 - Spin helix
- Magnetization dynamics
 - Magnetization switching
 - Magnonics
 - Ultrafast magnetization dynamics
 - Ultrafast demagnetization
- Magneto-dielectric effect
- Magnetoacoustic effect
- Magnetotransport
 - Magnetoresistance
 - Angular-dependent magnetoresistance
 - Anisotropic magnetoresistance
 - Colossal magnetoresistance
 - Giant magnetoresistance
 - Spin Hall magnetoresistance
 - Tunneling anisotropic magnetoresistance
 - Tunneling magnetoresistance
- Micromagnetism
- Molecular magnetism
- Spin dynamics
- Spintronics
 - Spin accumulation
 - Spin caloritronics
 - Spin Peltier effect
 - Spin Seebeck effect
 - Spin coherence
 - Spin current
 - Spin diffusion
 - Spin filtering
 - Chirality-induced spin selectivity
 - Spin generation
 - Electrical generation of spin carriers
 - Optical generation of spin carriers
 - Spin pumping
 - Spin injection

- Dynamic spin injection
- Electrical spin injection
- Optical spin injection
- Spin optoelectronics
- Spin orbitronics
- Spin polarization
- Spin relaxation
- Spin torque
 - Spin transfer torque
 - Spin-orbit torque
- Spin waves
- Ultrafast magnetic effects

Mechanical & acoustical properties

- Acoustic effects
 - Acoustic vortices
 - Thermoacoustic effect
 - Ultrasound attenuation
- Compressive strength
- Ductility
- Elasticity
 - Elastic modulus
 - Poisson ratio
- Embrittlement
- Ferroelasticity
- Fracture
- Friction
- Hardness
- Material failure
- Mechanical deformation
 - Anelastic deformation
 - Bending
 - Creep
 - Elastic deformation
 - Fatigue
 - Internal friction
 - Plastic deformation
 - Shear deformation
 - Strain
 - Epitaxial strain
 - Twist deformation
- Phononics
- Plasticity
- Rheology

- Flow boundary effects
 - Flow boundary instabilities
 - Flow confinement
 - Slip boundary effects
 - Wall slip

- Straintronics
- Stress
 - Stress propagation

Mesoscopics

- Coulomb blockade
- Geometric & topological phases
 - Chern number
 - Quantum geometry
 - Berry curvature
 - Quantum metric
 - Uhlmann phase
- Phase slips
- Quantum interference effects
 - Aharonov-Bohm effect
 - Aharonov-Casher effect
- Spin blockade

Optical & microwave phenomena

- Cloaking
- Electroluminescence
- Extraordinary optical transmission
- Kerr effect
 - Magneto-optical Kerr effect
 - Surface magneto-optical Kerr effect
- Light-induced magnetic effects
- Luminescence
- Magneto-optics
 - Faraday effect
 - Magneto-optical Kerr effect
 - Surface magneto-optical Kerr effect
- Nanoantennas
- Optical conductivity
- Optical forces
- Optical lattices & traps
 - BCS-BEC crossover
- Optoelectronics
 - Spin optoelectronics
- Photoconductivity

- Photogalvanic effect

- Photovoltaic effect

- Shift current

- Photocurrent

- Photoinduced effect

- Photonics

- Fano resonance

- Integrated optics

- Nanophotonics

- Topological effects in photonic systems

- Plasma oscillations

- Plasmonics

- Refraction

- Birefringence

- Brewster's angle

- Negative refraction

- Phase transitions

- Critical phenomena

- Critical exponents

- Critical field

- Dynamic critical phenomena

- Dynamical phase transitions

- Exotic phases of matter

- Excitonic insulators

- Phase-change materials

- Time crystals

- Jamming

- Landau theory

- Nucleation

- Order diagnosis

- Order parameters

- Charge order

- Magnetic order

- Altermagnetism

- Antiferromagnetism

- Asperomagnetism

- Diamagnetism

- Ferrimagnetism

- Ferromagnetism

- Frustrated magnetism

- Spin ice

- Artificial spin ice

- Spin liquid

Quantum spin liquid

Valence bond solid

Metamagnetism

Paramagnetism

Sperimagnetism

Speromagnetism

Superparamagnetism

Multipole order

Nematic order

Orbital order

Stripes

Structural order parameter

Superconducting order parameter

d-wave

f-wave

p-wave

s-wave

Phase diagrams

Phase separation

Dynamics of phase separation

Microphase separation

Spinodal decomposition

Surface-driven phase separation

Phase transitions by order

BKT transition

First order phase transitions

Second order phase transitions

Quantum phase transitions

Excited-state quantum phase transitions

Quantum criticality

Specific phase transitions

Crystallization

Depinning transition

Ferroelectric phase transition

Gelation

Glass transition

Liquid crystal phase transitions

Liquid-gas phase transition

Liquid-liquid phase transition

Spinodal decomposition

Liquid-solid phase transition

Magnetic phase transitions

Spin state transition

Martensitic phase transition

- Metal-insulator transition
- Mott-superfluid transition
- Nematic phase transition
- Solid-solid transformations
- Spin reorientation transition
- Structural phase transition
- Superconducting phase transition
- Superconductor-insulator transition
- Transition temperature

Quasiparticles & collective excitations

Anyons

- Majorana bound states
- Majorana edge modes
- Majorana zero modes

Bosons

- Composite bosons
- Cooper pairs
- Goldstone bosons
- Hard-core bosons

Doublon

Excitons

- Biexcitons
- Orthoexcitons
- Paraexcitons

Fermions

- Composite fermions
- Dirac fermions
- Majorana fermions
- Parafermions
- Spinless fermions
- Weyl fermions

Fractionalization

Fractons

Holon

Lifetimes & widths

- Lifetime of molecular or ionic species

Magnons

Phasons

Phonons

- Acoustic phonons
- Optical phonons

Plasmons

- Surface plasmons

Polaritons

- Exciton polariton
- Intersubband polariton
- Phonon polariton
- Surface phonon polaritons
- Surface plasmon polariton

Polarons

Spinon

Trions

Triplon

Radio frequency techniques

- Radio frequency calculations
- Radio frequency power sources
- Room temperature RF
- Superconducting RF

Robotics

Structural properties

Chemical bonding

- Valence

Composition

Crystal phenomena

- Crystal binding
- Crystal defects
- Crystal forms
- Crystal growth
- Crystal melting
- Crystal orientation
- Crystal stoichiometry
- Crystal structure
- Crystal symmetry
- Crystallization
- Nanocrystals
- Polycrystals
- Quasicrystalline structure

Crystal-field excitations

Defects

- Color centers
- Disclinations & dislocations
- Dopants
- Grain boundaries
- Impurities

Interstitials

Line defects

Point defects

Stacking faults

Twinning

Vacancies

NV centers

Nitrogen vacancy centers in diamond

Silicon vacancies

Domains

Domain walls

Domain wall motion

Doping effects

Elasticity

Elastic modulus

Poisson ratio

Ferroelasticity

Intercalation

Jahn-Teller effect

Pseudo Jahn-Teller effect

Lattice dynamics

Anharmonic lattice dynamics

Electron-phonon coupling

Topological effects in acoustic systems

Microstructure

Peierls transition

Charge density waves

Kekule distortion

Plasticity

Pressure effects

High-pressure studies

Shock waves

Shape memory effect

Superconductivity

Andreev bound states

Andreev reflection

Coherence length

Critical current

FFLO

Impurities in superconductors

Isotope effect

Josephson effect

Meissner effect

- Multiband superconductivity
- Odd-frequency superconductivity
- Pair density wave
- Pairing mechanisms
 - Electron-mediated pairing
 - Electron-phonon coupling
 - Spin fluctuations
- Proximity effect
- Spin-singlet pairing
- Spin-triplet pairing
- Superconducting fluctuations
- Superconducting gap
 - Pseudogap
- Superconducting order parameter
 - d-wave
 - f-wave
 - p-wave
 - s-wave
- Superconducting phase transition
- Superfluid density
 - Penetration depth
- Topological superconductors
- Vortices in superconductors
 - Flux pinning
 - Vortex lattices

- Superfluidity
 - Vortices in superfluids

- Surface & interfacial phenomena
 - Adhesion
 - Adsorption
 - Adsorption isotherm
 - Chemisorption
 - Gravimetric adsorption measurements
 - Physisorption
 - Volumetric adsorption measurements
 - Atom impact & scattering
 - Cohesion
 - Self-healing
 - Cracking
 - Crazing
 - Desorption
 - Fracture

- Friction
- Growth
 - Island
- Ion impact & scattering
- Irradiation effects
 - Radiation damage
- Island
- Lubrication
- Nucleation on surfaces
- Roughness
- Surface diffusion
- Surface instabilities
 - Buckling
 - Cratering
 - Creasing
 - Wrinkling
- Surface reconstruction
- Tribology
 - Abrasion
 - Friction
 - Lubrication
 - Wear
- Wall slip
- Wetting

- Thermal properties
 - Elastocaloric effect
- Entropy
 - Shannon entropy
- Heat radiation
- Heat transfer
 - Second sound
- Specific heat
- Temperature
- Thermal boundary conductance
- Thermal conductivity
 - Caloritronics
 - Spin caloritronics
 - Spin Peltier effect
 - Spin Seebeck effect
 - Electron thermal conductivity
 - Lattice thermal conductivity
 - Thermal Hall effect
 - Thermal conductivity of fluids

- Thermal transport
- Thermal expansion
- Thermoelasticity
- Thermoelectric effects
 - Ettingshausen effect
 - Nernst effect
 - Peltier effect
 - Seebeck effect
 - Thermopower
- Thermomagnetic effects
- Thermomechanical effects

- Topological phases of matter
 - Symmetry protected topological states
 - Topoelectrical circuits
 - Topological edge modes
 - Topological insulators
 - Chern insulators
 - Dilute magnetic topological insulators
 - Topological mechanics
 - Topological order
 - Topological phase transition
 - Topological superconductors

- Transport phenomena
 - Ballistic transport
 - Carrier dynamics
 - Carrier generation & recombination
 - Classical transport
 - Fourier's law
 - Diffusion
 - Anomalous diffusion
 - Self-diffusion
 - Diffusiophoresis
 - Dissipative dynamics
 - Electrical conductivity
 - Electromigration
 - Ionic conductivity
 - Electron relaxation
 - Electrophoresis
 - Hall effect
 - Anomalous Hall effect
 - Quantum Hall effect
 - Fractional quantum Hall effect

- Integer quantum Hall effect
- Quantum anomalous Hall effect
- Quantum spin Hall effect
- Spin Hall effect
- Inverse spin Hall effect
- Topological Hall effect
- Hopping transport
- Ionic transport
- Kane-Mele model
- Kondo effect
- Localization
 - Anderson localization
 - Many-body localization
 - Weak antilocalization
 - Weak localization
- Onsager relations
- Percolation
 - Directed percolation
- Quantum transport
- Skin effect
- Thermal transport
- Thermoelectric transport
- Thermophoresis

[Condensed Matter, Materials & Applied Physics --- Physical systems]

0-dimensional systems

- Nanocrystals
- Nanoparticles
 - Core-shell nanoparticles
 - Magnetic nanoparticles
- Point contacts
- Quantum dots
 - Double quantum dots
 - Quantum dot molecules
- Quantum rings
- Quantum wells

1-dimensional systems

- 1-dimensional spin chains
- Nanotubes
- Nanowires
- Quantum wires

2-dimensional systems

- Boron nitride

 - Hexagonal boron nitride

- Coatings

- Germanene

- Graphene

 - Bilayer graphene

 - Multilayer graphene

 - Twisted bilayer graphene

 - Twisted multilayer graphene

- Hyperbolic lattice

- Interfaces

 - Gas-liquid interfaces

 - Liquid-liquid interfaces

 - Liquid-solid interfaces

 - Solid-gas interfaces

 - Solid-solid interfaces

 - Vacuum interfaces

- Janus materials

- Lattice types

 - Honeycomb lattice

 - Kagome lattice

 - Kekule lattice

 - Square lattice

 - Triangular lattice

- Layered crystals

- MXenes

- Phosphorene

- Silicene

- Stanene

- Surfaces

- Thin films

 - Bilayer films

 - Magnetic thin films

 - Monolayer films

 - Multilayer thin films

 - Ultrathin films

- Transition metal dichalcogenides

- Transition metal trichalcogenides

- Twisted films

 - Moire materials

 - Twisted bilayers

 - Twisted heterostructures

Twisted multilayers

Two-dimensional electron system

Two-dimensional electron gas

Wigner crystal

3-dimensional systems

Alloys

Complex concentrated alloys

Disordered alloys

Heusler alloy

Half-Heusler alloy

High-entropy alloys

Multi-principal element alloys

Permalloy

Rare-earth alloys

Solid solutions

Transition metal alloys

Transition-metal rare-earth alloys

Amorphous materials

Glasses

Metallic glasses

Carbon-based materials

Diamond

Fullerenes

Graphene

Bilayer graphene

Multilayer graphene

Twisted bilayer graphene

Twisted multilayer graphene

Graphite

Nanotubes

Complex materials

Clathrates

Heterostructures

Superlattices

Metamaterials

Acoustic metamaterials

Metagratings

Phononic crystals

Hyperbolic metamaterials

Magnonic crystals

Mechanical metamaterials

Metasurfaces

Optical metamaterials

- Negative refraction
 - Optical cloaking
 - Periodic gratings
 - Split-ring resonators
 - Thermal metamaterials
 - Topological metamaterials
 - Wire medium
- van der Waals systems
- Electrides
- Hydrogenated materials
- Insulators
- Liquids
 - Supercooled liquid
 - Water
- MAX phase compounds
- Metal halides
- Metals
 - Elemental metals
 - Kagome metal
 - Liquid metals
- Molecular solids
 - Bechgaard salts
 - Ice
- Ordered compounds
 - Inorganic compounds
 - Borides
 - Carbides
 - Ceramics
 - Chalcogenides
 - Dichalcogenides
 - Hydrides
 - Ionic solids
 - Nitrides
 - Oxides
 - Cobaltates
 - Complex oxides
 - Cuprates
 - Ferrites
 - Iridates
 - Manganates
 - Manganites
 - Ruthenates
 - Transition metal oxides
 - Nickelates

Transparent conducting oxides

Vanadates

Pnictides

Skutterudites

Intermetallic compounds

Aluminides

Laves phases

Solder intermetallics

Zintl compounds

Organic compounds

Organic semiconductors

Organic superconductors

Organometallic materials

Photonic crystals

Photonic crystal waveguide

Porous materials

Clathrates

Zeolites

Semiconductors

Amorphous semiconductors

Doped semiconductors

Elemental semiconductors

Excitonic insulators

Layered semiconductors

Magnetic semiconductors

Dilute magnetic semiconductors

Narrow band gap systems

Semiconductor compounds

II-VI semiconductors

III-V semiconductors

Intermetallic semiconductors

Wide band gap systems

Semimetals

Supercritical fluids

Crystalline systems

Crystal structures

Body-centered cubic

Brownmillerite

Cesium chloride structure

Diamond structure

Face-centered cubic

Fluorite structure

Hexagonal close-packed

Noncentrosymmetric materials

Olivines

Perovskites

Hybrid perovskites

Organic-inorganic hybrid perovskites

Ruddlesden-Popper compounds

Pyrochlores

Simple cubic

Skutterudites

Sodium chloride structure

Spinels

Wurtzite

Zinc-blende structure

Polycrystalline materials

Quantum crystals

Quantum atomic crystals

Quantum molecular crystals

Quasicrystals

Single crystal materials

Devices

Capacitors

Demultiplexers

Device fabrication

Devices for digital logic, storage & processing

Diodes

LEDs

Metal-insulator-metal diodes

Organic LEDs

Photodiodes

Spin photodiodes

Flexible electronics

Memristors

Micromechanical devices

Multiplexers

Nano-oscillators

Spin torque nano-oscillators

Nanomechanical devices

Nano-electromechanical systems

Organic sensors

Qubits

Color center qubits

Neutral atom qubits

Photonic qubits

- Quantum dot qubits
- Spin qubits
- Superconducting qubits
- Topological qubits
- Trapped ion qubits
- Two-level systems
- Single-electron devices
- Solid-state detectors
- Superconducting devices
 - Josephson junctions
 - SNS junctions
 - SQUID
 - Superconducting qubits
- Thermoelectrics
 - Thermoelectric cooling
 - Thermoelectric generators
 - Thermoelectric heating
- Transducers
- Transistors
 - Field-effect transistors
 - MOSFET
 - Single-electron transistors

Electronically polarized systems

- Dielectrics
- Ferroelectrics
 - Antiferroelectrics
 - Relaxor ferroelectrics
- Flexoelectrics
- Multiferroics
- Paraelectrics
- Piezoelectrics
- Pyroelectrics

Elemental materials

- Actinides
- Alkali metals
- Alkaline earth metals
- Boron family
- Carbon family
- Chalcogens
- Elemental metals
- Elemental semiconductors
- Elemental superconductors

- Halogens
- Lanthanides
- Metalloids
- Noble gases
- Noble metals
- Pnictogens
- Transition metals

Functional materials

Energy applications

Batteries

- Flow batteries
- Lithium batteries
 - Lithium metal batteries
 - Lithium polymer batteries
 - Lithium-air batteries
 - Lithium-ion batteries
 - Lithium-sulfur batteries
- Lithium-alternative batteries
- Solid-state batteries
- Thermal batteries

Magnetic refrigeration

Solar cells

Solid-state refrigeration

Thermoelectrics

- Thermoelectric cooling
- Thermoelectric generators
- Thermoelectric heating

Energy materials

Hydrogen storage materials

Photovoltaic absorbers

- Tandem photovoltaics
- Thermal photovoltaics
- Thin-film photovoltaics

Smart materials

- Actuating materials
- Self-healing systems
- Shape-memory materials
- Stimuli-responsive materials

Junctions

Josephson junctions

SNS junctions

Molecular junctions

- Schottky barriers
- Tunnel junctions
 - Ferroelectric tunnel junctions
 - Magnetic tunnel junctions
 - Multiferroic tunnel junctions
- Weak links

Magnetic systems

- Altermagnets
- Antiferromagnets
- Chiral magnets
- Diamagnets
- Ferrimagnets
- Ferromagnets
 - Soft magnets
- Flexomagnetism
- Half-metals
- Helimagnets
- Magnetic insulators
- Magnetic multilayers
 - Synthetic antiferromagnetic multilayers
- Magnetic nanoparticles
- Magnetic semiconductors
 - Dilute magnetic semiconductors
- Magnetic thin films
- Molecular magnets
 - Single-molecule magnets
- Multiferroics
- Noncollinear magnets
- Paramagnets
- Permanent magnets
- Rare-earth magnetic materials
- Spin glasses
 - Spin ice
 - Artificial spin ice
- Spin valves

