

LBNL research themes, disciplines, and subjects

Theme: **Biosystems and health**

Discipline: **Bioscience**

Subjects

artificial photosynthesis

bacteria

biochemistry

bioenergy

bioengineering

biofuels

biology

biomass

biomedical imaging

biomimetic/bioinspired functional materials

biomolecular materials

botany

cancer biology

cellular processes

complex biological interactions

computational biology

environmental stress

enzymes

functional relationships in biology

high-throughput analysis

high-throughput structure determination

high-throughput technologies

industrial fermentation

intercellular communication

macromolecular analysis

metabolomics

microbes

microbial ecology

microorganisms
molecular biology
molecular machines
molecular motors
multi-enzyme metabolic conversions
multiscale information from microbial systems
plants
purification and screening techniques
synthetic biology
theoretical biology

Discipline: **Characterization**

Subjects

high-throughput structure determination
macromolecular protein crystallography
mass spectrometry
microcharacterization
NMR
protein crystallography
Raman imaging
x-ray crystallography

Discipline: **Engineering**

Subjects

advanced instrumentation design
atmospheric technology
bioengineering
bioinstrumentation
energy reservoir engineering
engineering
engineering business services
genomic technologies
heavy ion fusion
high-throughput analysis
high-throughput technologies
molecular motors

nanofabrication
nanoscale devices
optical systems
processing science
pulsed power
sensor technology for pathogen detection
sensors
synthetic biology

Discipline: **Genomics**

Subjects

agricultural systems
biofuels
bioinformatics
bioinstrumentation
cloning
computational analysis
computational genomics
energy bioscience
epigenetics
evolutionary genomics
functional genomics
gene regulatory networks
gene structures
genetic analysis
genetic expression
genetics
genetics - biological pathways
genetics - molecular markers
genome annotation
genome biology
genome maps
genome sequence characterization
genome sequences analysis
genomic analyses

genomic technologies
genomics
high-throughput sequencing
metagenomics
microarray analysis
photosynthesis
phylogenomics
production sequencing
sequencing
structural cell biology
structural genomics
systems biology
target selection
transcription regulation

Discipline: **Health science**

Subjects

Alzheimer's disease
biomedical imaging
breast cancer detection
cancer biology
cancer detection
cancer therapy
cardiac nuclear imaging
cardiology
cell-cell recognition in the immune system
cognition
DNA repair
drug design
environment
health
health and safety
heart disease
malaria
memory

neurodegenerative disease
Parkinson's disease
safety
sensor technology for pathogen detection

Discipline: **Imaging**

Subjects

atomic force microscopy
biomedical imaging
bolometer arrays
cameras
cardiac nuclear imaging
cryo-electron microscopy
crystallography
electron microscopy
electron tomography
high throughput discovery
histologic molecular imaging
imagers
imaging
macromolecular analysis
magnetic soft x-ray microscopy
microscopy
molecular imaging
multiscale and multimodal imaging
multi-scale imaging
nanoimaging
neutrino telescope
optical tweezers microscopy
positron emission tomography
Raman imaging
scintillation radiation
single-molecule fluorescence microscopy
telescope
x-ray crystallography

x-ray microscopy

Discipline: **Information science**

Subjects

bioinformatics
collaboration technology
communications services
cyberinfrastructure
data analysis
data management
data services
data sources
data storage
ecoinformatics
informatics
information science
metadata
omics analysis tools

Discipline: **Management**

Subjects

engineering business services
interdisciplinary science
scientific collaboration

Discipline: **Proteomics**

Subjects

high-throughput protein expression
macromolecular protein crystallography
protein crystallography
protein folding
proteins
proteomic markers
proteomics
structure prediction

Theme: **Earth and climate sciences**

Discipline: **Climate science**

Subjects

atmospheric modelling
carbon sequestration
carbon capture
carbon cycle
carbon emissions
carbon flows
carbon storage
climate change
climate change forcing
climate change mitigation
climate change modelling
climate modelling
climate predictions
climate science
global climate
green house gases

