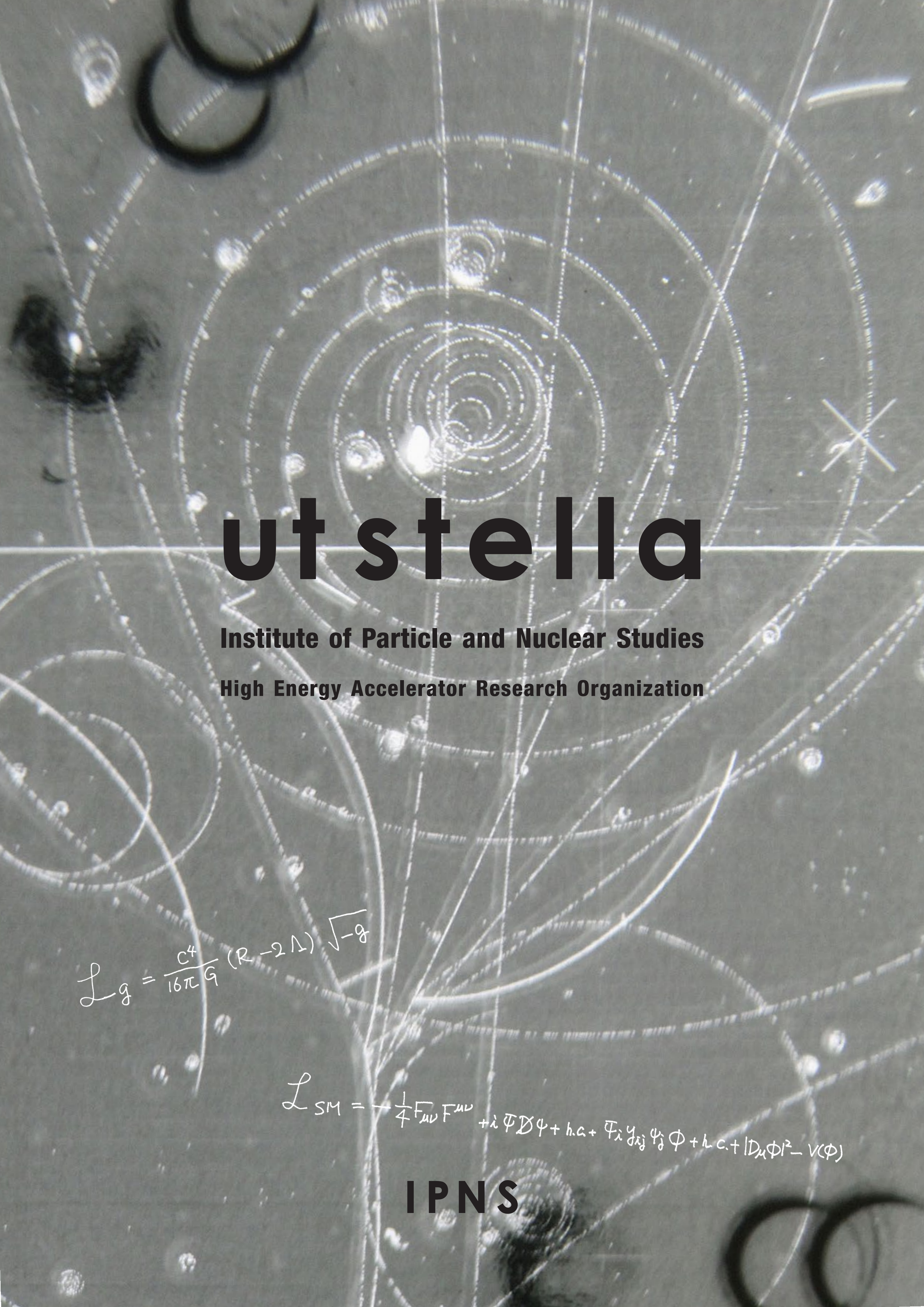


utstella

Institute of Particle and Nuclear Studies

High Energy Accelerator Research Organization

$$\mathcal{L}_g = \frac{c^4}{16\pi G}(R - 2\Lambda)\sqrt{-g}$$

$$\mathcal{L}_{SM} = -\frac{1}{4}F_{\mu\nu}F^{\mu\nu} + i\bar{\psi}\not{D}\psi + h.c. + \bar{\psi}_i y_{ij}\psi_j\Phi + h.c. + |D_\mu\Phi|^2 - V(\Phi)$$

IPNS

ut stella

IPNS Illuminates the "Unknown" like Stars

The Institute of Particle and Nuclear Studies (IPNS) is a research institution that advances our understanding of the physical world from microscopic particles to the whole universe, by developing theories and performing cutting-edge experiments. IPNS's organizational structure, made up of five distinct fields of research, resembles a constellation of stars.