Minerals

Nanostructures

- Nanoantennas
- Nanoclusters
- Nanodisks
- Nanofibers

Nanoparticles

- Core-shell nanoparticles

- Magnetic nanoparticles

Nanoribbon

Nanorods

Nanotechnology

Nanotubes

Nanowires

Non-Hermitian systems

- Exceptional points

Quantum many-body systems

Quantum fluids & solids

- Bose-Einstein condensates

 - BEC tunneling

 - Spinor Bose-Einstein condensates

- Fermionic condensates

- Molecular condensates

- Polariton condensate

- Solid hydrogen

- Superfluids

 - Helium-3 superfluids

 - Helium-4 superfluids

 - Mixtures of ^3He & ^4He

 - Mott superfluids

- Supersolids

- Ultracold gases

Semiconductors

- Amorphous semiconductors

- Doped semiconductors

- Elemental semiconductors

- Excitonic insulators

- Layered semiconductors

- Magnetic semiconductors

 - Dilute magnetic semiconductors

- Narrow band gap systems

- Semiconductor compounds

 - II-VI semiconductors

 - III-V semiconductors

 - Intermetallic semiconductors

- Wide band gap systems

Strongly correlated systems

- Charge-transfer insulators
- Heavy-fermion systems
- Kondo insulators
- Mott insulators
- Uniform electron gas

Superconductors

- Elemental superconductors
- Ferromagnetic superconductors
- High-temperature superconductors
- Iron-based superconductors
- Low-temperature superconductors
- Superconducting devices
 - Josephson junctions
 - SNS junctions
 - SQUID
 - Superconducting qubits
- Type-I superconductors
- Type-II superconductors
- Unconventional superconductors

Topological materials

- Dirac semimetal
- Nodal-line semimetals
- Topological insulators
 - Chern insulators
 - Dilute magnetic topological insulators
- Topological superconductors
- Weyl semimetal

[Condensed Matter, Materials & Applied Physics --- Techniques --- Computational Techniques]

Acoustic techniques

- Acoustic levitation
- Surface acoustic wave
- Ultrasound techniques
 - Ultrasound spectroscopy

Atomic techniques

- Atom diffraction
 - Grazing-incidence fast atom diffraction
- Atomic force microscopy

- Magnetic force microscopy
- Noncontact atomic force microscopy
- Piezoresponse force microscopy
- Tapping mode atomic force microscopy
- Field emission & field-ion microscopy
- Ion beam analysis
 - Elastic back scattering spectroscopy
 - Elastic recoil detection
 - Nuclear reaction analysis
 - Particle-induced x-ray emission
 - Rutherford back scattering spectroscopy
- Irradiation
- Mass spectrometry
 - Secondary ion mass spectrometry
 - Time-of-flight mass spectrometry
- Surface scattering
 - Atom or molecule scattering from surfaces
 - Ion scattering from surfaces
 - Molecular scattering from surfaces

Charge

Cryogenics

- Adiabatic demagnetization
- Dilution refrigerator
- Liquid helium cooling
- Liquid nitrogen cooling

Crystallography

Electron techniques

- Andreev point contact spectroscopy
- Auger electron spectroscopy
- Electron diffraction
 - Convergent beam electron diffraction
 - Low-energy electron diffraction
 - Current-voltage low-energy electron diffraction
 - Spot-profile analysis LEED
 - Reflection high-energy electron diffraction
- Electron energy loss spectroscopy
 - Electron magnetic circular dichroism
 - High-resolution electron energy loss spectroscopy
- Electron microscopy
 - Electron probe micro-analysis

- High-resolution electron microscopy
- High-resolution transmission electron microscopy
- Lorentz microscopy
- Low-energy electron microscopy
- Scanning electron microscopy
 - Cryo-scanning electron microscopy
 - Environmental scanning electron microscopy
- Scanning transmission electron microscopy
 - Cryo-transmission electron microscopy
- Transmission electron microscopy
- Energy loss near-edge fine structure
- Inelastic electron tunneling spectroscopy

Gamma-ray techniques

- Compton scattering
- Doppler broadening spectroscopy
- Gamma ray spectroscopy
- Mössbauer spectroscopy
 - Mössbauer emission spectroscopy
- Perturbed-angular correlation spectroscopy
- Positron annihilation spectroscopy
- Time-differential perturbed-angular correlation spectroscopy

Infrared techniques

- Brewster reflection spectroscopy
- Brillouin scattering & spectroscopy
- Fourier transform infrared spectroscopy
- Infrared spectroscopy
- Raman spectroscopy
- Rayleigh scattering
- Surface differential reflectance spectroscopy
- Surface-enhanced Raman spectroscopy
- Time-resolved infrared spectroscopy

Interferometry

- Fabry-Pérot interferometry

Levitation

- Acoustic levitation
- Magnetic levitation
- Optical levitation

Magnetic techniques

- Ferromagnetic resonance

- Magnetic force microscopy
- Magnetic levitation
- Magnetization measurements
- Magnetotransport
 - Magnetoresistance
 - Angular-dependent magnetoresistance
 - Anisotropic magnetoresistance
 - Colossal magnetoresistance
 - Giant magnetoresistance
 - Spin Hall magnetoresistance
 - Tunneling anisotropic magnetoresistance
 - Tunneling magnetoresistance
- Muon spin relaxation & rotation
- Optically detected magnetic resonance
- Spin noise spectroscopy
- Spin wave spectroscopy
- Susceptibility measurements
 - AC susceptibility measurements
 - DC susceptibility measurements
- Torque magnetometry

Mechanical spectroscopy

Mechanical testing

- Bend & torsion tests
- High strain-rate tests
- Impact test
- Indentation
- Tension tests

Microwave techniques

- Coherent Raman electron spin resonance spectroscopy
- Dielectric spectroscopy
- Electron nuclear double resonance
- Electron paramagnetic resonance
- Electron spin resonance
 - Electron dipole spin resonance

Neutron techniques

- Gamma decay
- Neutron capture
- Neutron diffraction
- Neutron imaging
 - Neutron tomography

- Neutron irradiation
- Neutron pair-distribution function analysis
- Neutron reflectometry
- Neutron scattering
 - Inelastic neutron scattering
 - Quasi elastic neutron scattering
 - Small angle neutron scattering
- Neutron spin echo spectroscopy
 - Spin echo small angle neutron scattering
- Thermal cross-sections
- Time-of-flight neutron spectroscopy

Optical techniques

- Bolometers
- Brillouin-Mandelstam spectroscopy
- Capacitance spectroscopy
- Cavity resonators
 - Dipole quantum emitters
 - Whispering gallery mode resonators
- Coherent control
- Confocal imaging
- Electroluminescence
- Ellipsometry
- Fluorescence spectroscopy
- Four-wave mixing
- High-harmonic generation
 - Chirp
 - Optical second-harmonic generation
 - Spectro-temporal characterization
- Homodyne & heterodyne detection
- Imaging & optical processing
 - Ghost imaging
 - Holography
 - Lidar
 - Radar
 - Tomography
- Kerr effect
 - Magneto-optical Kerr effect
 - Surface magneto-optical Kerr effect
- Laser techniques
 - Attosecond laser irradiation
 - Attosecond laser spectroscopy
 - Femtosecond laser irradiation
 - Femtosecond laser spectroscopy

- Laser ablation
- Laser-beam impact phenomena
- Optical pumping
- Optical tweezers
 - Tractor beams
- Pump-probe spectroscopy
 - Transient absorption spectroscopy
 - Ultrafast femtosecond pump probe
 - Ultrafast pump-probe spectroscopy
- Two-photon polymerization
- Light scattering
 - Diffusive wave spectroscopy
 - Inelastic light scattering
 - Photon correlation spectroscopy
 - Static light scattering
 - Time-resolved light scattering spectroscopy
- Luminescence
- Nonlinear optical techniques
 - Sum-frequency generation
- Optical computing
- Optical desorption spectroscopy
- Optical interferometry
 - Nonclassical interferometry
- Optical metallography
- Optical microscopy
 - Annular dark-field imaging
 - Dark-field microscopy
 - Phase contrast optical microscopy
 - Polarized optical microscopy
- Optical nanoscopy
- Photoexcitation
- Photoionization
 - Photoionization of molecules
- Photoluminescence
 - Fluorescence
 - Fluorescence recovery after photobleaching
 - Light sheet fluorescence microscopy
 - Phosphorescence
 - Time-resolved photoluminescence
- Photon counting
- RF, microwave, & terahertz sources
 - Terahertz sources
- Radiofrequency reflectometry
- Raman spectroscopy

- Reflectivity
- Resonant piezoelectric spectroscopy
- Single-photon detectors

Photoelectron techniques

- Photoabsorption
- Photoelectron diffraction
- Photoelectron emission microscopy
- Photoemission spectroscopy
 - Angle-resolved photoemission spectroscopy
 - Inverse photoemission spectroscopy
 - Angle-resolved inverse photoemission spectroscopy
 - Spin-resolved inverse photoemission spectroscopy
 - Polarization-dependent photoemission spectroscopy
 - Resonant photoemission spectroscopy
 - Spin-resolved photoemission spectroscopy
 - Time & angle resolved photoemission spectroscopy
 - Time-resolved two-photon photoemission spectroscopy
 - Two-photon photoelectron spectroscopy
 - Ultraviolet photoelectron spectroscopy

Positron diffraction

Pressure techniques

- Hugoniot measurements

Quantum oscillation techniques

- Shubnikov-de Haas effect
- de Haas-van Alphen effect

Radio frequency techniques

- Radio frequency calculations
- Radio frequency power sources
- Room temperature RF
- Superconducting RF

Resonance techniques

- Cyclotron resonance
- Dynamic nuclear polarization
- Electron nuclear double resonance
- Electron paramagnetic resonance
- Electron spin resonance
 - Electron dipole spin resonance
- Ferromagnetic resonance

- Muon spin resonance
- Mössbauer spectroscopy
 - Mössbauer emission spectroscopy
- Nuclear magnetic resonance
 - Beta-detected nuclear magnetic resonance
 - Functional magnetic resonance imaging
 - Magnetic resonance imaging
 - Nuclear magnetic resonance relaxation rate
- Nuclear quadrupole resonance
- Nuclear spin resonance
- Optically detected magnetic resonance
- Tunnel diode resonance

Sample preparation

- Annealing
- Arc discharge
- Chemical synthesis
- Cold working
- Compaction
- Crystal growth
- Crystallization
- Electropolishing
- Electrospinning
- Epitaxy
 - Chemical beam epitaxy
 - Liquid epitaxy
 - Molecular beam epitaxy
- Etching
 - Plasma etching
- Evaporation
- Film deposition
 - Chemical deposition
 - Chemical solution deposition
 - Chemical vapor deposition
 - Plating
 - Physical deposition
 - Dip coating
 - Langmuir-Blodgett deposition
 - Physical vapor deposition
 - Spin coating
- Focused ion beam
- Glow discharge
- Heat treatment
- Ion implantation

- Isotope separation & enrichment
- Laser ablation
- Laser annealing
- Lithography
- Melt-spinning
- Metallurgical magnetohydrodynamics
- Powder metallurgy
- Precipitation
- Sintering
- Sol-gel process
- Solidification
- Sputtering
- Strain engineering
- Welding

Scanning techniques

- Atomic force microscopy
 - Magnetic force microscopy
 - Noncontact atomic force microscopy
 - Piezoresponse force microscopy
 - Tapping mode atomic force microscopy
- Scanning electron microscopy
 - Cryo-scanning electron microscopy
 - Environmental scanning electron microscopy
- Scanning probe microscopy
 - Scanning near-field optical microscopy
- Scanning tunneling microscopy
 - Annular dark-field imaging
 - Electron spin resonance scanning tunneling microscopy
 - Spin-polarized scanning tunneling microscopy
- Scanning tunneling spectroscopy

Terahertz techniques

- Terahertz sources
- Terahertz spectroscopy
 - Optical-pump terahertz-probe spectroscopy
 - Terahertz time-domain spectroscopy

Thermal techniques

- Calorimetry
 - Differential scanning calorimetry
- Differential thermal analysis
- Pyrometry
- Specific heat measurements

- Thermodilatometry
- Thermogravimetric analysis
- Thermomechanical analysis
- Thermometry
- Thermoreflectance
 - Spatial domain thermoreflectance

Transport techniques

- Deep level transient spectroscopy
- Dielectric constant measurements
- Electrical transport techniques
 - Capacitance measurements
 - Field-effect transport measurements
 - Hall bar
 - Magnetoresistance measurements
 - Magnetotransport
 - Magnetoresistance
 - Angular-dependent magnetoresistance
 - Anisotropic magnetoresistance
 - Colossal magnetoresistance
 - Giant magnetoresistance
 - Spin Hall magnetoresistance
 - Tunneling anisotropic magnetoresistance
 - Tunneling magnetoresistance
 - Resistivity measurements
- Noise measurements

X-ray techniques

- Energy spectroscopy for chemical analysis
- Energy-dispersive x-ray spectroscopy
- Hard x-ray photoelectron spectroscopy
- X-ray absorption spectroscopy
 - X-ray absorption fine structure spectroscopy
 - X-ray absorption near-edge spectroscopy
- X-ray diffraction
 - Dynamical diffraction
 - Grazing-incidence X-ray diffraction
 - X-ray diffraction topography
 - X-ray powder diffraction
- X-ray emission spectroscopy
- X-ray fluorescence holography
- X-ray holography
- X-ray imaging
- X-ray magnetic circular dichroism

- X-ray magnetic linear dichroism
- X-ray pair-distribution function analysis
- X-ray photoelectron diffraction
- X-ray photoelectron spectroscopy
- X-ray photoemission electron microscopy
- X-ray photon correlation spectroscopy
- X-ray reflectivity
- X-ray scattering
 - Coherent X-ray scattering
 - Grazing-incidence small-angle x-ray scattering
 - Inelastic X-ray scattering
 - Nonresonant inelastic x-ray scattering
 - Resonant inelastic x-ray scattering
 - Resonant elastic x-ray scattering
 - Small-angle x-ray scattering
 - X-ray diffuse scattering
 - X-ray resonant magnetic scattering
- X-ray standing waves
- X-ray thermal diffuse scattering
- X-ray tomography

[Condensed Matter, Materials & Applied Physics --- Techniques --- Theoretical & Computational Techniques]

- Artificial intelligence
 - Machine learning
 - Machine learning categories
 - Deep learning
 - Artificial neural networks
 - Convolutional neural networks
 - Dimensionality reduction
 - Reinforcement learning
 - Semi-supervised learning
 - Supervised learning
 - Unsupervised learning
 - Machine learning models
 - Artificial neural networks
 - Convolutional neural networks
 - Bayesian networks
 - Belief functions
 - Decision trees
 - Random forests
 - Genetic algorithms
 - Regression analysis

- Support-vector machines
- Training models
- Natural language processing

Band structure methods

- Bloch wave theory
- Bloch-Floquet theorem
- Crystal-field theory
- Embedded atom model
- Free-electron model
- Korringa-Kohn-Rostoker method
- Luttinger-Kohn model
- Tight-binding model
- Variational wave functional methods
- Wannier function methods
- $k \cdot p$ method

Bayesian methods

Field & string theory models & techniques

- Bosonization
- Chern-Simons gauge theory
- Classical solutions in field theory
 - Domain walls
 - Domain wall motion
 - Instantons
 - Monopoles
 - Skyrmions
 - Solitons
 - Vortices in field theory
- Conformal field theory
- Effective field theory
- Feynman diagrams
- Finite temperature field theory
- Gauge theory techniques
- Gross-Neveu model
- Large-N expansion in field theory
- Non-Abelian models
- Path integrals
- Sachdev-Ye-Kitaev model
- Sigma models
 - Nonlinear sigma model
- String theory techniques in condensed matter

First-principles calculations

Density functional theory

Density functional approximations

DFT+DMFT

DFT+U

GGA

Hybrid functionals

LDA

Meta-GGA

Pseudopotentials

Time-dependent DFT

Density functional calculations

Density functional perturbation theory

Density functional theory development

GW method

High-throughput calculations

Quantum chemistry methods

Configuration interaction

Coupled cluster

Hartree-Fock methods

Molecular orbital theory

Hierarchical equations of motion

Lattice models in condensed matter

Hubbard model

Bose-Hubbard model

Extended Hubbard model

Holstein model

Kondo lattice model

Sachdev-Ye-Kitaev model

Single impurity model

Anderson impurity model

Multichannel Anderson model

Spin lattice models

Heisenberg model

Kitaev-Heisenberg model

Ising model

Random bond Ising model

Random field Ising model

Kitaev model

Potts model

Random field spin models

Random field Ising model

- Random field XY model
- Spin chains
 - Classical spin chains
 - Quantum spin chains
- Spin ladders
- Spin-boson model
- XY model
- XYZ model
- Su-Schrieffer-Heeger model
- t-J model

Many-body techniques

Approximation methods for many-body systems

- Bethe-Salpeter equation
- Cluster expansion
- Coupled mode theory
- Discrete dipole approximation
- Gutzwiller approximation
- Perturbation theory
- Random phase approximation
- Semiclassical methods
- Semiconductor Bloch equations
- Variational approach

Density matrix methods

Diagrammatic methods

Duality

Effective mass theory

Electron-correlation calculations

Exact solutions for many-body systems

- Bethe ansatz
- Exact diagonalization

Fermi liquid theory

Green's function methods

- Coherent potential approximation
- Nonequilibrium Green's function

Landau-Ginzburg-Devonshire theory

Luttinger liquid model

Mean field theory

- Cluster methods
- Dynamical mean field theory

Non-Fermi-liquid theory

Renormalization group

- Density matrix renormalization group
- Functional renormalization group

- Matrix product states
- Numerical Renormalization Group
- Projected entangled pair states
- Tensor network renormalization
- Second quantization
- Slave bosons
- Tensor network methods
- Thomas–Fermi model
- Trial wave functions

Materials modeling

Methods in electromagnetism

- Classical electromagnetism
 - Maxwell's equations
 - Transformation optics
- Effective medium approach
- Elastic wave theory
- Electromagnetic wave theory
- Finite-difference time-domain method
- Optical conformal mapping
- Plane-wave expansion
- Rigorous coupled-wave analysis
- Transfer matrix method

Methods in magnetism

- Holstein-Primakoff method
- Landau-Ginzburg-Wilson theory
- Landau-Lifschitz-Gilbert equation
- Landau-Lifshitz model
- Micromagnetic modeling
- Schwinger boson method
- Spin wave theory
 - Linear spin wave theory
- Thiele equation

Methods in superconductivity

- BCS theory
- Bogoliubov-de Gennes equations
- Eliashberg theory
- Landau-Ginzburg theory
- London theory
- Resonating valence bond theory
- Usadel equation

Methods in transport

- Boltzmann theory
- Drude model
- Landauer formula
- S-matrix method in transport
- Time-dependent Ginzburg-Landau theory

Numerical techniques

- Data mining
- Finite-element method
- Genetic algorithms
- Molecular dynamics
 - Ab initio molecular dynamics
 - Deep potential molecular dynamics
- Monte Carlo methods
 - Entropic sampling methods
 - Heatbath algorithm
 - Hybrid Monte Carlo algorithm
 - Langevin algorithm
 - Metropolis algorithm
 - Path-integral Monte Carlo
 - Quantum Monte Carlo
 - Diffusion quantum Monte Carlo
 - Simulated annealing
- Multiscale modeling
- Phase-field modeling

Quantum master equation

Symmetries in condensed matter

- Continuous symmetries in condensed matter
 - Chiral symmetry
 - Conformal symmetry
 - Exceptional Lie algebra symmetries
 - Infinite dimensional symmetries
 - $O(N)$ symmetry
 - $SO(N)$ symmetry
 - $SU(N)$ symmetries
 - $Sl(N)$ symmetry
 - $Sp(2N)$ symmetry
 - $U(N)$ symmetry
- Discrete symmetries in condensed matter
 - C-symmetry

- Inversion symmetry
- P-symmetry
- PT-symmetry
- T-symmetry
- Z₂ symmetry
- Gauge symmetries
- Projective symmetries