Discipline: **Earth science**

Subjects

atmospheric aerosols
atmospheric chemistry
atmospheric science
atmospheric technology
biogeochemistry
chemical ecology
computational geomechanics
computational geophysics
computational geoscience
contaminant hydrology
earth sciences

ecoinformatics
ecosystems
forestry
geostrophysics
geochemical transport
geochemistry
geologic modeling
geophysics
geothermal energy
hydroecology
hydrogeology
hydrogeophysics
hydrology
isotope geochemistry
land use
marine geochemistry
mineralogy
molecular ecology
molecular geochemistry
molecular microbial ecology
nanogeoscience
oceanic science
ozone photochemistry
rock physics
soil geochemistry
terrestrial biogeochemistry
water resources

Discipline: **Engineering**

Subjects

advanced instrumentation design
atmospheric technology
bioengineering
bioinstrumentation
energy reservoir engineering

engineering
engineering business services
genomic technologies
heavy ion fusion
high-throughput analysis
high-throughput technologies
molecular motors
nanofabrication
nanoscale devices
optical systems
processing science
pulsed power
sensor technology for pathogen detection
sensors
synthetic biology

Discipline: **Environmental science and technology**

Subjects

air pollution
air quality
bioremediation
carbon-neutral transportation fuels
chemical transformation
chemical transport
emissions
energy efficient technologies
environmental bioremediation
environmental characterization
environmental cleanup
environmental contamination
environmental impact
environmental policy
environmental processes modelling
environmental protection
environmental remediation

environmental restoration
environmental science
environmental stockpile stewardship
environmental stress
environmental sustainability
environmental chemistry
green chemistry
land use
natural attenuation
nuclear waste
policy analysis
technical research
toxic waste reduction

Discipline: **Imaging**

Subjects

atomic force microscopy
biomedical imaging
bolometer arrays
cameras
cardiac nuclear imaging
cryo-electron microscopy
crystallography
electron microscopy
electron tomography
high throughput discovery
histologic molecular imaging
imagers
imaging
macromolecular analysis
magnetic soft x-ray microscopy
microscopy
molecular imaging
multiscale and multimodal imaging
multi-scale imaging

nanoimaging
neutrino telescope
optical tweezers microscopy
positron emission tomography
Raman imaging
scintillation radiation
single-molecule fluorescence microscopy
telescope
x-ray crystallography
x-ray microscopy

Discipline: **Information science**

Subjects

bioinformatics
collaboration technology
communications services
cyberinfrastructure
data analysis
data management
data services
data sources
data storage
ecoinformatics
informatics
information science
metadata
omics analysis tools

Discipline: **Management**

Subjects

engineering business services
interdisciplinary science
scientific collaboration

Theme: **High-performance computing and networking**

Discipline: **Computing science and technology**

Subjects

algorithmic design
chemical simulation
communications networking
computational biology
computational methodologies
computational modelling
computational science
computational science of scale
computational tools
computational visualization
computer infrastructure
computer networking
computer security
computer simulation
computer systems architecture
computer visualization
data management
distributed computing
emerging technology
grid computing
high performance computing
high speed Internet networks
high speed network
large scale computing
power-efficient computing
pulsed power
quantum computing
remote computing
software development
software engineering
software implementation

Discipline: **Engineering**

Subjects

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high-throughput technologies
molecular motors
nanofabrication
nanoscale devices
optical systems
processing science
pulsed power
sensor technology for pathogen detection
sensors
synthetic biology

Discipline: **Imaging**

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crystallography
electron microscopy
electron tomography
high throughput discovery

histologic molecular imaging
imagers
imaging
macromolecular analysis
magnetic soft x-ray microscopy
microscopy
molecular imaging
multiscale and multimodal imaging
multi-scale imaging
nanoimaging
neutrino telescope
optical tweezers microscopy
positron emission tomography
Raman imaging
scintillation radiation
single-molecule fluorescence microscopy
telescope
x-ray crystallography
x-ray microscopy