[Energy Science & Technology --- Research areas]

Energy sources

Biofuels

- Algal fuel
- Biodiesel
- Bioethanol
- Biogas

Energy harvesting devices

- Piezoelectric devices
- RF energy harvesting devices
- Solar energy harvesting devices
- Thermal energy harvesting devices

Fossil fuels

Geothermal energy

- Geothermal heating
- Geothermal power

Hydroelectricity

- Hydroelectric dams
- Pumped-storage hydroelectricity
- Run-of-river hydroelectricity
- Tidal hydroelectricity

Hydrogen energy

- Hydrogen production
 - Electrolysis of water
 - Hydrogen evolution reaction
- Hydrogen storage
 - Chemical hydrogen storage
 - Compressed hydrogen
 - Liquified hydrogen
 - Physical hydrogen storage
- Hydrogen utilization
 - Hydrogen fuel cells

Nuclear power

- Fission

- Scission point
- Nuclear decay
- Nuclear fusion
 - Fusion evaporation reactions
- Ocean energy
 - Wave energy
- Photosynthesis
- Solar energy
 - Photovoltaic absorbers
 - Tandem photovoltaics
 - Thermal photovoltaics
 - Thin-film photovoltaics
 - Solar concentrators
 - Solar thermal energy
- Thermoelectrics
 - Thermoelectric cooling
 - Thermoelectric generators
 - Thermoelectric heating
- Wind energy

Sustainability

- Atmospheric science
 - Atmospheric fluid dynamics
 - Global warming
- Carbon capture & utilization
 - Alternative feedstock chemicals
 - Electrocatalysis
 - Photocatalysis
 - Carbon capture
 - Carbon sequestration
 - Geological CO₂ storage
 - Mineralogical CO₂ storage
 - Carbon-neutral fuels
- Climate research
- Energy-efficient infrastructure
 - Energy-efficient buildings
 - Energy-efficient industry
 - Energy-efficient transportation
- Geoengineering
 - Solar radiation management

Energy storage

- Batteries
 - Flow batteries

Lithium batteries

- Lithium metal batteries
- Lithium polymer batteries
- Lithium-air batteries
- Lithium-ion batteries
- Lithium-sulfur batteries

Lithium-alternative batteries

Solid-state batteries

Thermal batteries

Energy materials

Hydrogen storage materials

Photovoltaic absorbers

- Tandem photovoltaics
- Thermal photovoltaics
- Thin-film photovoltaics

Hydrogen storage

- Chemical hydrogen storage
- Compressed hydrogen
- Liquified hydrogen
- Physical hydrogen storage

Mechanical energy storage

- Compressed air energy storage
- Flywheel energy storage
- Gravity batteries
- Pumped-storage hydroelectricity

Supercapacitors

- Electrochemical pseudocapacitors
- Electrostatic double-layer capacitors
- Hybrid capacitors

Thermal energy storage

Energy utilization

Electric power transmission

- Grid modernization
- Grid stability
- Grid-integrated energy storage

Energy conversion technologies

Fuel cells

- Alkaline fuel cells
- Biofuel cells
- Hydrogen fuel cells
- Molten carbonate fuel cells
- Phosphoric acid fuel cells
- Proton-exchange membrane fuel cells

- Solid acid fuel cells
- Solid oxide fuel cells
- Energy transport
- Scaling of energy technologies

[Fluid Dynamics --- Research areas]

Acoustics

- Acoustic forces
- Acoustic measurements
 - Photoacoustics
- Acoustic metamaterials
 - Metagratings
 - Phononic crystals
- Acoustic modeling
- Acoustic signal processing & noise
- Acoustic wave phenomena
 - Acoustic vortices
- Acoustofluidics
- Aeroacoustics
- Architectural acoustics
- Bioacoustics
 - Hearing
 - Sound detection
 - Sound discrimination
 - Sound recognition
 - Sound source perception
 - Sound detection
 - Sound generation
 - Speech
 - Speech aerodynamics
 - Speech perception
 - Speech processing
 - Speech production
- Hydrodynamic noise
- Linear acoustics
- Musical acoustics
- Noise control
- Nonlinear acoustics
- Sound waves
- Topological effects in acoustic systems
- Ultrasonics
- Underwater acoustics

Aerodynamics

- Aerodynamic noise
- Flow-structure interactions
- High-speed flow

Astrophysical fluid dynamics

Biological fluid dynamics

- Bioconvection
- Flying
- Physiological flows
 - Blood flow
 - Capsule & cell dynamics
 - Flow-vessel interactions
 - Haemodynamics
 - Pulmonary fluid mechanics
- Swimming
 - Microswimmers
 - Flagella
 - Low Reynolds number swimmers
- Vascular flow

Boundary layers

- Boundary layer receptivity, stability & separation
- Compressible boundary layers
- Structure & turbulence of boundary layers

Cavitation

- Laser-induced cavitation
- Sonoluminescence

Compressible flows

- Shock waves
- Stable compressible flows

Convection

- Doubly diffusive convection
- Marangoni convection
- Plumes & thermals
- Rayleigh-Bénard convection
- Thermal convection
- Turbulent convection

Drop & bubble phenomena

- Atomization
- Boiling
- Bubble dynamics
- Drop breakup
- Drop coalescence
- Drop interactions
- Drop or bubble formation
- Electrohydrodynamic effects
- Thermocapillarity

Electrokinetic flows

Flow control

- Control theory
- Drag reduction
- Mixing enhancement

Flow instability

- Fingering instability
- Instability control
- Kelvin-Helmholtz instability
- Rayleigh-Taylor instability
- Richtmyer-Meshkov instability
- Saffman-Taylor instability
- Transition to turbulence

Flows in porous media

- Convection in porous media
- Displacement of immiscible fluids
- Imbibition & injection

Geophysical fluid dynamics

- Atmospheric fluid dynamics
- Mixing in geophysical flows
- Oceanography
 - Ocean waves
 - Sea ice
 - Surface gravity waves
- Rotating geophysical flows
- Sediment transport
- Stratified geophysical flows

Granular flows

- Granular avalanches
- Granular mixing
- Granular segregation
- Jamming

Interactions in fluids

- Fluid-particle interactions
- Interparticle interactions
- Surface tension effects

Interfacial flows

- Contact line dynamics
- Instability of free-surface flows
- Liquid bridges
- Thin fluid films
- Wetting

Laminar flows

Low Reynolds number flows

- Hele-shaw flows
- Lubrication theory
- Slender body theory
- Stokesian dynamics

Magnetohydrodynamics

- Dynamo theory
- High Hartmann number flows
- Magnetic field generation & plasma dynamo
- Magnetohydrodynamic turbulence
- Plasma stability

Microfluidics

Multiphase flows

- Alluvial dynamics
- Core-annular flows
- Evaporation
- Fluidized beds
- Particle-laden flows
- Reacting multiphase flows
- Turbulent multiphase flows

Nanofluidics

Nonlinear dynamics in fluids

- Bifurcations

- Chaos

 - Chaotic advection

 - Control & applications of chaos

 - Quantum chaos

 - Dynamical localization

 - Dynamical tunneling

 - Loschmidt echo

 - Quantum chaotic transport

 - Quantum graphs

 - Quantum scars

 - Quantum walks

 - Spatiotemporal chaos

 - Wave chaos

- Fractals

 - Multifractal systems

- Low-dimensional models

- Pattern formation

 - Chemical waves

 - Spiral & scroll waves

 - Turbulent mixing

Rarefied flows

- Kinetic theory

 - Quantum kinetic theory

 - Relativistic kinetic theory

- Noncontinuum effects

Reacting flows

- Combustion

- Detonation

- Laminar reacting flows

- Turbulent reacting flows

Rheology

- Flow boundary effects

 - Flow boundary instabilities

 - Flow confinement

 - Slip boundary effects

 - Wall slip

Shear flows

Turbulence

- Compressible turbulence
- Energy cascade
- Enstrophy
- Helicity
- Homogeneous turbulence
- Intermittency
- Isotropic turbulence
- Rotating turbulence
- Shear layer turbulence
- Stratified turbulence
- Taylor-Couette system
- Three-dimensional turbulence
- Turbulence control
- Turbulence modeling
- Turbulence simulations
- Turbulent boundary layers
- Turbulent mixing
- Two-dimensional turbulence
- Wakes & jets
- Wave-turbulence interactions
- Weak turbulence

Vortex flows

- Vortex breakdown
- Vortex dynamics
- Vortex interactions
- Vortex shedding

Waves and free surface flows

- Capillary waves
- Channel flow
- Elastic waves
- Faraday waves
- Hydrodynamic waves
- Kelvin, coastal, & edge waves
- Shear waves
- Solitary waves
- Surface gravity waves
- Vortex streets
- Wave breaking
- Wave scattering
- Wave-structure interactions

[Fluid Dynamics --- Physical systems]

Acoustic tweezers

Binary fluids

Colloids

- Charged colloids
- Colloidal crystal
- Colloidal gel
- Colloidal glass
- Ferrofluids
- Grafted colloids
- Hard sphere colloids
- Janus particles
- Magnetic colloids
- Patchy particles
- Soft colloids

Complex fluids

Drops & bubbles

- Aerosols
- Antibubbles
- Microbubbles
- Nanobubbles

Granular materials

- Dry granular materials
- Granular chains
- Granular fluids
- Granular gases
- Granular monolayers
- Granular solids
- Impact craters
- Vibrofluidized granular materials
- Wet granular materials

Magnetic fluids

Microfluidic devices

Nanofluidic devices

Non-Newtonian fluids

Polymers

- Block copolymers

- Charged polymers

- Conducting polymers

- Conjugated polymers

- Elastomers

- Liquid crystalline polymers

- Membrane structures

- Metal-organic framework

- Polyelectrolytes

- Polymer blends

- Polymer brushes

- Polymer composites

 - Polymer-nanoparticle composites

- Polymer gels

- Polymer glasses

- Polymer melts

- Polymer solutions

- Polymer suspensions

- Polymer thin films

- Polymers by architecture

 - Brush polymer

 - Comb polymers

 - Cross-linked polymers

 - Dendritic polymers

 - H-polymer

 - Linear polymer

 - Polymer networks

 - Ring polymers

 - Star polymers

- Semicrystalline polymers

- Single polymer chains

 - DNA

 - Rodlike polymer

 - Wormlike chain

- Stereochemistry

 - Atactic polymers

 - Eutactic polymers

 - Isotactic polymers

 - Syndiotactic polymers

Thermosetting polymers

Porous media

Suspensions

[Fluid Dynamics --- Properties]

Buoyancy

Rheological properties

Shear thickening

Shear thinning

Viscoelasticity

Viscoplasticity

Viscosity

[Fluid Dynamics --- Techniques --- Computational Techniques]

Artificial intelligence

Machine learning

Machine learning categories

Deep learning

Artificial neural networks

Convolutional neural networks

Dimensionality reduction

Reinforcement learning

Semi-supervised learning

Supervised learning

Unsupervised learning

Machine learning models

Artificial neural networks

Convolutional neural networks

Bayesian networks

Belief functions

Decision trees

Random forests

Genetic algorithms

Regression analysis

Support-vector machines

Training models

Natural language processing

Boundary element method

Direct numerical simulations

Immersed boundary methods

Lagrangian particle tracking

Large eddy simulations

Lattice-Boltzmann methods

Volume of fluid method

[Fluid Dynamics --- Techniques --- Experimental Techniques]

Hele-Shaw cell

Hot-wire anemometry

Lagrangian particle tracking

Rheology techniques

 Microrheology

 Viscometers

[Fluid Dynamics --- Techniques --- Theoretical Techniques]

Euler equation

Eulerian flow field

Lagrangian flow field

Navier-Stokes equation

Reynolds-averaged Navier Stokes

Stokes equations

[Gravitation, Cosmology & Astrophysics --- Research areas]

Cosmic rays & astroparticles

- Cosmic ray acceleration
- Cosmic ray composition & spectra
- Cosmic ray propagation
- Cosmic ray sources
- Extrasolar neutrino astronomy
- Particle dark matter
 - Dark matter direct detection
- Solar neutrinos

Cosmology

- Anthropic considerations
- Baryogenesis & leptogenesis
- Baryon acoustic oscillations
- Big bang nucleosynthesis
- Cosmic microwave background
- Cosmic strings & domain walls
- Cosmological parameters
- Dark energy
 - Cosmological constant
- Dark matter
 - Massive compact halo objects
 - Particle dark matter
 - Dark matter direct detection
- Evolution of the Universe
 - Astrochemistry
- Inflation
- Large scale structure of the Universe
- Primordial magnetic fields
- Quantum cosmology
- Relativistic aspects of cosmology

Electromagnetic radiation astronomy

- Gamma ray astronomy
- Gravitational lenses
- Optical, UV, & IR astronomy
- Radio, microwave, & sub-mm astronomy
 - Cosmic microwave background
- Sky surveys
- X ray astronomy

Formation & evolution of stars & galaxies

Global Positioning System

Gravitation

- Alternative gravity theories

- Experimental studies of gravity

 - Astrophysical studies of gravity

 - Laboratory studies of gravity

- General relativity

 - Classical black holes

 - Fluid-gravity correspondence

 - Fluids & classical fields in curved spacetime

 - General relativity equations & solutions

 - General relativity formalism

 - Quantum fields in curved spacetime

 - Unruh effect

 - Singularities In general relativity

 - Spacetime topology & causal structure

 - Special relativity

- Gravitational waves

 - Gravitational wave detection

 - Gravitational wave sources

- Gravity in dimensions other than four

- Quantum gravity

 - Canonical quantum gravity

 - Loop quantum gravity

 - Quantum aspects of black holes

- Supergravity

Hydrostatic stellar nucleosynthesis

- H & He burning

- s process

Transient & explosive astronomical phenomena

- Gamma ray bursts

- Neutron star cooling

- Novae & supernovae

- Nucleosynthesis in explosive environments

 - Explosive burning

 - r process

 - rp process

- X ray bursts

[Gravitation, Cosmology & Astrophysics --- Physical systems]

Astronomical black holes

Primordial black holes

Galaxies

Active & peculiar galaxies

Astrophysical jets

Galactic disks

Galactic halos

Galactic nuclei & quasars

Intergalactic medium

Interstellar medium

Normal galaxies

Milky Way

Supernova remnants

Galaxy clusters

Globular clusters

Large scale structure of the Universe

Planets & planetary systems

Asteroids, meteors, & meteorites

Extrasolar planets

Fluid planets

Planetary satellites & rings

Moon

Solar system & its planets

Solid-surface planets

Stars

Binary stars

Neutron stars & pulsars

Neutron star crust

Normal stars

Sun

Pre-main-sequence stars

Variable & peculiar stars

[Gravitation, Cosmology & Astrophysics --- Properties]

Astronomical masses & mass distributions

Astrophysical electromagnetic fields

Composition of astronomical objects

Distances, redshifts, & velocities

[Gravitation, Cosmology & Astrophysics --- Techniques --- Computational Techniques]

Numerical simulations in gravitation & astrophysics

 Astrophysical & cosmological simulations

 Numerical relativity

[Gravitation, Cosmology & Astrophysics --- Techniques --- Experimental Techniques]

Cosmic ray & astroparticle detectors

 Dark matter detectors

Gravitational wave detectors

Telescopes

[Interdisciplinary Physics --- Research areas]

Chemical Physics & Physical Chemistry

 Analytical chemistry

 Chemical separation

 Biochemistry

 Chemical kinetics, dynamics & catalysis

 Chemical reactions

 Chemical charge transfer

 Electrochemistry

 Inorganic chemistry

 Organic & organometallic chemistry

 Photochemistry

 Photocatalysis

 Reactions at surfaces & chemisorption

 Solid-state chemistry

 Solvation

 Thermodynamics

- Interface & surface thermodynamics
- Nonequilibrium & irreversible thermodynamics
 - Entropy production
 - Macroscopic fluctuation theory
- Quantum thermodynamics
 - Information thermodynamics
- Stochastic thermodynamics
- Thermodynamics of computation
- Thermodynamics of mixing
- Ultracold chemistry

Complex systems

- Patterns in complex systems
 - Image processing
- Scaling laws of complex systems

Engineering

Environmental research

- Climate research

Geophysics

- Atmospheric science
 - Atmospheric fluid dynamics
 - Global warming
- Geomagnetism
- Geophysical fluid dynamics
 - Atmospheric fluid dynamics
 - Mixing in geophysical flows
- Oceanography
 - Ocean waves
 - Sea ice
 - Surface gravity waves
- Rotating geophysical flows
- Sediment transport
- Stratified geophysical flows

Geophysical networks

- Climate networks
- River networks

Materials

- Earth's interior
- Rocks

Oceanography

- Ocean waves

- Sea ice
- Surface gravity waves
- Seismology
 - Earthquakes
 - Earthquake detection & measurement
 - Earthquake statistics & scaling
- Space science

Global Positioning System

History of physics

Information & communication theory

- Analog computation
 - Neuromorphic computing
- Communication measures
- Communication schemes
- Computational complexity
- Physics of computation
- Probabilistic computing
- Shannon entropy

Mathematical physics

- Inverse problems

Metrology

- Adaptive methods
- Determination of fundamental constants
- Magnetometry
- Time & frequency standards

Physics & society

- Advocacy
- Diversity
- Governance

Transportation research

Social systems

- Econophysics

[Networks --- Research areas]

Biological neural networks

- Connectome
- Learning
- Memory
- Neuronal network activity
 - Inhibitory synapses
 - Neuronal avalanches
 - Spiking neurons

Collective behavior in networks

Network evolution

- Competition
- Fitness
- Preferential attachment

Network formation & growth

Network optimization

- Network flow optimization
- Preferential attachment

Network phase transitions

- Continuous phase transition
- Discontinuous phase transition
- Percolation phase transition
 - Continuous percolation transition
 - Discontinuous percolation transition
- Synchronization transition
- Topological phase transition

Network searches

- Exhaustive network search
- Guided network search
- Network navigation

Network stability

- Attacks on networks
 - Random attacks
 - Targeted attacks
- Cascades
- Network resilience
- Robustness

Network structure

- Clustering

- Community structure

- Cycles

- Degree correlations

- Degree distributions

Spreading

- Epidemic

 - Epidemic evolution

 - Epidemic growth

 - Epidemic prevalence

- Rumor

 - Rumor evolution

 - Rumor growth

 - Rumor prevalence

Synchronization

- Chimera states

Traffic

- Transportation

Transport in networks

- Network diffusion

- Network flow

[Networks --- Physical systems]

Artificial neural networks

- Convolutional neural networks

Bayesian networks

Bipartite graphs

Boolean networks

Decision trees

- Random forests

Deterministic networks

Directed networks

Evolving networks

Exponential networks

Homogeneous networks

- Lattices

- Poisson degree distribution networks

Interconnected & interdependent networks

Multilayer & multiplex networks

Quantum complex networks

Real world networks

- Biological networks

 - Biological neural networks

 - Connectome

 - Learning

 - Memory

 - Neuronal network activity

 - Inhibitory synapses

 - Neuronal avalanches

 - Spiking neurons

 - Brain network

 - Cardiovascular networks

 - Cortical networks

 - Gene regulatory networks

 - Protein interaction networks

 - Signaling networks

 - Stem cell networks

- Chemical networks

- Ecological networks

 - Food webs

- Financial networks

 - Trade networks

- Geophysical networks

 - Climate networks

 - River networks

- Social networks

 - Language networks

 - Online social networks

Technological networks

Communication networks

Quantum networks

Satellite communication networks

Wireless communication networks

Internet

Power grid networks

World wide web

Transportation networks

Flight networks

Road networks

Scale free & inhomogeneous networks

Barabasi-Albert network

Small-world networks

Watts-Strogatz network

Stochastic networks

Erdos-Renyi graph

Random graphs

Support-vector machines

Tree network

Triangular network

Uncorrelated network

Weighted networks

[Networks --- Techniques --- Computational Techniques]