Discipline: **Information science**

Subjects

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collaboration technology
communications services
cyberinfrastructure
data analysis
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data storage
ecoinformatics
informatics
information science
metadata

omics analysis tools

Discipline: **Management**

Subjects

engineering business services

interdisciplinary science

scientific collaboration

Theme: **Matter and force in the Universe**

Discipline: **Accelerators**

Subjects

accelerator physics

accelerators

beam equipment

beam generators

beam physics

beam science

beamlines

cyclotron

high energy particle collisions

ion beams

ion sources

Large Hadron Collider

synchrotron

Discipline: **Astrophysics**

Subjects

astrophysics

astrophysics theory

baryon acoustic oscillations

cosmic microwave background radiation

dark energy

dark energy mapping

exoplanets

geoastronomy

gravitational weak lensing

interstellar chemistry

luminous galaxies

nuclear astrophysics

quasars

space observatory

supernovae

telescope

Discipline: **Characterization**

Subjects

high-throughput structure determination

macromolecular protein crystallography

mass spectrometry

microcharacterization

NMR

protein crystallography

Raman imaging

x-ray crystallography

Discipline: **Chemistry**

Subjects

actinide science

alternative syntheses

atmospheric chemistry

biochemistry

biogeochemistry

catalysis

chemical dynamics

chemical energy

chemical modelling

chemical physics

chemical simulation

chemical synthesis

chemistry

combustion chemistry

electrochemistry
environmental chemistry
geochemistry
green chemistry
heavy element chemistry
heavy element studies
heterogeneous catalysis
interstellar chemistry
isotope geochemistry
materials chemistry
materials phase transformations
molecular chemistry
molecular structure and dynamics
nuclear chemistry
ozone photochemistry
quantum chemistry
radiochemical synthesis
radiochemistry
soft matter
solid state chemistry
statistical mechanics
surface chemistry
theoretical chemistry

Discipline: **Cosmology**

Subjects

baryon acoustic oscillations
cosmic expansion
cosmology
dark energy
dark energy mapping
space observatory
universe expansion

Discipline: **Detectors**

Subjects

bolometer arrays
cameras
detectors
gamma-ray detector system
scintillation detector

Discipline: **Engineering**

Subjects

advanced instrumentation design
atmospheric technology
bioengineering
bioinstrumentation
energy reservoir engineering
engineering
engineering business services
genomic technologies
heavy ion fusion
high-throughput analysis
high-throughput technologies
molecular motors
nanofabrication
nanoscale devices
optical systems
processing science
pulsed power
sensor technology for pathogen detection
sensors
synthetic biology

Discipline: **High energy physics**

Subjects

high energy neutrinos
high energy particle collisions
high energy physics
high-energy heavy-ion physics

Discipline: **Imaging**

Subjects

atomic force microscopy
biomedical imaging
bolometer arrays
cameras
cardiac nuclear imaging
cryo-electron microscopy
crystallography
electron microscopy
electron tomography
high throughput discovery
histologic molecular imaging
imagers
imaging
macromolecular analysis
magnetic soft x-ray microscopy
microscopy
molecular imaging
multiscale and multimodal imaging
multi-scale imaging
nanoimaging
neutrino telescope
optical tweezers microscopy
positron emission tomography
Raman imaging
scintillation radiation
single-molecule fluorescence microscopy
telescope
x-ray crystallography
x-ray microscopy

Discipline: **Light sources**

Subjects

advanced light source accelerator

beam science
extreme ultraviolet radiation
gamma rays
lasers
optics
photoionization
soft x-ray radiation
synchrotron light
UV
X-rays

Discipline: **Management**

Subjects

engineering business services
interdisciplinary science
scientific collaboration

Discipline: **Mathematics**

Subjects

mathematical physics
mathematics
mathematics modelling
numerical algorithms
partial different equations

Discipline: **Nuclear science**

Subjects

atomic science
dense nuclear matter
heavy ions
high energy neutrinos
high energy nuclear collisions
neutrino telescope
nuclear astrophysics
nuclear chemistry
nuclear dynamics

nuclear energy
nuclear physics
nuclear properties under extreme conditions
nuclear science
nuclear structure
nuclear theory
nuclear waste
quark-gluon plasma
solar neutrinos

Discipline: **Optics**

Subjects

mask defect analysis
multilayer optics
novel diffractive optics

Discipline: **Particle physics**

Subjects

b-quark
lepton flavor
neutral B-meson system
neutrinos
particle theory
quark
scintillation detector
symmetries
tau-lepton

Discipline: **Physics**

Subjects

atomic physics
chemical physics
condensed matter physics
conformal field theory
electroweak symmetry breaking
formal theory

fundamental symmetries
grand unification
mathematical physics
molecular physics
molecular structure and dynamics
nuclear physics
particle physics
perturbative QCD
physics
plasma physics
QCD in hadronic physics
quantum gravity
quark decays
radiation
radiation physics
soft matter
standard model
supersymmetry
topological field theory

Discipline: **Polymers**

Subjects

polymers

Discipline: **Quantum theory and science**

Subjects

quantum gravity
quantum groups
quantum mechanics
quantum theory
statistical mechanics
string theory

Discipline: **Radiation**

Subjects

cosmic microwave background radiation

extreme ultraviolet radiation

gamma-ray detector system

radiation detectors

radiation effect

soft x-ray radiation

Discipline: **Superconductors**

Subjects

superconducting magnets

superconductivity

Theme: **Novel materials, ultrafast processes, nanodevices**

Discipline: **Accelerators**

Subjects

accelerator physics

accelerators

beam equipment

beam generators

beam physics

beam science

beamlines

cyclotron

high energy particle collisions

ion beams

ion sources

Large Hadron Collider

synchrotron

Discipline: **Building design**

Subjects

air pollutants

air ventilation

airflow

building construction

building design

building energy use
building heating
building materials
cool roofing materials
health and productivity
health risk assessments
heat islands
indoor air quality
lighting
lighting efficiency
modelling
pollutant control
pollutant transport
sustainable design
thermal comfort
windows

Discipline: **Characterization**

Subjects

high-throughput structure determination
macromolecular protein crystallography
mass spectrometry
microcharacterization
NMR
protein crystallography
Raman imaging
x-ray crystallography

Discipline: **Detectors**

Subjects

bolometer arrays
cameras
detectors
gamma-ray detector system
scintillation detector

Discipline: **Electronics**

Subjects

charge-coupled devices
electronic systems
integrated circuits
microelectronics

Discipline: **Engineering**

Subjects

advanced instrumentation design
atmospheric technology
bioengineering
bioinstrumentation
energy reservoir engineering
engineering
engineering business services
genomic technologies
heavy ion fusion
high-throughput analysis
high-throughput technologies
molecular motors
nanofabrication
nanoscale devices
optical systems
processing science
pulsed power
sensor technology for pathogen detection
sensors
synthetic biology

Discipline: **Environmental science and technology**

Subjects

air pollution
air quality
bioremediation

carbon-neutral transportation fuels
chemical transformation
chemical transport
emissions
energy efficient technologies
environmental bioremediation
environmental characterization
environmental cleanup
environmental contamination
environmental impact
environmental policy
environmental processes modelling
environmental protection
environmental remediation
environmental restoration
environmental science
environmental stockpile stewardship
environmental stress
environmental sustainability
environmental chemistry
green chemistry
land use
natural attenuation
nuclear waste
policy analysis
technical research
toxic waste reduction

Discipline: **Imaging**

Subjects

atomic force microscopy
biomedical imaging
bolometer arrays
cameras
cardiac nuclear imaging

cryo-electron microscopy
crystallography
electron microscopy
electron tomography
high throughput discovery
histologic molecular imaging
imagers
imaging
macromolecular analysis
magnetic soft x-ray microscopy
microscopy
molecular imaging
multiscale and multimodal imaging
multi-scale imaging
nanoimaging
neutrino telescope
optical tweezers microscopy
positron emission tomography
Raman imaging
scintillation radiation
single-molecule fluorescence microscopy
telescope
x-ray crystallography
x-ray microscopy