Monte Carlo methods

Entropic sampling methods

Heatbath algorithm

Hybrid Monte Carlo algorithm

Langevin algorithm

Metropolis algorithm

Path-integral Monte Carlo

Quantum Monte Carlo

Diffusion quantum Monte Carlo

Simulated annealing

[Networks --- Techniques --- Experimental Techniques]

Biological network methods

- In-vitro methods

- In-vivo methods

Neuroimaging

- Electroencephalography

- Functional magnetic resonance imaging

- Magnetic resonance imaging

[Networks --- Techniques --- Theoretical Techniques]

Critical phenomena

- Critical exponents

- Critical field

- Dynamic critical phenomena

Diffusion & random walks

Ising model

- Random bond Ising model

- Random field Ising model

Monte Carlo methods

- Entropic sampling methods

- Heatbath algorithm

- Hybrid Monte Carlo algorithm

- Langevin algorithm

- Metropolis algorithm

- Path-integral Monte Carlo

- Quantum Monte Carlo

 - Diffusion quantum Monte Carlo

- Simulated annealing

Network Models

- Barabasi-Albert model

- Collective behavior models

 - Consensus & non-consensus models

 - Decision making models

- Game theory models
 - Prisoner's Dilemma
 - Threshold & cascade models
 - Voter model

- Evolving network models
- Fitness models
- Preferential attachment models
- Price's model
- Small-world model
- Vertex copying models
- Watts-Strogatz model

Networks Analysis Tools

- Block models
- Network inference
- Neuronal network models
 - Compartmental model
 - Hodgkin-Huxley model
 - Hopfield model
 - Integrate-and-fire model
 - Exponential integrate-and-fire model
 - Leaky integrate-and-fire model
 - Spiking neuron models
 - Synaptic transmission model
- Phase oscillator models
 - Kuramoto model
- Spreading models
 - SIR model
 - SIRS model
 - SIS model
 - Epidemic spreading
 - Rumor spreading

Topological tools

- Assortativity
- Betweenness
- Centrality
- Clustering coefficient & triangles
- Community detection algorithms
 - Evolving communities
 - Non-overlapping communities
 - Overlapping communities
- Cycles
- Degree distributions
- Paths

Percolation theory

- Correlated percolation

- Explosive percolation

- Uncorrelated percolation

Potts model

Renormalization

Self-organized criticality

Self-similarity

XY model

[Nonlinear Dynamics --- Research areas]

Bifurcations

Chaos

- Chaotic advection

- Control & applications of chaos

- Quantum chaos

 - Dynamical localization

 - Dynamical tunneling

 - Loschmidt echo

 - Quantum chaotic transport

 - Quantum graphs

 - Quantum scars

 - Quantum walks

- Spatiotemporal chaos

- Wave chaos

Classical mechanics

- Continuum mechanics

- Lagrangian dynamics

Dynamics of networks

- Neuronal dynamics

Pattern formation

- Chemical waves

Spiral & scroll waves
Turbulent mixing

Population dynamics

Synchronization
Chimera states

[Nonlinear Dynamics --- Physical systems]

Coupled oscillators

Dynamical systems

Chaotic systems
 Billiards
Coherent structures
Collective dynamics
Floquet systems
High dimensional systems
Multiple time scale dynamics
Nonlinear time-delay systems
Sine-Gordon equation
Stochastic dynamical systems

Hamiltonian systems

Nonlinear waves

Breathers
Front propagation
Solitons
Traveling waves

Population dynamics

Quantum chaotic systems

Quantum billiards
Quantum kicked rotor
Quantum ratchets

Reaction diffusion systems

[Nonlinear Dynamics --- Techniques --- Theoretical Techniques]

Extreme event statistics

First passage problems

Pattern formation

Chemical waves

Spiral & scroll waves

Turbulent mixing

Phase space methods

Random matrix theory

Semiclassical methods

Time series analysis

[Nuclear Physics --- Research areas]

Nuclear astrophysics

Hydrostatic stellar nucleosynthesis

H & He burning

s process

Nuclear matter in neutron stars

Nuclear physics of explosive environments

Nucleosynthesis in explosive environments

Explosive burning

r process

rp process

Solar neutrinos

Nuclear structure & decays

Alpha decay

Beta decay

Double beta decay

Neutrinoless double beta decay

Binding energy & masses

Charge distributions (defunct)

Collective levels

Coulomb energies & analogue states

Electromagnetic transitions

Electron & muon capture

Electroweak interactions in nuclear physics

- Energy levels
- Few-body systems
 - Efimov states
- Giant resonances
- Heavy-particle decays
- High spin states
- Hypernuclei & mesic nuclei
- Isomer decays
- Level densities
- Lifetimes & widths
 - Lifetime of molecular or ionic species
- Neutron decay time
- Neutron skin thickness
- Nuclear binding
- Nuclear charge distribution
 - Nuclear charge radii
- Nuclear forces
- Nuclear matter
 - Asymmetric nuclear matter
 - Equations of state of nuclear matter
 - Symmetry energy
- Nuclear radii
- Nuclear shapes and moments
- Nuclear spin & parity
- Nucleon distribution
- Nucleon-nucleon interactions
- Nucleus-neutrino interactions
- Proton emission
- Rare & new isotopes
- Spectroscopic factors & electromagnetic moments

Strong interaction

- Color confinement
- Multiquark bound states
- Quantum chromodynamics
 - Chiral perturbation theory
 - Generalized parton distributions
 - Heavy quark effective theory
 - Lattice QCD
 - Nonrelativistic QCD
 - Parton distribution functions
 - Fragmentation functions
 - Spin-dependent parton distribution functions
 - Transverse momentum dependent distribution

- Perturbative QCD

- QCD phenomenology

- Quark & gluon jets

- Quark matter

- Quark model

- Quark-gluon plasma

- Nuclear engineering

- Isotope separation & enrichment

- Neutron physics

- Nuclear explosions

- Nuclear reactors

- Radioactive waste

- Reactor fuels & coolants

- Reactor instrumentation

- Theory, design & simulation of reactors

- Nuclear tests of fundamental interactions

- Synthesis of new superheavy elements

- Nuclear reactions

- Breakup reactions

- Charge-exchange reactions

- Coulomb dissociation

- Coulomb excitation

- Direct reactions

- Elastic scattering reactions

- Electron-ion collisions

- Fission

- Scission point

- Gamma-ray strength functions

- H & He induced nuclear reactions

- Inelastic scattering reactions

- Lepton induced nuclear reactions

- Low & intermediate energy heavy-ion reactions

- Heavy-ion reaction mechanisms

- Meson & hyperon induced nuclear reactions

- Models & methods for nuclear reactions

- Nuclear fragmentation

- Nuclear fusion

- Fusion evaporation reactions

- Nuclear reaction rates

- Nuclear transition rates

- Nucleon induced nuclear reactions
- Photonuclear reactions
- Polarization phenomena
- QCD in nuclear reactions
- Radiative capture
- Resonance reactions
- S-factor
- Statistical phenomena & chaos
- Transfer reactions
 - Knockout reactions
- Unstable nuclei induced nuclear reactions
 - Shape coexistence
 - Shape development

- Relativistic heavy-ion collisions
 - Charged-particle multiplicity
 - Collective flow
 - Hard scattering
 - Jet quenching
 - Jets & heavy flavor physics
 - Particle & resonance production
 - Particle correlations & fluctuations
 - Photon, lepton & quark production
 - QCD phase transitions
 - Color deconfinement
 - Quark-gluon plasma
 - Transport in heavy-ion collisions
 - Ion-induced tracks

[Nuclear Physics --- Properties]

Multipole matrix elements

Nuclear mass ranges

- $150 \leq A \leq 189$
- $190 \leq A \leq 219$
- $20 \leq A \leq 38$
- $39 \leq A \leq 58$
- $59 \leq A \leq 89$
- $6 \leq A \leq 19$
- $90 \leq A \leq 149$
- $A \leq 5$
- $A \geq 220$

Parity

Spin

Nucleon spin structure

Helicity distribution functions

Transversity distribution functions

[Nuclear Physics --- Techniques --- Experimental Techniques]

Nuclear data analysis & compilation

Particle sources & targets

Radiation detectors

Radioactive beams

Spectrometers & spectroscopic techniques

[Nuclear Physics --- Techniques --- Theoretical Techniques]

Ab initio calculations

Cluster models

Collective models

Hydrodynamic models

Hyperspherical method

Lattice gauge theory

Models based on symmetries

Monte Carlo methods

Entropic sampling methods

Heatbath algorithm

Hybrid Monte Carlo algorithm

Langevin algorithm

Metropolis algorithm

- Path-integral Monte Carlo
- Quantum Monte Carlo
 - Diffusion quantum Monte Carlo
- Simulated annealing

Nuclear density functional theory

Nuclear many-body theory

Optical, coupled-channel & distorted wave models

Random matrix theory

Shell model

Thermal & statistical models

[Particles & Fields --- Research areas]

Electroweak interaction

- Cabibbo–Kobayashi–Maskawa matrix
- Electroweak phase transition
- Electroweak radiative corrections
- Electroweak symmetry breaking
- Hierarchy problem
- Quantum electrodynamics
- Vacuum stability

Hypothetical particle physics models

- Composite models
- Dynamical symmetry breaking models
- Extensions of Higgs sector
- Extensions of fermion sector
- Extensions of gauge sector
- Extensions of scalar sector
- Grand unified models
- Supersymmetric models

Naturalness

Particle astrophysics

- Baryogenesis & leptogenesis
- Cosmic strings & domain walls

Particle dark matter

- Dark matter direct detection

Particle phenomena

Particle decays

- Branching fraction
- Hadronic decays
- Invisible decays
- Leptonic, semileptonic & radiative decays
- Rare decays

Particle detection signatures

- Signatures with Higgs bosons
- Signatures with W or Z bosons
- Signatures with bottom quarks
- Signatures with jets
- Signatures with light leptons
- Signatures with missing energy
- Signatures with new bosons
- Signatures with new fermions
- Signatures with photons
- Signatures with specific particles
- Signatures with tau leptons
- Signatures with top quarks

Particle interactions

- Deep inelastic scattering
- Flavor changing neutral currents
- Hadron-hadron interactions
- Lepton-hadron interactions
- Lepton-lepton interactions
- Neutrino interactions
 - Neutrinoless double beta decay
 - Nucleus-neutrino interactions
- Photon & charged-lepton interactions with hadrons
- Polarization in interactions & scattering
- Yukawa coupling

Particle mixing & oscillations

- Hadron mixing
- Neutrino mixing
- Neutrino oscillations
 - Atmospheric neutrino oscillations
 - Seesaw mechanism
- Quark mixing

Particle production

- Bottom quark production

- Diffractive production
- Fragmentation into hadrons
- Hadron production
- Hypothetical particle production
- Lepton production
- Photon production
- Quark & gluon jets
- Top quark production
- Weak boson production

Phase shift

Phenomenology

Quantum field theory

- Anomalies
- Bethe-Salpeter equation
- Bosonization
- Bound states
 - Bound states in the continuum
- Casimir effect
- Classical solutions in field theory
 - Domain walls
 - Domain wall motion
 - Instantons
 - Monopoles
 - Skyrmions
 - Solitons
 - Vortices in field theory
- Conformal field theory
- Dirac equation
- Dualities in field theory
- Effective field theory
- Entanglement in field theory
- Feynman diagrams
- Finite temperature field theory
- Gauge theories
 - Chern-Simons gauge theory
 - Lattice gauge theory
 - Non-Abelian gauge theories
- Higher-dimensional field theories
- Integrability in field theory
- Large-N expansion in field theory
- Lattice field theory

- Lower-dimensional field theories
- Noncommutative field theories
- Nonperturbative effects in field theory
- Path integrals
- Perturbation theory
- Quantum fields in curved spacetime
 - Unruh effect
- Quantum master equation
- Renormalization
- Renormalization group
 - Density matrix renormalization group
 - Functional renormalization group
 - Matrix product states
 - Numerical Renormalization Group
 - Projected entangled pair states
 - Tensor network renormalization
- Resummation methods
- Scattering amplitudes
- Schwinger effect
- Schwinger-Dyson equations
- Sigma models
 - Nonlinear sigma model
- Spontaneous symmetry breaking
- Statistical field theory
- Supersymmetric field theories
- Topological field theories

Strings & branes

- Braneworlds
- Compactification
- Gauge-gravity dualities
- M-theory
- String dualities
- String phenomenology

Strong interaction

- Color confinement
- Multiquark bound states
- Quantum chromodynamics
 - Chiral perturbation theory
 - Generalized parton distributions
 - Heavy quark effective theory
 - Lattice QCD
 - Nonrelativistic QCD

- Parton distribution functions
 - Fragmentation functions
 - Spin-dependent parton distribution functions
 - Transverse momentum dependent distribution

- Perturbative QCD
 - QCD phenomenology

- Quark & gluon jets
- Quark matter
- Quark model
- Quark-gluon plasma

Sum rules

Total cross sections

[Particles & Fields --- Physical systems]

Gauge bosons

- Gluons
- Hypothetical gauge bosons
- Photons
- W & Z bosons

Hadrons

- Baryons
 - Antiprotons
 - Exotic baryons
 - Heavy baryons
 - Bottom baryons
 - Charmed baryons
 - Hyperons
 - Neutrons
 - Nucleons
 - Protons

Mesons

- Exotic mesons
 - Glueballs
 - Hybrid mesons
- Heavy mesons
 - Bottom mesons
 - Charmed mesons
- Light mesons
 - Kaons

Pions
Vector mesons
Quarkonia

Higgs bosons

Hypothetical particles

Axion-like particles
Axions
Gravitons
Heavy neutrinos
Hypothetical fermions
Hypothetical gauge bosons
Hypothetical scalars
Leptoquarks
Magnetic monopoles
Majorana neutrinos
Sterile neutrinos
Superpartners
Weakly interacting massive particles

Leptons

Electrons
Muons
Neutrinos
Positrons
Tau leptons

Quarks

Bottom quark
Charm quark
Down quark
Light quarks
Strange quark
Top quark
Up quark

[Particles & Fields --- Properties]

Particle properties

Angular momentum
Electric moment
Form factors

- Gyromagnetic ratio
- Lifetimes & widths
 - Lifetime of molecular or ionic species
- Magnetic moment
- Mass
 - Neutrino mass
 - Friedberg-Lee neutrino mass model
 - Radiative neutrino mass models
- Parity
- Polarization
- Spin
 - Nucleon spin structure
 - Helicity distribution functions
 - Transversity distribution functions

Symmetries

- Continuous symmetries
 - Baryon & lepton number symmetries
 - Chiral symmetry
 - Conformal symmetry
 - Infinite-dimensional symmetries
 - Quantum group symmetries
- Discrete symmetries
 - C-symmetry
 - CP symmetry
 - CP violation
 - CPT symmetry
 - Isospin violation
 - P-symmetry
 - PT-symmetry
 - T-symmetry
- Flavor symmetries
- Spacetime symmetries
 - Conformal symmetry
 - Killing symmetry
 - Lorentz symmetry
- Supersymmetry

[Particles & Fields --- Techniques --- Computational Techniques]

Lattice field theory

Monte Carlo methods

- Entropic sampling methods
- Heatbath algorithm
- Hybrid Monte Carlo algorithm
- Langevin algorithm
- Metropolis algorithm
- Path-integral Monte Carlo
- Quantum Monte Carlo
 - Diffusion quantum Monte Carlo
- Simulated annealing

Truncated conformal space approach

[Particles & Fields --- Techniques --- Experimental Techniques]

- Particle accelerators
 - Hadron colliders
 - Lepton colliders
 - Lepton-hadron colliders

Particle beams

- Particle data analysis
 - Artificial intelligence
 - Machine learning
 - Machine learning categories
 - Deep learning
 - Artificial neural networks
 - Convolutional neural networks
 - Dimensionality reduction
 - Reinforcement learning
 - Semi-supervised learning
 - Supervised learning
 - Unsupervised learning
 - Machine learning models
 - Artificial neural networks
 - Convolutional neural networks
 - Bayesian networks
 - Belief functions
 - Decision trees
 - Random forests
 - Genetic algorithms
 - Regression analysis
 - Support-vector machines

- Training models
 - Natural language processing
- Artificial neural networks
 - Convolutional neural networks
- Bayesian methods
- Grid computing

- Particle detectors
 - Calorimeters
 - Electromagnetic calorimeters
 - Hadronic calorimeters
 - Cherenkov detectors
 - Cosmic ray & astroparticle detectors
 - Dark matter detectors
 - Gaseous detectors
 - Multi-wire proportional & drift chambers
 - Time-projection chambers
 - Multi-purpose particle detectors
 - Neutrino detection
 - Scintillators
 - Solid-state detectors

- Precision measurements

[Particles & Fields --- Techniques --- Theoretical Techniques]

- Mathematical physics methods
 - Ab initio calculations
 - Abstract algebra
 - Differential equations
 - Functional analytical methods
 - Geometry
 - Noncommutative geometry
 - Graph theory
 - Group theory
 - Integral equations
 - Probability theory
 - Real & complex analysis
 - Stochastic processes & statistics
 - Topology

- Monte Carlo methods
 - Entropic sampling methods

- Heatbath algorithm
- Hybrid Monte Carlo algorithm
- Langevin algorithm
- Metropolis algorithm
- Path-integral Monte Carlo
- Quantum Monte Carlo
 - Diffusion quantum Monte Carlo
- Simulated annealing

[Physics of Living Systems --- Research areas]

Biomolecular & subcellular processes

- Biomolecular processes
 - Adsorbed biomolecules
 - Bioenergetics
 - Quantum effects in biological systems
 - Biomechanics
 - Biomolecular diffusion
 - Biomolecular dynamics
 - Conformation changes
 - Fluctuations
 - Equilibrium fluctuations
 - Nonequilibrium fluctuations
 - Folding
 - DNA folding
 - DNA origami
 - Protein folding
 - Protein folding pathways
 - RNA folding
 - Protein targeting
 - Replication
 - Transcription
 - Translation
 - Translocation
 - Protein translocation
 - Unfolding
 - DNA unfolding
 - Protein unfolding
 - RNA unfolding
 - Biomolecular interactions
 - DNA-protein interactions
 - Protein-ligand interactions
 - Protein-membrane interactions

- Protein-protein interactions
- Protein-solvent interactions
- RNA-protein interactions
- Biomolecular optics
 - Bioluminescence
 - Fluorescent biomolecules
 - Iridescence
- Biomolecular self-assembly
 - Aggregation
 - Crystallization
 - Fibril formation
- Biomolecular structure
 - Bimolecular conformation
 - Protein structure
 - RNA structure
 - Secondary structure
 - Tertiary structure
- Biomolecule manipulation
- Biosensing
 - Bioacoustics
 - Hearing
 - Sound detection
 - Sound discrimination
 - Sound recognition
 - Sound source perception
 - Sound detection
 - Sound generation
 - Speech
 - Speech aerodynamics
 - Speech perception
 - Speech processing
 - Speech production
 - Vision
 - Binocular vision
 - Color detection
 - Light detection
 - Motion detection
 - Vision defects
 - Astigmatism
 - Color blindness
 - Hyperopia
 - Myopia
- Electrophoresis
- Genome organization

Nucleic acid replication & information processes

- Epigenetics
- Gene expression
- Gene recombination
- Gene repair

Protein dynamics, structure & function

- Protein folding
 - Protein folding pathways
- Protein structure
- Protein structure prediction
- Protein unfolding

Subcellular processes & properties (defunct)

Virology & self-assembly

Cellular organization, physiology & dynamics

Biological fluid dynamics

- Bioconvection
- Flying
- Physiological flows
 - Blood flow
 - Capsule & cell dynamics
 - Flow-vessel interactions
 - Haemodynamics
 - Pulmonary fluid mechanics
- Swimming
 - Microswimmers
 - Flagella
 - Low Reynolds number swimmers
- Vascular flow

Mechanobiology

- Mechanotransduction

Molecular networks

Omics

- Genomics
 - Transposable elements
 - Transposases
 - Transposon activity
- Metabolomics
- Metagenomics
- Phenomics
- Proteomics
- Transcriptomics

Phase transitions in biological systems

- Mechanisms of phase transition regulation & control in biology

Phase transitions in cellular systems

Phase transitions in protein & nucleic acid assemblies

Processes in cells, tissues & organoids

Calcium signaling

Cell adhesion

Cell aggregation

Cell assembly

Cell communication

Cell division

Meiosis

Cell fusion

Cell growth

Cell locomotion

Cell mechanics

Cell membrane transport

Cell migration

Cell polarity

Cell signaling

Cellular bilayers

Chemotaxis

Compartmentalization

Endocytosis

Exocytosis

Force sensing

Intracellular signalling

Intracellular trafficking

Intracellular transport

Membranes

Electrical properties of membranes

Mechanical properties of membranes

Membrane assembly

Membrane dynamics

Membrane fluctuations

Membrane formation

Membrane structure

Mitosis

Osmosis

Vesicles

Medical physics & public health

Diseases, physiology & pathology

Cancer

Degenerative diseases

Dementia

Developmental diseases

Epilepsy

Genetic diseases

Heart diseases

Immune system diseases

Motor system diseases

Pathogenic infections

Bacterial infections

Parasitic diseases

Prion diseases

Viral diseases

Stroke

Epidemiology, prevention & mitigation of disease spreading

Imaging & diagnostics

Medical imaging

Electroencephalography

Mammography

Digital mammography

Film mammography

Medical X-ray imaging

Angiography

Bone densitometry

Fluoroscopy

Radiography

Medical image processing

Medical image quality

Medical imaging safety

Medical magnetic resonance imaging

Neuronal imaging

Nuclear medicine imaging

Positron emission tomography

Radiopharmaceuticals

Single photon emission computed tomography

Pathology (defunct)

Therapeutics

Chemotherapy

Dialysis

Dosimetry

Drug delivery

Electromagnetic therapy

Light therapy

Medical devices

Molecular design

Plasma medicine

Proton therapy
Radiation therapy

Neuroscience, neural computation & artificial intelligence

Biological information processing

Neural information

Biological neural networks

Connectome

Learning

Memory

Neuronal network activity

Inhibitory synapses

Neuronal avalanches

Spiking neurons

Embodiment

Neural basis of learning & memory

Action potential propagation

Neural encoding

Neuroplasticity

Synapses

Neural mechanisms of decision making

Sensory processes

Hearing

Sound detection

Sound discrimination

Sound recognition

Sound source perception

Olfaction

Touch

Vision

Binocular vision

Color detection

Light detection

Motion detection

Vision defects

Astigmatism

Color blindness

Hyperopia

Myopia

Organismal, population, evolutionary & ecological systems

Animal behavior, social interactions & emergent phenomena

Social system dynamics

Biological optics (defunct)

Developmental biology

- Cell division

 - Meiosis

- Developmental pattern formation

- Embryonic development

 - Axis specification (defunct)

 - Signal transduction

- Invertebrate development

- Limb development

- Morphogenesis

- Plant development

- Regeneration

- Vertebrate development

Diseases (defunct)

Ecological phenomena

- Ecological pattern formation

- Ecological population dynamics

 - Biological aging

 - Survival strategies

- Marine ecology

- Plant ecology

Emergent biological functions from complex interactions

- Biological movement

 - Kinesiology

 - Locomotion

- Biological self-organization

- Cardiac dynamics

- Circadian rhythms

- Collective behavior

 - Clustering

 - Emergence of patterns

 - Flocking

 - Foraging

 - Jamming

 - Swarming

Evolutionary & population dynamics

- Phylogenetics reconstruction

- Population genetics

 - Mutation

- Theoretical evolution

Learning & adaptation without a brain

- Adaptive immunity

- Bacterial communities

- Host-pathogen interactions

Living matter & active matter

Active gels

- Active nematic gels

- Active polar gels

- Active liquid films

- Active nematics

- Active defects

- Lyotropic active nematics

- Dry active matter

- Self-propelled particles

- Active Brownian particles

- Self-propelled janus particles

- Molecular evolution

[Physics of Living Systems --- Physical systems]

Biological networks

- Biological neural networks

- Connectome

- Learning

- Memory

- Neuronal network activity

- Inhibitory synapses

- Neuronal avalanches

- Spiking neurons

- Brain network

- Cardiovascular networks

- Cortical networks

- Gene regulatory networks

- Protein interaction networks

- Signaling networks

- Stem cell networks

Biomolecules

- Carbohydrates

- Chromatin

- Enzymes

- ATP

- Hormones

- Lipids

- Nucleic acids

- DNA

- RNA

Peptides

Proteins

Actin

Collagen

Motor proteins

Cytoskeletal motor proteins

Dynein

Kinesin

Myosin

Photosystems

Tubulin

Viruses

Body & organ systems

Auditory system

Ear

Cochlea

Circulatory system

Endocrine system

Immune system

Motor system

Nervous system

Reproductive system

Skeletal system

Vascular system

Visual system

Cells

Blood

Blood plasma

Platelets

Red blood cells

White blood cells

Cell junctions

Epithelial cells

Extracellular matrix

Glial cells

Nerve cells

Axons

Spermatozoa

Stem cells

Genomes

Genes

- Promoters
- Repeat sequences

Microbial multicellular systems

- Biofilms
- Microbial mats

Multi-organism systems

- Ecologies
- Flocks
- Populations

Organisms

- Archea
- Bacteria
 - Flagella
- Birds
- Fish
- Insects
- Mammals
- Microswimmers
 - Flagella
 - Low Reynolds number swimmers
- Plants
- Viruses

Organs

- Brain
- Ear
 - Cochlea
- Eye
 - Retina
- Heart
- Larynx
- Leaves

Subcellular structures

- Cell membrane
- Cell nucleus
- Cell wall
- Cellular compartments
- Chloroplasts
- Chromosomes
- Cilia

- Cytoskeleton
 - Filaments
 - Flagella
 - Histones
- Membrane structures
 - Micelles
 - Cylindrical micelles
 - Disk micelles
 - Spherical micelles
 - Microtubules
- Mitochondria
- Organelle
- Pseudopods
- Vesicle structures
 - Giant vesicles
 - Unilamellar vesicles

- Tissues
 - Epidermis
 - Mesenchyme
 - Muscle
 - Retina

- Tumors

[Physics of Living Systems --- Techniques --- Computational Techniques]

- Bioinformatics
 - Sequencing analysis

- Cellular automata

- Coarse graining

- Finite-element method

- First-principles calculations
 - Density functional theory
 - Density functional approximations
 - DFT+DMFT
 - DFT+U
 - GGA
 - Hybrid functionals

LDA

Meta-GGA

Pseudopotentials

Time-dependent DFT

Density functional calculations

Density functional perturbation theory

Density functional theory development

GW method

High-throughput calculations

Quantum chemistry methods

Configuration interaction

Coupled cluster

Hartree-Fock methods

Molecular orbital theory

Lattice-Boltzmann methods

Molecular dynamics

Ab initio molecular dynamics

Deep potential molecular dynamics

Monte Carlo methods

Entropic sampling methods

Heatbath algorithm

Hybrid Monte Carlo algorithm

Langevin algorithm

Metropolis algorithm

Path-integral Monte Carlo

Quantum Monte Carlo

Diffusion quantum Monte Carlo

Simulated annealing

Multiscale modeling

Phase-field modeling

[Physics of Living Systems --- Techniques --- Experimental Techniques]

Atomic techniques

Atom diffraction

Grazing-incidence fast atom diffraction

Atomic force microscopy

Magnetic force microscopy

- Noncontact atomic force microscopy
- Piezoresponse force microscopy
- Tapping mode atomic force microscopy
- Field emission & field-ion microscopy
- Ion beam analysis
 - Elastic back scattering spectroscopy
 - Elastic recoil detection
 - Nuclear reaction analysis
 - Particle-induced x-ray emission
 - Rutherford back scattering spectroscopy

Irradiation

Mass spectrometry

- Secondary ion mass spectrometry
- Time-of-flight mass spectrometry

Surface scattering

- Atom or molecule scattering from surfaces
- Ion scattering from surfaces
- Molecular scattering from surfaces

Crystallography

Electrical techniques

- Patch clamping

Electron techniques

- Andreev point contact spectroscopy
- Auger electron spectroscopy
- Electron diffraction
 - Convergent beam electron diffraction
 - Low-energy electron diffraction
 - Current-voltage low-energy electron diffraction
 - Spot-profile analysis LEED
 - Reflection high-energy electron diffraction
- Electron energy loss spectroscopy
 - Electron magnetic circular dichroism
 - High-resolution electron energy loss spectroscopy
- Electron microscopy
 - Electron probe micro-analysis
 - High-resolution electron microscopy
 - High-resolution transmission electron microscopy
 - Lorentz microscopy
 - Low-energy electron microscopy
 - Scanning electron microscopy
 - Cryo-scanning electron microscopy

- Environmental scanning electron microscopy
- Scanning transmission electron microscopy
- Cryo-transmission electron microscopy
- Transmission electron microscopy
- Energy loss near-edge fine structure
- Inelastic electron tunneling spectroscopy

Infrared techniques

- Brewster reflection spectroscopy
- Brillouin scattering & spectroscopy
- Fourier transform infrared spectroscopy
- Infrared spectroscopy
- Raman spectroscopy
- Rayleigh scattering
- Surface differential reflectance spectroscopy
- Surface-enhanced Raman spectroscopy
- Time-resolved infrared spectroscopy

Medical imaging

- Electroencephalography
- Mammography
 - Digital mammography
 - Film mammography
- Medical X-ray imaging
 - Angiography
 - Bone densitometry
 - Fluoroscopy
 - Radiography
- Medical image processing
- Medical image quality
- Medical imaging safety
- Medical magnetic resonance imaging
- Neuronal imaging
- Nuclear medicine imaging
 - Positron emission tomography
 - Radiopharmaceuticals
 - Single photon emission computed tomography

Microwave techniques

- Coherent Raman electron spin resonance spectroscopy
- Dielectric spectroscopy
- Electron nuclear double resonance
- Electron paramagnetic resonance
- Electron spin resonance

Electron dipole spin resonance

Neutron techniques

Gamma decay

Neutron capture

Neutron diffraction

Neutron imaging

Neutron tomography

Neutron irradiation

Neutron pair-distribution function analysis

Neutron reflectometry

Neutron scattering

Inelastic neutron scattering

Quasi elastic neutron scattering

Small angle neutron scattering

Neutron spin echo spectroscopy

Spin echo small angle neutron scattering

Thermal cross-sections

Time-of-flight neutron spectroscopy

Optical techniques

Bolometers

Brillouin-Mandelstam spectroscopy

Capacitance spectroscopy

Cavity resonators

Dipole quantum emitters

Whispering gallery mode resonators

Coherent control

Confocal imaging

Electroluminescence

Ellipsometry

Fluorescence spectroscopy

Four-wave mixing

High-harmonic generation

Chirp

Optical second-harmonic generation

Spectro-temporal characterization

Homodyne & heterodyne detection

Imaging & optical processing

Ghost imaging

Holography

Lidar

Radar

Tomography

Kerr effect

- Magneto-optical Kerr effect

- Surface magneto-optical Kerr effect

Laser techniques

- Attosecond laser irradiation

- Attosecond laser spectroscopy

- Femtosecond laser irradiation

- Femtosecond laser spectroscopy

- Laser ablation

- Laser-beam impact phenomena

- Optical pumping

- Optical tweezers

- Tractor beams

- Pump-probe spectroscopy

- Transient absorption spectroscopy

- Ultrafast femtosecond pump probe

- Ultrafast pump-probe spectroscopy

- Two-photon polymerization

Light scattering

- Diffusive wave spectroscopy

- Inelastic light scattering

- Photon correlation spectroscopy

- Static light scattering

- Time-resolved light scattering spectroscopy

Luminescence

Nonlinear optical techniques

- Sum-frequency generation

Optical computing

Optical desorption spectroscopy

Optical interferometry

- Nonclassical interferometry

Optical metallography

Optical microscopy

- Annular dark-field imaging

- Dark-field microscopy

- Phase contrast optical microscopy

- Polarized optical microscopy

Optical nanoscopy

Photoexcitation

Photoionization

- Photoionization of molecules

Photoluminescence

- Fluorescence

- Fluorescence recovery after photobleaching

- Light sheet fluorescence microscopy
- Phosphorescence
- Time-resolved photoluminescence
- Photon counting
- RF, microwave, & terahertz sources
 - Terahertz sources
- Radiofrequency reflectometry
- Raman spectroscopy
- Reflectivity
- Resonant piezoelectric spectroscopy
- Single-photon detectors

Photoelectron techniques

- Photoabsorption
- Photoelectron diffraction
- Photoelectron emission microscopy
- Photoemission spectroscopy
 - Angle-resolved photoemission spectroscopy
 - Inverse photoemission spectroscopy
 - Angle-resolved inverse photoemission spectroscopy
 - Spin-resolved inverse photoemission spectroscopy
 - Polarization-dependent photoemission spectroscopy
 - Resonant photoemission spectroscopy
 - Spin-resolved photoemission spectroscopy
 - Time & angle resolved photoemission spectroscopy
 - Time-resolved two-photon photoemission spectroscopy
 - Two-photon photoelectron spectroscopy
 - Ultraviolet photoelectron spectroscopy

Resonance techniques

- Cyclotron resonance
- Dynamic nuclear polarization
- Electron nuclear double resonance
- Electron paramagnetic resonance
- Electron spin resonance
 - Electron dipole spin resonance
- Ferromagnetic resonance
- Muon spin resonance
- Mössbauer spectroscopy
 - Mössbauer emission spectroscopy
- Nuclear magnetic resonance
 - Beta-detected nuclear magnetic resonance
 - Functional magnetic resonance imaging
 - Magnetic resonance imaging

- Nuclear magnetic resonance relaxation rate
- Nuclear quadrupole resonance
- Nuclear spin resonance
- Optically detected magnetic resonance
- Tunnel diode resonance

Scanning techniques

- Atomic force microscopy
 - Magnetic force microscopy
 - Noncontact atomic force microscopy
 - Piezoresponse force microscopy
 - Tapping mode atomic force microscopy
- Scanning electron microscopy
 - Cryo-scanning electron microscopy
 - Environmental scanning electron microscopy
- Scanning probe microscopy
 - Scanning near-field optical microscopy
- Scanning tunneling microscopy
 - Annular dark-field imaging
 - Electron spin resonance scanning tunneling microscopy
 - Spin-polarized scanning tunneling microscopy
- Scanning tunneling spectroscopy

Single molecule techniques

- Tethered particle motion

Sound wave techniques

- Sonar
- Ultrasonography
 - Doppler ultrasonography

Thermal techniques

- Calorimetry
 - Differential scanning calorimetry
- Differential thermal analysis
- Pyrometry
- Specific heat measurements
- Thermodilatometry
- Thermogravimetric analysis
- Thermomechanical analysis
- Thermometry
- Thermoreflectance
 - Spatial domain thermoreflectance

X-ray techniques

- Energy spectroscopy for chemical analysis

- Energy-dispersive x-ray spectroscopy

- Hard x-ray photoelectron spectroscopy

- X-ray absorption spectroscopy

 - X-ray absorption fine structure spectroscopy

 - X-ray absorption near-edge spectroscopy

- X-ray diffraction

 - Dynamical diffraction

 - Grazing-incidence X-ray diffraction

 - X-ray diffraction topography

 - X-ray powder diffraction

- X-ray emission spectroscopy

- X-ray fluorescence holography

- X-ray holography

- X-ray imaging

- X-ray magnetic circular dichroism

- X-ray magnetic linear dichroism

- X-ray pair-distribution function analysis

- X-ray photoelectron diffraction

- X-ray photoelectron spectroscopy

- X-ray photoemission electron microscopy

- X-ray photon correlation spectroscopy

- X-ray reflectivity

- X-ray scattering

 - Coherent X-ray scattering

 - Grazing-incidence small-angle x-ray scattering

 - Inelastic X-ray scattering

 - Nonresonant inelastic x-ray scattering

 - Resonant inelastic x-ray scattering

 - Resonant elastic x-ray scattering

 - Small-angle x-ray scattering

 - X-ray diffuse scattering

 - X-ray resonant magnetic scattering

- X-ray standing waves

- X-ray thermal diffuse scattering

- X-ray tomography

[Physics of Living Systems --- Techniques --- Theoretical Techniques]

Density functional theory

- Density functional approximations

 - DFT+DMFT

- DFT+U
- GGA
- Hybrid functionals
- LDA
- Meta-GGA
- Pseudopotentials
- Time-dependent DFT
- Density functional calculations
- Density functional perturbation theory
- Density functional theory development

Monte Carlo methods

- Entropic sampling methods
- Heatbath algorithm
- Hybrid Monte Carlo algorithm
- Langevin algorithm
- Metropolis algorithm
- Path-integral Monte Carlo
- Quantum Monte Carlo
 - Diffusion quantum Monte Carlo
- Simulated annealing

Network Models

- Barabasi-Albert model
- Collective behavior models
 - Consensus & non-consensus models
 - Decision making models
 - Game theory models
 - Prisoner's Dilemma
 - Threshold & cascade models
 - Voter model
- Evolving network models
- Fitness models
- Preferential attachment models
- Price's model
- Small-world model
- Vertex copying models
- Watts-Strogatz model

Networks Analysis Tools

- Block models
- Network inference
- Neuronal network models
 - Compartmental model

- Hodgkin-Huxley model
- Hopfield model
- Integrate-and-fire model
 - Exponential integrate-and-fire model
 - Leaky integrate-and-fire model
- Spiking neuron models
- Synaptic transmission model