Discipline: **Light sources**

Subjects

advanced light source accelerator
beam science
extreme ultraviolet radiation
gamma rays
lasers
optics
photoionization
soft x-ray radiation

synchrotron light

UV

X-rays

Discipline: **Management**

Subjects

engineering business services

interdisciplinary science

scientific collaboration

Discipline: **Materials science and technology**

Subjects

biomimetic/bioinspired functional materials

biomolecular materials

condensed matter physics

ferroelectrics

magnets

mask defect analysis

materials chemistry

materials phase transformations

materials science

materials science behavior

nanostructure materials

photovoltaic semiconductor elements

plastic electronics

processing science

quantum materials

semiconductors

solid state chemistry

surface chemistry

synthesis

thermoelectrics

ultrafast materials

Discipline: **Nanoscience and technology**

Subjects

combinatorial nanoscience
microcharacterization
microelectronics
molecular chemistry
molecular machines
molecular motors
molecular science
nanofabrication
nanogeoscience
nanoimaging
nanointerfaces
nanomaterials
nanoscale devices
nanoscience
nanostructure fabrication
nanostructure materials
nanotechnology
nanotechnology
thin films

Discipline: **Polymers**

Subjects

polymers

Discipline: **Superconductors**

Subjects

superconducting magnets

superconductivity

Discipline: **Ultrafast science and technology**

Subjects

ultrafast materials

ultrafast/time-resolved studies

Theme: **Secure and sustainable energy**

Discipline: **Building design**

Subjects

air pollutants
air ventilation
airflow
building construction
building design
building energy use
building heating
building materials
cool roofing materials
health and productivity
health risk assessments
heat islands
indoor air quality
lighting
lighting efficiency
modelling
pollutant control
pollutant transport
sustainable design
thermal comfort
windows

Discipline: **Energy science and technology**

Subjects

appliance energy use
artificial photosynthesis
batteries
bioenergy
biofuels
biomass
biosynthetic pathways
building energy use
carbon-neutral transportation fuels

chemical energy
clean energy generation
combustion technologies
electricity
electricity markets
electricity transmission
energy
energy bioscience
energy consumption
energy conversion
energy demand
energy distribution
energy efficiency
energy efficient technologies
energy end use
energy harvesting
energy policy
energy production
energy reservoir engineering
energy simulation
energy standards
energy storage
energy transmission
fuel cells
fuels
fusion energy
geothermal energy
global energy use
heavy ion fusion
hydrocarbon fuels
low emission combustion
mechanochemical energy conversion
multiscale information from microbial systems
natural gas
nuclear energy

oil and gas resources
photoelectrochemical cells
photoionization
photovoltaic semiconductor elements
proton-proton interactions
public policy
purification and screening techniques
sensors
solar cells
solar energy
spectroscopy
stored energy
subsurface energy production
sustainable design
transportation

Discipline: **Engineering**

Subjects

advanced instrumentation design
atmospheric technology
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bioinstrumentation
energy reservoir engineering
engineering
engineering business services
genomic technologies
heavy ion fusion
high-throughput analysis
high-throughput technologies
molecular motors
nanofabrication
nanoscale devices
optical systems
processing science
pulsed power

sensor technology for pathogen detection

sensors

synthetic biology

Discipline: **Environmental science and technology**

Subjects

air pollution

air quality

bioremediation

carbon-neutral transportation fuels

chemical transformation

chemical transport

emissions

energy efficient technologies

environmental bioremediation

environmental characterization

environmental cleanup

environmental contamination

environmental impact

environmental policy

environmental processes modelling

environmental protection

environmental remediation

environmental restoration

environmental science

environmental stockpile stewardship

environmental stress

environmental sustainability

environmental chemistry

green chemistry

land use

natural attenuation

nuclear waste

policy analysis

technical research

toxic waste reduction

Discipline: **Imaging**

Subjects

atomic force microscopy

biomedical imaging

bolometer arrays

cameras

cardiac nuclear imaging

cryo-electron microscopy

crystallography

electron microscopy

electron tomography

high throughput discovery

histologic molecular imaging

imagers

imaging

macromolecular analysis

magnetic soft x-ray microscopy

microscopy

molecular imaging

multiscale and multimodal imaging

multi-scale imaging

nanoimaging

neutrino telescope

optical tweezers microscopy

positron emission tomography

Raman imaging

scintillation radiation

single-molecule fluorescence microscopy

telescope

x-ray crystallography

x-ray microscopy

Discipline: **Management**

Subjects

engineering business services

interdisciplinary science

scientific collaboration