Phase oscillator models

- Kuramoto model

Spreading models

- SIR model

- SIRS model

- SIS model

 - Epidemic spreading

 - Rumor spreading

Topological tools

- Assortativity

- Betweenness

- Centrality

- Clustering coefficient & triangles

- Community detection algorithms

 - Evolving communities

 - Non-overlapping communities

 - Overlapping communities

- Cycles

- Degree distributions

- Paths

Percolation theory

- Correlated percolation

- Explosive percolation

- Uncorrelated percolation

Renormalization group

- Density matrix renormalization group

- Functional renormalization group

- Matrix product states

- Numerical Renormalization Group

- Projected entangled pair states

- Tensor network renormalization

Scaling methods

Self-organized criticality

Self-similarity

Statistical hydrodynamics

Statistical methods

- Asymmetric simple exclusion process

- Brownian dynamics

- Dissipative particle dynamics

- Extreme event statistics

 - First passage problems

- Fokker–Planck equation

- Full counting statistics

- Ising model

 - Random bond Ising model

 - Random field Ising model

- Kardar–Parisi–Zhang equation

- Langevin equation

 - Complex Langevin dynamics

 - Stokesian dynamics

- Markovian processes

- Master equation

- Non-Markovian processes

- Phase space dynamics

- Replica theory

- Spatial modeling

- Stochastic analysis

- Stochastic differential equations

- Transfer matrix calculations

- Virial theorem

- XY model

Theories of collective dynamics & active matter

- Vicsek model

[Plasma Physics --- Research areas]

High-energy-density plasmas

Laboratory studies of space & astrophysical plasmas

Magnetohydrodynamics

- Dynamo theory

High Hartmann number flows
Magnetic field generation & plasma dynamo
Magnetohydrodynamic turbulence
Plasma stability

Nonlinear phenomena in plasmas

Plasma instabilities

Edge localized mode

Magnetic reconnection

Plasma macroinstabilities

Ballooning instability

Filamentation in plasmas

Fire-hose instability

Hydrodynamic instabilities

Hydromagnetic instability

Kelvin-Helmholtz instability

Kink instability

Mirror instability

Rayleigh-Taylor instability

Resistive wall modes

Tearing instability

Weibel instability

Plasma microinstabilities

Beam-plasma instability

Buneman instability

Drift, ion- or electron-cyclotron instability

Electron driven instability

Ion-acoustic instability

Loss-cone instability

Two-stream instability

Shock waves & discontinuities in plasma

Collisionless shock in plasma

Plasma turbulence

Plasma acceleration & new acceleration techniques

Fast particle effects in plasmas

Free-electron laser acceleration

Laser driven electron acceleration

Laser driven ion acceleration

Laser wakefield acceleration

Particle acceleration in plasmas

Radiation pressure acceleration

Target normal sheath acceleration

Plasma discharges

- Atmospheric electricity
- Glow & corona plasma discharges
- High-frequency & RF discharges in plasmas
- Low-field & Townsend plasma discharges
- Penning discharges
- Plasma discharges in liquid & solid
- Plasma discharges in vacuum

Plasma fusion

- Current drive
- Direct drive
- Fast ignition
- Fusion products
- Implosion symmetry
- Indirect drive
- Inertial confinement fusion
- Magnetic confinement fusion
- Magnetoinertial fusion
- Target design & fabrication

Plasma interactions

- Laser-plasma interactions
 - High intensity laser-plasma interactions
 - Laser light absorption in plasmas
 - Laser-induced magnetic fields in plasmas
 - Rayleigh scattering in plasmas
 - Self-focusing & filamentation in plasmas
 - Stimulated Brillouin & Raman scattering in plasmas
- Plasma interactions with antennas
- Plasma-beam interactions
- Plasma-particle interactions
- Plasma-solid interactions
- Plasma-wall interactions
- Wave-wave, wave-particle interactions
 - Ponderomotive effects

Plasma ionization

Plasma medicine

Plasma opacity

Plasma optics

Plasma production & heating

- Dense plasma focus
- Free-electron devices
- High-pressure, high-current plasma production
- Plasma production & heating by high-voltage diodes
- Plasma production & heating by laser beams, laser-foil, laser-cluster
- Plasma production & heating by particle beams
- Plasma production & heating by shock waves & compression
- Plasma sources

Plasma thermodynamics

Plasma transport

Plasma waves

- Drift waves
- Electromagnetic waves & oscillations
 - Bernstein plasma waves
 - Electron-cyclotron plasma waves
 - Upper & lower hybrid plasma waves
 - Whistler plasma waves
- Electrostatic waves & oscillations
 - Buneman waves
 - Ion-acoustic waves
- Magnetohydrodynamic waves
 - Alfvén waves
- Solitons
- Sound waves

Radiation & particle generation in plasmas

- Gamma-ray generation in plasmas
- Plasma surface high-order harmonics
- Terahertz generation in plasmas
- X-ray generation in plasmas

Space weather

[Plasma Physics --- Physical systems]

Laboratory plasma

- Fusion reactors
- Inertially confined plasmas

- Ion-inertial confinement
- Laser inertial confinement
- Z-pinches

Magnetically confined plasmas

- Field-reversed plasma confinement configurations
- Magnetic mirrors & traps
- Spheromaks
- Stellarators & toroidal confinement devices
- Theta pinch
- Tokamaks

Space & astrophysical plasma

- Accretion disk & black-hole plasma

- Astrophysical jets

- Earth's atmosphere

- Auroras
 - Electricity & lightning

- Earth's ionosphere

- Earth's magnetosphere

- Auroral phenomena in magnetosphere
 - Magnetic storms, substorms
 - Magnetopause
 - Magnetosheath
 - Magnetotail
 - Plasma sheet
 - Plasmasphere
 - Radiation belts

- Heliosphere

- Heliopause

- Intergalactic medium

- Interplanetary magnetic field

- Interstellar medium

- Lunar plasmas

- Lunar atmosphere
 - Lunar dust & plasma
 - Lunar magnetic field

- Planetary plasmas

- Core of giant planets
 - Planetary atmosphere
 - Planetary bow shock
 - Planetary magnetosphere

- Solar plasma

- Coronal loops
 - Coronal mass ejections

- Helioseismology
- Photosphere
- Solar corona
- Solar cycles
- Solar flares
- Solar interior
- Solar wind
- Stellar plasmas
 - Stellar atmosphere
 - Stellar interior
 - Stellar wind

Specific kinds of plasmas

- Dusty or complex plasma
- Electron-positron plasmas
- Hot dense plasma
- Low-temperature plasma
- Magnetized plasma
- Multicomponent & negative-ion plasma
- Near-critical & underdense plasmas
- Nonneutral plasmas
- Plasma crystals
- Plasma sheaths & surfaces
- Quantum plasmas
- Relativistic plasmas
- Single-component plasmas
- Strongly-coupled plasmas
- Warm-dense matter

[Plasma Physics --- Techniques --- Experimental Techniques]

Optical techniques

- Bolometers
- Brillouin-Mandelstam spectroscopy
- Capacitance spectroscopy
- Cavity resonators
 - Dipole quantum emitters
 - Whispering gallery mode resonators
- Coherent control
- Confocal imaging
- Electroluminescence
- Ellipsometry
- Fluorescence spectroscopy

Four-wave mixing

High-harmonic generation

- Chirp

- Optical second-harmonic generation

- Spectro-temporal characterization

Homodyne & heterodyne detection

Imaging & optical processing

- Ghost imaging

- Holography

- Lidar

- Radar

- Tomography

Kerr effect

- Magneto-optical Kerr effect

 - Surface magneto-optical Kerr effect

Laser techniques

- Attosecond laser irradiation

- Attosecond laser spectroscopy

- Femtosecond laser irradiation

- Femtosecond laser spectroscopy

- Laser ablation

- Laser-beam impact phenomena

- Optical pumping

- Optical tweezers

 - Tractor beams

- Pump-probe spectroscopy

 - Transient absorption spectroscopy

 - Ultrafast femtosecond pump probe

 - Ultrafast pump-probe spectroscopy

- Two-photon polymerization

Light scattering

- Diffusive wave spectroscopy

- Inelastic light scattering

- Photon correlation spectroscopy

- Static light scattering

- Time-resolved light scattering spectroscopy

Luminescence

Nonlinear optical techniques

- Sum-frequency generation

Optical computing

Optical desorption spectroscopy

Optical interferometry

- Nonclassical interferometry

Optical metallography

Optical microscopy

- Annular dark-field imaging
- Dark-field microscopy
- Phase contrast optical microscopy
- Polarized optical microscopy

Optical nanoscopy

Photoexcitation

Photoionization

- Photoionization of molecules

Photoluminescence

Fluorescence

- Fluorescence recovery after photobleaching
- Light sheet fluorescence microscopy

Phosphorescence

- Time-resolved photoluminescence

Photon counting

RF, microwave, & terahertz sources

- Terahertz sources

Radiofrequency reflectometry

Raman spectroscopy

Reflectivity

Resonant piezoelectric spectroscopy

Single-photon detectors

Plasma diagnostic techniques

- Electric & magnetic plasma measurements
- Optical plasma measurements
- Particle plasma measurements
- Plasma spectroscopy
- Radio-frequency & microwave plasma measurements
- X-ray & gamma ray plasma measurements

Satellite data analysis

Spectroscopy

Bragg spectroscopy

High-order harmonic spectroscopy

Optical spectroscopy

- Dark-field optical spectroscopy
- Dielectric spectroscopy
- Femtosecond laser spectroscopy
- Near-field optical spectroscopy
- Optical absorption spectroscopy
- Pump-probe spectroscopy

- Transient absorption spectroscopy
- Ultrafast femtosecond pump probe
- Ultrafast pump-probe spectroscopy
- Time-resolved light scattering spectroscopy
- Time-resolved reflection spectroscopy
- Two-dimensional coherent spectroscopy
- Photocurrent spectroscopy
- Vibronic spectroscopy

X-ray techniques

- Energy spectroscopy for chemical analysis
- Energy-dispersive x-ray spectroscopy
- Hard x-ray photoelectron spectroscopy
- X-ray absorption spectroscopy
 - X-ray absorption fine structure spectroscopy
 - X-ray absorption near-edge spectroscopy
- X-ray diffraction
 - Dynamical diffraction
 - Grazing-incidence X-ray diffraction
 - X-ray diffraction topography
 - X-ray powder diffraction
- X-ray emission spectroscopy
- X-ray fluorescence holography
- X-ray holography
- X-ray imaging
- X-ray magnetic circular dichroism
- X-ray magnetic linear dichroism
- X-ray pair-distribution function analysis
- X-ray photoelectron diffraction
- X-ray photoelectron spectroscopy
- X-ray photoemission electron microscopy
- X-ray photon correlation spectroscopy
- X-ray reflectivity
- X-ray scattering
 - Coherent X-ray scattering
 - Grazing-incidence small-angle x-ray scattering
 - Inelastic X-ray scattering
 - Nonresonant inelastic x-ray scattering
 - Resonant inelastic x-ray scattering
 - Resonant elastic x-ray scattering
 - Small-angle x-ray scattering
 - X-ray diffuse scattering
 - X-ray resonant magnetic scattering
- X-ray standing waves

X-ray thermal diffuse scattering

X-ray tomography

[Plasma Physics --- Techniques --- Theoretical & Computational Techniques]

First-principles calculations in plasma physics

Fokker-Planck & Vlasov model

Gyrofluid & gyrokinetics

Hybrid model

Hydrodynamics

Relativistic hydrodynamics

Magnetohydrodynamic techniques

Hall magnetohydrodynamics

Reduced magnetohydrodynamics

Relativistic magnetohydrodynamics

Molecular dynamics

Ab initio molecular dynamics

Deep potential molecular dynamics

Monte Carlo methods

Entropic sampling methods

Heatbath algorithm

Hybrid Monte Carlo algorithm

Langevin algorithm

Metropolis algorithm

Path-integral Monte Carlo

Quantum Monte Carlo

Diffusion quantum Monte Carlo

Simulated annealing

Particle-in-cell methods

Perturbative methods

Plasma kinetic theory

Scaling methods

Statistical methods

- Asymmetric simple exclusion process
- Brownian dynamics
- Dissipative particle dynamics
- Extreme event statistics
 - First passage problems
- Fokker–Planck equation
- Full counting statistics
- Ising model
 - Random bond Ising model
 - Random field Ising model
- Kardar–Parisi–Zhang equation
- Langevin equation
 - Complex Langevin dynamics
 - Stokesian dynamics
- Markovian processes
- Master equation
- Non-Markovian processes
- Phase space dynamics
- Replica theory
- Spatial modeling
- Stochastic analysis
- Stochastic differential equations
- Transfer matrix calculations
- Virial theorem
- XY model

Test-particle methods

Two-fluid & multi-fluid model

[Polymers & Soft Matter --- Research areas]

Applications of soft matter

- Adhesives
- Biomimetic & bio-inspired materials
- Coatings
- Cosmetics
- Devices
 - Capacitors
 - Demultiplexers
 - Device fabrication

Devices for digital logic, storage & processing

Diodes

- LEDs

- Metal-insulator-metal diodes

- Organic LEDs

- Photodiodes

 - Spin photodiodes

Flexible electronics

Memristors

Micromechanical devices

Multiplexers

Nano-oscillators

- Spin torque nano-oscillators

Nanomechanical devices

- Nano-electromechanical systems

Organic sensors

Qubits

- Color center qubits

- Neutral atom qubits

- Photonic qubits

- Quantum dot qubits

- Spin qubits

- Superconducting qubits

- Topological qubits

- Trapped ion qubits

- Two-level systems

Single-electron devices

Solid-state detectors

Superconducting devices

- Josephson junctions

 - SNS junctions

- SQUID

- Superconducting qubits

Thermoelectrics

- Thermoelectric cooling

- Thermoelectric generators

- Thermoelectric heating

Transducers

Transistors

- Field-effect transistors

 - MOSFET

- Single-electron transistors

Drug delivery

Electronic materials

Electronically polarized systems

- Dielectrics

- Ferroelectrics

 - Antiferroelectrics

 - Relaxor ferroelectrics

- Flexoelectrics

- Multiferroics

- Paraelectrics

- Piezoelectrics

- Pyroelectrics

Flexible electronics

Food additives

Functional materials

- Energy applications

 - Batteries

 - Flow batteries

 - Lithium batteries

 - Lithium metal batteries

 - Lithium polymer batteries

 - Lithium-air batteries

 - Lithium-ion batteries

 - Lithium-sulfur batteries

 - Lithium-alternative batteries

 - Solid-state batteries

 - Thermal batteries

 - Magnetic refrigeration

 - Solar cells

 - Solid-state refrigeration

 - Thermoelectrics

 - Thermoelectric cooling

 - Thermoelectric generators

 - Thermoelectric heating

- Energy materials

 - Hydrogen storage materials

 - Photovoltaic absorbers

 - Tandem photovoltaics

 - Thermal photovoltaics

 - Thin-film photovoltaics

- Smart materials

 - Actuating materials

 - Self-healing systems

 - Shape-memory materials

 - Stimuli-responsive materials

Junctions

- Josephson junctions
 - SNS junctions
- Molecular junctions
- Schottky barriers
- Tunnel junctions
 - Ferroelectric tunnel junctions
 - Magnetic tunnel junctions
 - Multiferroic tunnel junctions
- Weak links

- Laser systems
 - Chemical lasers
 - Dye lasers
 - Fiber lasers
 - Gas lasers
 - Liquid crystal lasers
 - Microcavity & microdisk lasers
 - Photonic crystal lasers
 - Raman lasers
 - Random lasers
 - Solid state lasers
 - Diode lasers
 - Semiconductor lasers
 - Quantum cascade lasers
 - VCSELs
 - Tunable lasers
 - X-ray lasers

- Lubricants

- Organic electronics
 - LEDs
 - Organic sensors
 - Organic transistors
 - Photovoltaic absorbers
 - Tandem photovoltaics
 - Thermal photovoltaics
 - Thin-film photovoltaics

- Packaging materials

- Paints

- Straintronics

- Tissue engineering

- Waveguides
 - Waveguide arrays

Chirality

Collective behavior

- Clustering
- Emergence of patterns
- Flocking
- Foraging
- Jamming
- Swarming

Confinement

Conformation & topology

- Distortions & defects
 - Boojums
 - Disclinations & dislocations
 - Line defects
 - Point defects
 - Topological defects
- Polymer conformation & topology
 - Helix-coil transition
 - Polymer knots

Crystal phenomena

- Crystal binding
- Crystal defects
- Crystal forms
- Crystal growth
- Crystal melting
- Crystal orientation
- Crystal stoichiometry
- Crystal structure
- Crystal symmetry
- Crystallization
- Nanocrystals
- Polycrystals
- Quasicrystalline structure

Electric field effects

Fluctuations & noise

- Brownian motion
 - Fractional Brownian motion
 - Microparticles
- Escape problems
- Fluctuation theorems

Work theorems

Fluctuation-dissipation theorem

Noise

Shot noise

Noise-induced transitions

Random walks

Continuous-time random walk

Levy flights

Granular packing

Granular compaction

Interactions & forces

Acoustic interactions

Capillary interactions

Depletion interactions

Elastic forces

Electromagnetic interactions

Electrostatic interactions

Electrostatic double layer forces

Excluded volume interaction

Fluctuation mediated interactions

Casimir effect

Hydrogen bonds

Hydrophilic interactions

Hydrophobic interactions

Magnetic interactions

Dipolar interaction

Exchange bias

Exchange interaction

RKKY interaction

Osmotic interactions

Stereochemical interactions

π - π stacking

van der Waals interaction

Mechanical deformation

Anelastic deformation

Bending

Creep

Elastic deformation

Fatigue

Internal friction

Plastic deformation

Shear deformation

Strain

Epitaxial strain

Twist deformation

Pattern formation

Chemical waves

Spiral & scroll waves

Turbulent mixing

Patterning

Phase behavior

Phase transitions

Critical phenomena

Critical exponents

Critical field

Dynamic critical phenomena

Dynamical phase transitions

Exotic phases of matter

Excitonic insulators

Phase-change materials

Time crystals

Jamming

Landau theory

Nucleation

Order diagnosis

Order parameters

Charge order

Magnetic order

Altermagnetism

Antiferromagnetism

Asperomagnetism

Diamagnetism

Ferrimagnetism

Ferromagnetism

Frustrated magnetism

Spin ice

Artificial spin ice

Spin liquid

Quantum spin liquid

Valence bond solid

Metamagnetism

- Paramagnetism
- Sperimagnetism
- Speromagnetism
- Superparamagnetism
- Multipole order
- Nematic order
- Orbital order
- Stripes
- Structural order parameter
- Superconducting order parameter
 - d-wave
 - f-wave
 - p-wave
 - s-wave
- Phase diagrams
- Phase separation
 - Dynamics of phase separation
 - Microphase separation
 - Spinodal decomposition
 - Surface-driven phase separation
- Phase transitions by order
 - BKT transition
 - First order phase transitions
 - Second order phase transitions
- Quantum phase transitions
 - Excited-state quantum phase transitions
 - Quantum criticality
- Specific phase transitions
 - Crystallization
 - Depinning transition
 - Ferroelectric phase transition
 - Gelation
 - Glass transition
 - Liquid crystal phase transitions
 - Liquid-gas phase transition
 - Liquid-liquid phase transition
 - Spinodal decomposition
 - Liquid-solid phase transition
 - Magnetic phase transitions
 - Spin state transition
 - Martensitic phase transition
 - Metal-insulator transition
 - Mott-superfluid transition
 - Nematic phase transition

- Solid-solid transformations
- Spin reorientation transition
- Structural phase transition
- Superconducting phase transition
- Superconductor-insulator transition
- Transition temperature

Polymer aging

Polymer behavior

- Chain stiffness
- Persistence length
- Polymer conformation changes
- Polymer entanglement
- Polymer folding
- Polymer translocation
- Reptation

Rheology

- Flow boundary effects
 - Flow boundary instabilities
- Flow confinement
- Slip boundary effects
- Wall slip

Self-assembly

- Aggregation
- Electric field alignment
- Encapsulation
- Magnetic field alignment
- Origami & Kirigami
- Phase separation driven self-assembly
- Supramolecular phase separation

Surface & interfacial phenomena

- Adhesion
- Adsorption
 - Adsorption isotherm
 - Chemisorption
 - Gravimetric adsorption measurements
 - Physisorption
 - Volumetric adsorption measurements
- Atom impact & scattering
- Cohesion

- Self-healing

- Cracking

- Crazing

- Desorption

- Fracture

- Friction

- Growth

- Island

- Ion impact & scattering

- Irradiation effects

- Radiation damage

- Island

- Lubrication

- Nucleation on surfaces

- Roughness

- Surface diffusion

- Surface instabilities

- Buckling

- Cratering

- Creasing

- Wrinkling

- Surface reconstruction

- Tribology

- Abrasion

- Friction

- Lubrication

- Wear

- Wall slip

- Wetting

- Synthesis

- Polymer synthesis

- Polymerization

- Thermodynamics

- Interface & surface thermodynamics

- Nonequilibrium & irreversible thermodynamics

- Entropy production

- Macroscopic fluctuation theory

- Quantum thermodynamics

- Information thermodynamics

- Stochastic thermodynamics

- Thermodynamics of computation

- Thermodynamics of mixing

Transport phenomena

- Ballistic transport

- Carrier dynamics

- Carrier generation & recombination

- Classical transport

 - Fourier's law

- Diffusion

 - Anomalous diffusion

 - Self-diffusion

- Diffusiophoresis

- Dissipative dynamics

- Electrical conductivity

 - Electromigration

 - Ionic conductivity

- Electron relaxation

- Electrophoresis

- Hall effect

 - Anomalous Hall effect

 - Quantum Hall effect

 - Fractional quantum Hall effect

 - Integer quantum Hall effect

 - Quantum anomalous Hall effect

 - Quantum spin Hall effect

 - Spin Hall effect

 - Inverse spin Hall effect

 - Topological Hall effect

- Hopping transport

- Ionic transport

- Kane-Mele model

- Kondo effect

- Localization

 - Anderson localization

 - Many-body localization

 - Weak antilocalization

 - Weak localization

- Onsager relations

- Percolation

 - Directed percolation

- Quantum transport

- Skin effect

- Thermal transport

- Thermoelectric transport

- Thermophoresis

[Polymers & Soft Matter --- Physical systems]

Auxetic materials

Biological materials

Biomolecules

Carbohydrates

Chromatin

Enzymes

ATP

Hormones

Lipids

Nucleic acids

DNA

RNA

Peptides

Proteins

Actin

Collagen

Motor proteins

Cytoskeletal motor proteins

Dynein

Kinesin

Myosin

Photosystems

Tubulin

Viruses

Cells

Blood

Blood plasma

Platelets

Red blood cells

White blood cells

Cell junctions

Epithelial cells

Extracellular matrix

Glial cells

Nerve cells

Axons

Spermatozoa

Stem cells

Microbial multicellular systems

Biofilms

Microbial mats

Subcellular structures

Cell membrane

Cell nucleus

Cell wall

Cellular compartments

Chloroplasts

Chromosomes

Cilia

Cytoskeleton

Filaments

Flagella

Histones

Membrane structures

Micelles

 Cylindrical micelles

 Disk micelles

 Spherical micelles

Microtubules

Mitochondria

Organelle

Pseudopods

Vesicle structures

 Giant vesicles

 Unilamellar vesicles

Tumors

Colloids

Charged colloids

Colloidal crystal

Colloidal gel

Colloidal glass

Ferrofluids

Grafted colloids

Hard sphere colloids

Janus particles

Magnetic colloids

Patchy particles

Soft colloids

Complex fluids

Composite materials

Partially composite materials

Drops & bubbles

- Aerosols
- Antibubbles
- Microbubbles
- Nanobubbles

Emulsions

Fibers

Foams

- Conformal foams

Gels

- Aerogel
- Clay gels
- Hydrogels
- Microgels
- Organogels
- Xerogels

Glassy systems

Granular materials

- Dry granular materials
- Granular chains
- Granular fluids
- Granular gases
- Granular monolayers
- Granular solids
- Impact craters
- Vibrofluidized granular materials
- Wet granular materials

Interfaces

- Gas-liquid interfaces
- Liquid-liquid interfaces
- Liquid-solid interfaces
- Solid-gas interfaces
- Solid-solid interfaces
- Vacuum interfaces

Ionic fluids

Liquid crystals

- Bent-core liquid crystals
- Biaxial liquid crystals
- Biological liquid crystals
- Cholesteric liquid crystals
- Columnar liquid crystals
- Discotic liquid crystals
- Ferroelectric liquid crystals
- Ferromagnetic liquid crystals
- Liquid crystal blue phase
- Lyotropic liquid crystals
 - Chromonic liquid crystals
- Metallotropic liquid crystals
- Nematic liquid crystals
- Smectic liquid crystals
- Thermotropic liquid crystals

Living matter & active matter

- Active gels
 - Active nematic gels
 - Active polar gels
- Active liquid films
- Active nematics
 - Active defects
 - Lyotropic active nematics
- Dry active matter
- Self-propelled particles
 - Active Brownian particles
 - Self-propelled janus particles

Macromolecules

Polydisperse materials

Polymers

- Block copolymers
- Charged polymers
- Conducting polymers
- Conjugated polymers
- Elastomers
- Liquid crystalline polymers
- Membrane structures

- Metal-organic framework
- Polyelectrolytes
- Polymer blends
- Polymer brushes
- Polymer composites
 - Polymer-nanoparticle composites
- Polymer gels
- Polymer glasses
- Polymer melts
- Polymer solutions
- Polymer suspensions
- Polymer thin films
- Polymers by architecture
 - Brush polymer
 - Comb polymers
 - Cross-linked polymers
 - Dendritic polymers
 - H-polymer
 - Linear polymer
 - Polymer networks
 - Ring polymers
 - Star polymers
- Semicrystalline polymers
- Single polymer chains
 - DNA
 - Rodlike polymer
 - Wormlike chain
- Stereochemistry
 - Atactic polymers
 - Eutactic polymers
 - Isotactic polymers
 - Syndiotactic polymers
- Thermosetting polymers

- Surfactants, micelles & vesicles
 - Aggregates
 - Langmuir-Blodgett films
 - Micelles
 - Cylindrical micelles
 - Disk micelles
 - Spherical micelles
 - Surfactant bilayers
 - Surfactant composites
 - Surfactant monolayers

- Vesicle structures
 - Giant vesicles
 - Unilamellar vesicles

[Polymers & Soft Matter --- Techniques --- Computational Techniques]

Cellular automata

Coarse graining

Finite-element method

First-principles calculations

- Density functional theory

 - Density functional approximations

 - DFT+DMFT

 - DFT+U

 - GGA

 - Hybrid functionals

 - LDA

 - Meta-GGA

 - Pseudopotentials

 - Time-dependent DFT

 - Density functional calculations

 - Density functional perturbation theory

 - Density functional theory development

- GW method

- High-throughput calculations

- Quantum chemistry methods

 - Configuration interaction

 - Coupled cluster

 - Hartree-Fock methods

 - Molecular orbital theory

Lattice-Boltzmann methods

Molecular dynamics

- Ab initio molecular dynamics

- Deep potential molecular dynamics

Monte Carlo methods

- Entropic sampling methods

- Heatbath algorithm

- Hybrid Monte Carlo algorithm
- Langevin algorithm
- Metropolis algorithm
- Path-integral Monte Carlo
- Quantum Monte Carlo
 - Diffusion quantum Monte Carlo
- Simulated annealing

Multiscale modeling

Phase-field modeling

[Polymers & Soft Matter --- Techniques --- Experimental Techniques]

Additive manufacturing

Atomic techniques

- Atom diffraction
 - Grazing-incidence fast atom diffraction
- Atomic force microscopy
 - Magnetic force microscopy
 - Noncontact atomic force microscopy
 - Piezoresponse force microscopy
 - Tapping mode atomic force microscopy
- Field emission & field-ion microscopy
- Ion beam analysis
 - Elastic back scattering spectroscopy
 - Elastic recoil detection
 - Nuclear reaction analysis
 - Particle-induced x-ray emission
 - Rutherford back scattering spectroscopy
- Irradiation
- Mass spectrometry
 - Secondary ion mass spectrometry
 - Time-of-flight mass spectrometry
- Surface scattering
 - Atom or molecule scattering from surfaces
 - Ion scattering from surfaces
 - Molecular scattering from surfaces

Crystallography

Electron techniques

- Andreev point contact spectroscopy
- Auger electron spectroscopy
- Electron diffraction
 - Convergent beam electron diffraction
 - Low-energy electron diffraction
 - Current-voltage low-energy electron diffraction
 - Spot-profile analysis LEED
 - Reflection high-energy electron diffraction
- Electron energy loss spectroscopy
 - Electron magnetic circular dichroism
 - High-resolution electron energy loss spectroscopy
- Electron microscopy
 - Electron probe micro-analysis
 - High-resolution electron microscopy
 - High-resolution transmission electron microscopy
 - Lorentz microscopy
 - Low-energy electron microscopy
 - Scanning electron microscopy
 - Cryo-scanning electron microscopy
 - Environmental scanning electron microscopy
 - Scanning transmission electron microscopy
 - Cryo-transmission electron microscopy
 - Transmission electron microscopy
- Energy loss near-edge fine structure
- Inelastic electron tunneling spectroscopy

Infrared techniques

- Brewster reflection spectroscopy
- Brillouin scattering & spectroscopy
- Fourier transform infrared spectroscopy
- Infrared spectroscopy
- Raman spectroscopy
- Rayleigh scattering
- Surface differential reflectance spectroscopy
- Surface-enhanced Raman spectroscopy
- Time-resolved infrared spectroscopy

Microwave techniques

- Coherent Raman electron spin resonance spectroscopy
- Dielectric spectroscopy
- Electron nuclear double resonance
- Electron paramagnetic resonance
- Electron spin resonance
 - Electron dipole spin resonance

Neutron techniques

- Gamma decay
- Neutron capture
- Neutron diffraction
- Neutron imaging
 - Neutron tomography
- Neutron irradiation
- Neutron pair-distribution function analysis
- Neutron reflectometry
- Neutron scattering
 - Inelastic neutron scattering
 - Quasi elastic neutron scattering
 - Small angle neutron scattering
- Neutron spin echo spectroscopy
 - Spin echo small angle neutron scattering
- Thermal cross-sections
- Time-of-flight neutron spectroscopy

Optical techniques

- Bolometers
- Brillouin-Mandelstam spectroscopy
- Capacitance spectroscopy
- Cavity resonators
 - Dipole quantum emitters
 - Whispering gallery mode resonators
- Coherent control
- Confocal imaging
- Electroluminescence
- Ellipsometry
- Fluorescence spectroscopy
- Four-wave mixing
- High-harmonic generation
 - Chirp
 - Optical second-harmonic generation
 - Spectro-temporal characterization
- Homodyne & heterodyne detection
- Imaging & optical processing
 - Ghost imaging
 - Holography
 - Lidar
 - Radar
 - Tomography
- Kerr effect

- Magneto-optical Kerr effect

- Surface magneto-optical Kerr effect

- Laser techniques

- Attosecond laser irradiation

- Attosecond laser spectroscopy

- Femtosecond laser irradiation

- Femtosecond laser spectroscopy

- Laser ablation

- Laser-beam impact phenomena

- Optical pumping

- Optical tweezers

- Tractor beams

- Pump-probe spectroscopy

- Transient absorption spectroscopy

- Ultrafast femtosecond pump probe

- Ultrafast pump-probe spectroscopy

- Two-photon polymerization

- Light scattering

- Diffusive wave spectroscopy

- Inelastic light scattering

- Photon correlation spectroscopy

- Static light scattering

- Time-resolved light scattering spectroscopy

- Luminescence

- Nonlinear optical techniques

- Sum-frequency generation

- Optical computing

- Optical desorption spectroscopy

- Optical interferometry

- Nonclassical interferometry

- Optical metallography

- Optical microscopy

- Annular dark-field imaging

- Dark-field microscopy

- Phase contrast optical microscopy

- Polarized optical microscopy

- Optical nanoscopy

- Photoexcitation

- Photoionization

- Photoionization of molecules

- Photoluminescence

- Fluorescence

- Fluorescence recovery after photobleaching

- Light sheet fluorescence microscopy

- Phosphorescence
- Time-resolved photoluminescence
- Photon counting
- RF, microwave, & terahertz sources
 - Terahertz sources
- Radiofrequency reflectometry
- Raman spectroscopy
- Reflectivity
- Resonant piezoelectric spectroscopy
- Single-photon detectors

Photoelectron techniques

- Photoabsorption
- Photoelectron diffraction
- Photoelectron emission microscopy
- Photoemission spectroscopy
 - Angle-resolved photoemission spectroscopy
 - Inverse photoemission spectroscopy
 - Angle-resolved inverse photoemission spectroscopy
 - Spin-resolved inverse photoemission spectroscopy
 - Polarization-dependent photoemission spectroscopy
 - Resonant photoemission spectroscopy
 - Spin-resolved photoemission spectroscopy
 - Time & angle resolved photoemission spectroscopy
 - Time-resolved two-photon photoemission spectroscopy
 - Two-photon photoelectron spectroscopy
 - Ultraviolet photoelectron spectroscopy

Resonance techniques

- Cyclotron resonance
- Dynamic nuclear polarization
- Electron nuclear double resonance
- Electron paramagnetic resonance
- Electron spin resonance
 - Electron dipole spin resonance
- Ferromagnetic resonance
- Muon spin resonance
- Mössbauer spectroscopy
 - Mössbauer emission spectroscopy
- Nuclear magnetic resonance
 - Beta-detected nuclear magnetic resonance
 - Functional magnetic resonance imaging
 - Magnetic resonance imaging
 - Nuclear magnetic resonance relaxation rate

- Nuclear quadrupole resonance
- Nuclear spin resonance
- Optically detected magnetic resonance
- Tunnel diode resonance

Rheology techniques

- Microrheology
- Viscometers

Sample preparation

- Annealing
- Arc discharge
- Chemical synthesis
- Cold working
- Compaction
- Crystal growth
- Crystallization
- Electropolishing
- Electrospinning
- Epitaxy
 - Chemical beam epitaxy
 - Liquid epitaxy
 - Molecular beam epitaxy
- Etching
 - Plasma etching
- Evaporation
- Film deposition
 - Chemical deposition
 - Chemical solution deposition
 - Chemical vapor deposition
 - Plating
 - Physical deposition
 - Dip coating
 - Langmuir-Blodgett deposition
 - Physical vapor deposition
 - Spin coating
- Focused ion beam
- Glow discharge
- Heat treatment
- Ion implantation
- Isotope separation & enrichment
- Laser ablation
- Laser annealing
- Lithography

- Melt-spinning
- Metallurgical magnetohydrodynamics
- Powder metallurgy
- Precipitation
- Sintering
- Sol-gel process
- Solidification
- Sputtering
- Strain engineering
- Welding

Scanning techniques

- Atomic force microscopy
 - Magnetic force microscopy
 - Noncontact atomic force microscopy
 - Piezoresponse force microscopy
 - Tapping mode atomic force microscopy
- Scanning electron microscopy
 - Cryo-scanning electron microscopy
 - Environmental scanning electron microscopy
- Scanning probe microscopy
 - Scanning near-field optical microscopy
- Scanning tunneling microscopy
 - Annular dark-field imaging
 - Electron spin resonance scanning tunneling microscopy
 - Spin-polarized scanning tunneling microscopy
- Scanning tunneling spectroscopy

Single molecule techniques

- Tethered particle motion

Thermal techniques

- Calorimetry
 - Differential scanning calorimetry
- Differential thermal analysis
- Pyrometry
- Specific heat measurements
- Thermodilatometry
- Thermogravimetric analysis
- Thermomechanical analysis
- Thermometry
- Thermorefectance
 - Spatial domain thermorefectance

X-ray techniques

- Energy spectroscopy for chemical analysis

- Energy-dispersive x-ray spectroscopy

- Hard x-ray photoelectron spectroscopy

- X-ray absorption spectroscopy

 - X-ray absorption fine structure spectroscopy

 - X-ray absorption near-edge spectroscopy

- X-ray diffraction

 - Dynamical diffraction

 - Grazing-incidence X-ray diffraction

 - X-ray diffraction topography

 - X-ray powder diffraction

- X-ray emission spectroscopy

- X-ray fluorescence holography

- X-ray holography

- X-ray imaging

- X-ray magnetic circular dichroism

- X-ray magnetic linear dichroism

- X-ray pair-distribution function analysis

- X-ray photoelectron diffraction

- X-ray photoelectron spectroscopy

- X-ray photoemission electron microscopy

- X-ray photon correlation spectroscopy

- X-ray reflectivity

- X-ray scattering

 - Coherent X-ray scattering

 - Grazing-incidence small-angle x-ray scattering

 - Inelastic X-ray scattering

 - Nonresonant inelastic x-ray scattering

 - Resonant inelastic x-ray scattering

 - Resonant elastic x-ray scattering

 - Small-angle x-ray scattering

 - X-ray diffuse scattering

 - X-ray resonant magnetic scattering

- X-ray standing waves

- X-ray thermal diffuse scattering

- X-ray tomography

[Polymers & Soft Matter --- Techniques --- Theoretical Techniques]

Density functional theory

- Density functional approximations

 - DFT+DMFT

- DFT+U
- GGA
- Hybrid functionals
- LDA
- Meta-GGA
- Pseudopotentials
- Time-dependent DFT
- Density functional calculations
- Density functional perturbation theory
- Density functional theory development

Mode coupling theory

Monte Carlo methods

- Entropic sampling methods
- Heatbath algorithm
- Hybrid Monte Carlo algorithm
- Langevin algorithm
- Metropolis algorithm
- Path-integral Monte Carlo
- Quantum Monte Carlo
 - Diffusion quantum Monte Carlo
- Simulated annealing

Pattern formation

- Chemical waves
- Spiral & scroll waves
- Turbulent mixing

Polymer theory

- Ideal-chain models
 - Bead-spring models
 - Continuous Gaussian chain model
 - Freely-jointed chain
 - Freely-rotating chain
 - Hindered rotation model
 - Worm-like chain model
- Maxwell model
- Polymer scaling theory
- Rouse model
- Self-consistent field theory
- Tube theories
- Zimm model

Renormalization group

- Density matrix renormalization group
- Functional renormalization group
- Matrix product states
- Numerical Renormalization Group
- Projected entangled pair states
- Tensor network renormalization

Scaling methods

Statistical hydrodynamics

Statistical methods

- Asymmetric simple exclusion process
- Brownian dynamics
- Dissipative particle dynamics
- Extreme event statistics
 - First passage problems
- Fokker–Planck equation
- Full counting statistics
- Ising model
 - Random bond Ising model
 - Random field Ising model
- Kardar–Parisi–Zhang equation
- Langevin equation
 - Complex Langevin dynamics
 - Stokesian dynamics
- Markovian processes
- Master equation
- Non-Markovian processes
- Phase space dynamics
- Replica theory
- Spatial modeling
- Stochastic analysis
- Stochastic differential equations
- Transfer matrix calculations
- Virial theorem
- XY model

Theories of collective dynamics & active matter

- Vicsek model

[Quantum Information, Science & Technology --- Research areas]

Quantum algorithms & computation

Quantum circuits

Quantum computation

Artificial intelligence

Machine learning

Machine learning categories

Deep learning

Artificial neural networks

Convolutional neural networks

Dimensionality reduction

Reinforcement learning

Semi-supervised learning

Supervised learning

Unsupervised learning

Machine learning models

Artificial neural networks

Convolutional neural networks

Bayesian networks

Belief functions

Decision trees

Random forests

Genetic algorithms

Regression analysis

Support-vector machines

Training models

Natural language processing

Quantum algorithms

Quantum algorithms for chemical calculations

Quantum benchmarking

Quantum computing models

Adiabatic quantum optimization

Measurement-based quantum computing

Surface code quantum computing

Topological quantum computing

Quantum gates

Quantum software

Qubits

Color center qubits

Neutral atom qubits

Photonic qubits

Quantum dot qubits

Spin qubits

Superconducting qubits

- Topological qubits

- Trapped ion qubits

- Two-level systems

- Qudits

- Quantum error correction

- Quantum information processing

- Quantum information architectures & platforms

- Optical quantum information processing

- Quantum information with atoms & light

- Quantum information with hybrid systems

- Quantum information with solid state qubits

- Quantum information with trapped ions

- Quantum information processing with continuous variables

- Quantum interconnects

- Quantum memories

- Quantum information theory

- Quantum simulation

- Quantum communication, protocols & technology

- Quantum communication

- Quantum channels

- Quantum cryptography

- Quantum networks

- Quantum repeaters

- Quantum control

- Quantum engineering

- Quantum feedback

- Quantum metrology

- Quantum Fisher information

- Quantum sensing

- Quantum parameter estimation

- Quantum protocols

- Boson sampling

- Quantum teleportation

- Quantum tomography

- Quantum verification

- Quantum walks

- Quantum state transfer

- Quantum correlations, foundations & formalism

- Geometric & topological phases

- Chern number

- Quantum geometry

- Berry curvature

- Quantum metric
- Uhlmann phase
- Nonrelativistic wave equations
 - Schroedinger equation
- Open quantum systems & decoherence
 - Hilbert-Schmidt speed measure
- Two-level systems
- PT-symmetric quantum mechanics
- Quantum Zeno dynamics
- Quantum coherence & coherence measures
- Quantum correlations in quantum information
 - Nonlocality
 - Quantum discord
 - Quantum entanglement
 - Entanglement detection
 - Entanglement manipulation
 - Measurement back action
 - Entanglement measures
 - Entanglement entropy
 - Measures of continuous variables entanglement
 - Entanglement production
 - Hyperentanglement
 - Quantum macroscopicity
 - Quantum superposition
 - Symmetry breaking states
 - Unsharp measurements
 - Resource theories
- Quantum field theory (low energy)
- Quantum formalism
- Quantum foundations
 - Uncertainty relation
- Quantum harmonic oscillator
- Quantum measurements
 - Quantum nondemolition measurement
- Quantum-to-classical transition
- Relativistic quantum information
- Relativistic wave equations
 - Dirac equation
- Semiclassical physics
- Tests of fundamental symmetries
- Tunneling & traversal time
 - BEC tunneling
- Weak values & weak measurements

Qubit architectures

Qubits

- Color center qubits
- Neutral atom qubits
- Photonic qubits
- Quantum dot qubits
- Spin qubits
- Superconducting qubits
- Topological qubits
- Trapped ion qubits
- Two-level systems

[Statistical Physics & Thermodynamics --- Research areas]

Ballistic deposition

Classical statistical mechanics

Equations of state

Fluctuations & noise

- Brownian motion

 - Fractional Brownian motion

 - Microparticles

- Escape problems

- Fluctuation theorems

 - Work theorems

- Fluctuation-dissipation theorem

- Noise

 - Shot noise

- Noise-induced transitions

- Random walks

 - Continuous-time random walk

 - Levy flights

Fractional dimension

Growth processes

Irreversible processes

Kinetic theory

- Quantum kinetic theory

Relativistic kinetic theory

Nonequilibrium statistical mechanics

Quantum quench

Zero-range process

Optimization problems

Boolean satisfiability problem

NP-hard problems

Stochastic inference

Packing & jamming problems

Pattern formation

Chemical waves

Spiral & scroll waves

Turbulent mixing

Percolation

Directed percolation

Phase transitions

Critical phenomena

Critical exponents

Critical field

Dynamic critical phenomena

Dynamical phase transitions

Exotic phases of matter

Excitonic insulators

Phase-change materials

Time crystals

Jamming

Landau theory

Nucleation

Order diagnosis

Order parameters

Charge order

Magnetic order

Altermagnetism

Antiferromagnetism

Asperomagnetism

Diamagnetism

Ferrimagnetism

Ferromagnetism

- Frustrated magnetism
 - Spin ice
 - Artificial spin ice
 - Spin liquid
 - Quantum spin liquid
 - Valence bond solid
- Metamagnetism
- Paramagnetism
- Sperimagnetism
- Speromagnetism
- Superparamagnetism
- Multipole order
- Nematic order
- Orbital order
- Stripes
- Structural order parameter
- Superconducting order parameter
 - d-wave
 - f-wave
 - p-wave
 - s-wave
- Phase diagrams
- Phase separation
 - Dynamics of phase separation
 - Microphase separation
 - Spinodal decomposition
 - Surface-driven phase separation
- Phase transitions by order
 - BKT transition
 - First order phase transitions
 - Second order phase transitions
- Quantum phase transitions
 - Excited-state quantum phase transitions
 - Quantum criticality
- Specific phase transitions
 - Crystallization
 - Depinning transition
 - Ferroelectric phase transition
 - Gelation
 - Glass transition
 - Liquid crystal phase transitions
 - Liquid-gas phase transition
 - Liquid-liquid phase transition
 - Spinodal decomposition

- Liquid-solid phase transition
- Magnetic phase transitions
 - Spin state transition
- Martensitic phase transition
- Metal-insulator transition
- Mott-superfluid transition
- Nematic phase transition
- Solid-solid transformations
- Spin reorientation transition
- Structural phase transition
- Superconducting phase transition
- Superconductor-insulator transition
- Transition temperature

Population dynamics

Quantum statistical mechanics

- Eigenstate thermalization
- Information scrambling

Self-avoiding walks

Self-organized systems

- Self-organized criticality

Stochastic processes

- Diffusion
 - Anomalous diffusion
 - Self-diffusion
- Open quantum systems
- Quantum stochastic processes
 - Quantum master equation
- Search strategy
- Stochastic resetting
- Stochastic resonance
- Stochastic restart

Synchronization

- Chimera states

Thermodynamics

- Interface & surface thermodynamics
- Nonequilibrium & irreversible thermodynamics
 - Entropy production

- Macroscopic fluctuation theory
- Quantum thermodynamics
 - Information thermodynamics
- Stochastic thermodynamics
- Thermodynamics of computation
- Thermodynamics of mixing

Transport phenomena

- Ballistic transport
- Carrier dynamics
- Carrier generation & recombination
- Classical transport
 - Fourier's law
- Diffusion
 - Anomalous diffusion
 - Self-diffusion
- Diffusiophoresis
- Dissipative dynamics
- Electrical conductivity
 - Electromigration
 - Ionic conductivity
- Electron relaxation
- Electrophoresis
- Hall effect
 - Anomalous Hall effect
 - Quantum Hall effect
 - Fractional quantum Hall effect
 - Integer quantum Hall effect
 - Quantum anomalous Hall effect
 - Quantum spin Hall effect
 - Spin Hall effect
 - Inverse spin Hall effect
 - Topological Hall effect
- Hopping transport
- Ionic transport
- Kane-Mele model
- Kondo effect
- Localization
 - Anderson localization
 - Many-body localization
 - Weak antilocalization
 - Weak localization
- Onsager relations
- Percolation

- Directed percolation
- Quantum transport
- Skin effect
- Thermal transport
- Thermoelectric transport
- Thermophoresis

[Statistical Physics & Thermodynamics --- Physical systems]

Auxetic materials

Biological materials

- Biomolecules

 - Carbohydrates

 - Chromatin

 - Enzymes

 - ATP

 - Hormones

 - Lipids

 - Nucleic acids

 - DNA

 - RNA

 - Peptides

 - Proteins

 - Actin

 - Collagen

 - Motor proteins

 - Cytoskeletal motor proteins

 - Dynein

 - Kinesin

 - Myosin

 - Photosystems

 - Tubulin

 - Viruses

- Cells

 - Blood

 - Blood plasma

 - Platelets

 - Red blood cells

 - White blood cells

 - Cell junctions

 - Epithelial cells

 - Extracellular matrix

Glial cells

Nerve cells

Axons

Spermatozoa

Stem cells

Microbial multicellular systems

Biofilms

Microbial mats

Subcellular structures

Cell membrane

Cell nucleus

Cell wall

Cellular compartments

Chloroplasts

Chromosomes

Cilia

Cytoskeleton

Filaments

Flagella

Histones

Membrane structures

Micelles

Cylindrical micelles

Disk micelles

Spherical micelles

Microtubules

Mitochondria

Organelle

Pseudopods

Vesicle structures

Giant vesicles

Unilamellar vesicles

Tumors

Brownian ratchet

Classical fluids

Ionic fluids

Classical spin models

Colloids

Charged colloids

Colloidal crystal

- Colloidal gel
- Colloidal glass
- Ferrofluids
- Grafted colloids
- Hard sphere colloids
- Janus particles
- Magnetic colloids
- Patchy particles
- Soft colloids

Complex fluids

Composite materials

- Partially composite materials

Continuum particle models

Disordered systems

- Glasses
- Spin glasses
 - Spin ice
 - Artificial spin ice

Drops & bubbles

- Aerosols
- Antibubbles
- Microbubbles
- Nanobubbles

Emulsions

Fibers

Foams

- Conformal foams

Fractals

- Multifractal systems

Gels

- Aerogel
- Clay gels
- Hydrogels
- Microgels

Organogels

Xerogels

Glassy systems

Granular materials

Dry granular materials

Granular chains

Granular fluids

Granular gases

Granular monolayers

Granular solids

Impact craters

Vibrofluidized granular materials

Wet granular materials

Heat engines

Efficiency at maximum power

Quantum heat engines & refrigerators

Interfaces

Gas-liquid interfaces

Liquid-liquid interfaces

Liquid-solid interfaces

Solid-gas interfaces

Solid-solid interfaces

Vacuum interfaces

Ionic fluids

Lattice models in statistical physics

Equilibrium lattice models

Lattice gases

Nonequilibrium lattice models

Exclusion processes

Phase oscillator models

Kuramoto model

Sandpile models

Traffic models

Liquid crystals

Bent-core liquid crystals

Biaxial liquid crystals

Biological liquid crystals

- Cholesteric liquid crystals
- Columnar liquid crystals
- Discotic liquid crystals
- Ferroelectric liquid crystals
- Ferromagnetic liquid crystals
- Liquid crystal blue phase
- Lyotropic liquid crystals
 - Chromonic liquid crystals
- Metallotropic liquid crystals
- Nematic liquid crystals
- Smectic liquid crystals
- Thermotropic liquid crystals

Living matter & active matter

- Active gels
 - Active nematic gels
 - Active polar gels
- Active liquid films
- Active nematics
 - Active defects
 - Lyotropic active nematics
- Dry active matter
- Self-propelled particles
 - Active Brownian particles
 - Self-propelled janus particles

Macromolecules

Multicomponent systems

Networks & random structures

- Complex networks

Nonequilibrium systems

- Floquet systems

Polydisperse materials

Polydisperse systems

Polymers

- Block copolymers
- Charged polymers
- Conducting polymers

- Conjugated polymers
- Elastomers
- Liquid crystalline polymers
- Membrane structures
- Metal-organic framework
- Polyelectrolytes
- Polymer blends
- Polymer brushes
- Polymer composites
 - Polymer-nanoparticle composites
- Polymer gels
- Polymer glasses
- Polymer melts
- Polymer solutions
- Polymer suspensions
- Polymer thin films
- Polymers by architecture
 - Brush polymer
 - Comb polymers
 - Cross-linked polymers
 - Dendritic polymers
 - H-polymer
 - Linear polymer
 - Polymer networks
 - Ring polymers
 - Star polymers
- Semicrystalline polymers
- Single polymer chains
 - DNA
 - Rodlike polymer
 - Wormlike chain
- Stereochemistry
 - Atactic polymers
 - Eutactic polymers
 - Isotactic polymers
 - Syndiotactic polymers
- Thermosetting polymers

Population dynamics

Quantum compass model

Quantum fluids & solids

- Bose-Einstein condensates

- BEC tunneling
- Spinor Bose-Einstein condensates
- Fermionic condensates
- Molecular condensates
- Polariton condensate
- Solid hydrogen
- Superfluids
 - Helium-3 superfluids
 - Helium-4 superfluids
 - Mixtures of ^3He & ^4He
 - Mott superfluids
- Supersolids
- Ultracold gases

Quantum spin models

Social dynamics

- Economic games
- Evolutionary games
- Language models

Supercritical fluids

Surface growth

Surfactants, micelles & vesicles

- Aggregates
- Langmuir-Blodgett films
- Micelles
 - Cylindrical micelles
 - Disk micelles
 - Spherical micelles
- Surfactant bilayers
- Surfactant composites
- Surfactant monolayers
- Vesicle structures
 - Giant vesicles
 - Unilamellar vesicles

[Statistical Physics & Thermodynamics --- Techniques --- Computational Techniques]

Cellular automata

Coarse graining

Combinatorics

Computational complexity

Data analysis

Finite-size scaling

Lattice-Boltzmann methods

Molecular dynamics

Ab initio molecular dynamics

Deep potential molecular dynamics

Monte Carlo methods

Entropic sampling methods

Heatbath algorithm

Hybrid Monte Carlo algorithm

Langevin algorithm

Metropolis algorithm

Path-integral Monte Carlo

Quantum Monte Carlo

Diffusion quantum Monte Carlo

Simulated annealing

Numerical approximation & analysis

Path-integral methods

Phase-field modeling

Series expansions & exact enumeration

Transfer matrix calculations

Time series analysis

[Statistical Physics & Thermodynamics --- Techniques --- Experimental Techniques]

Confocal imaging

Diffusive wave spectroscopy

Fractal analysis

Neutron techniques

- Gamma decay
- Neutron capture
- Neutron diffraction
- Neutron imaging
 - Neutron tomography
- Neutron irradiation
- Neutron pair-distribution function analysis
- Neutron reflectometry
- Neutron scattering
 - Inelastic neutron scattering
 - Quasi elastic neutron scattering
 - Small angle neutron scattering
- Neutron spin echo spectroscopy
 - Spin echo small angle neutron scattering
- Thermal cross-sections
- Time-of-flight neutron spectroscopy

Particle image velocimetry

Tomography

X-ray techniques

- Energy spectroscopy for chemical analysis
- Energy-dispersive x-ray spectroscopy
- Hard x-ray photoelectron spectroscopy
- X-ray absorption spectroscopy
 - X-ray absorption fine structure spectroscopy
 - X-ray absorption near-edge spectroscopy
- X-ray diffraction
 - Dynamical diffraction
 - Grazing-incidence X-ray diffraction
 - X-ray diffraction topography
 - X-ray powder diffraction
- X-ray emission spectroscopy
- X-ray fluorescence holography
- X-ray holography
- X-ray imaging
- X-ray magnetic circular dichroism
- X-ray magnetic linear dichroism
- X-ray pair-distribution function analysis

- X-ray photoelectron diffraction
- X-ray photoelectron spectroscopy
- X-ray photoemission electron microscopy
- X-ray photon correlation spectroscopy
- X-ray reflectivity
- X-ray scattering
 - Coherent X-ray scattering
 - Grazing-incidence small-angle x-ray scattering
 - Inelastic X-ray scattering
 - Nonresonant inelastic x-ray scattering
 - Resonant inelastic x-ray scattering
 - Resonant elastic x-ray scattering
 - Small-angle x-ray scattering
 - X-ray diffuse scattering
 - X-ray resonant magnetic scattering
- X-ray standing waves
- X-ray thermal diffuse scattering
- X-ray tomography

[Statistical Physics & Thermodynamics --- Techniques --- Theoretical Techniques]

Bifurcation analysis

Cavity methods

Chaos & nonlinear dynamics

Computational complexity

Conformal field theory

Density functional theory

- Density functional approximations

 - DFT+DMFT

 - DFT+U

 - GGA

 - Hybrid functionals

 - LDA

 - Meta-GGA

 - Pseudopotentials

 - Time-dependent DFT

- Density functional calculations

- Density functional perturbation theory

Density functional theory development

Ergodic theory

Fractal dimension characterization

Information theory

Integrable systems

Kinetically constrained models

Large deviation & rare event statistics

Lee-Yang & Fisher zeroes

Lindblad equation

Linear response theory

Many-body techniques

Approximation methods for many-body systems

Bethe-Salpeter equation

Cluster expansion

Coupled mode theory

Discrete dipole approximation

Gutzwiller approximation

Perturbation theory

Random phase approximation

Semiclassical methods

Semiconductor Bloch equations

Variational approach

Density matrix methods

Diagrammatic methods

Duality

Effective mass theory

Electron-correlation calculations

Exact solutions for many-body systems

Bethe ansatz

Exact diagonalization

Fermi liquid theory

Green's function methods

Coherent potential approximation

Nonequilibrium Green's function

- Landau-Ginzburg-Devonshire theory
- Luttinger liquid model
- Mean field theory
 - Cluster methods
 - Dynamical mean field theory
- Non-Fermi-liquid theory
- Renormalization group
 - Density matrix renormalization group
 - Functional renormalization group
 - Matrix product states
 - Numerical Renormalization Group
 - Projected entangled pair states
 - Tensor network renormalization
- Second quantization
- Slave bosons
- Tensor network methods
- Thomas–Fermi model
- Trial wave functions

Mean-field & cluster methods

Monte Carlo methods

- Entropic sampling methods
- Heatbath algorithm
- Hybrid Monte Carlo algorithm
- Langevin algorithm
- Metropolis algorithm
- Path-integral Monte Carlo
- Quantum Monte Carlo
 - Diffusion quantum Monte Carlo
- Simulated annealing

Neural network simulations

Path-integral methods

Pattern formation

- Chemical waves
- Spiral & scroll waves
- Turbulent mixing

Random matrix theory

Renormalization group

- Density matrix renormalization group
- Functional renormalization group
- Matrix product states
- Numerical Renormalization Group
- Projected entangled pair states
- Tensor network renormalization

Replica methods

Scaling methods

Statistical hydrodynamics

Statistical methods

- Asymmetric simple exclusion process
- Brownian dynamics
- Dissipative particle dynamics
- Extreme event statistics
 - First passage problems
- Fokker–Planck equation
- Full counting statistics
- Ising model
 - Random bond Ising model
 - Random field Ising model
- Kardar–Parisi–Zhang equation
- Langevin equation
 - Complex Langevin dynamics
 - Stokesian dynamics
- Markovian processes
- Master equation
- Non-Markovian processes
- Phase space dynamics
- Replica theory
- Spatial modeling
- Stochastic analysis
- Stochastic differential equations
- Transfer matrix calculations
- Virial theorem
- XY model

Stochastic analysis methods

Time series analysis