It was once thought that atoms were the smallest building blocks of matter. It eventually became known that atoms consist of a nucleus and electrons. Furthermore, the nucleus is made up of protons and neutrons, which are in turn composed of quarks. At present, the quarks and leptons (of which the electron is one) are considered to be the fundamental particles – the smallest building blocks of matter. We know of four forces acting on these fundamental particles: gravitational, electromagnetic, strong, and weak. The electromagnetic, strong, and weak forces are understood to be transmitted by gauge bosons, a separate class of particles. Finally, the Higgs boson plays a central role in giving mass to these particles. Physicists have spent over a century developing the 'Standard Model of Particle Physics' that encompasses these concepts.

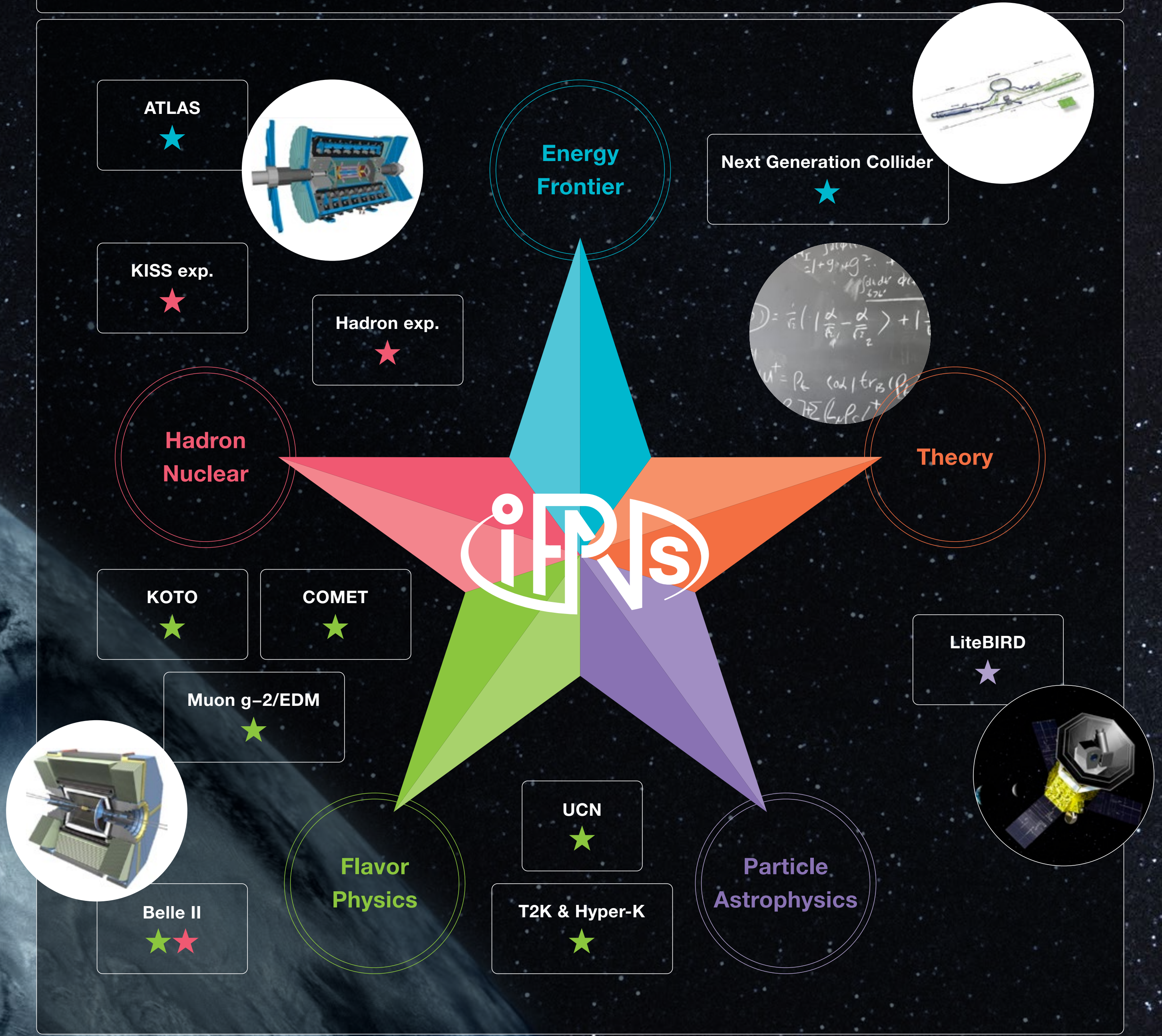
About 13.8 billion years ago, the universe was incredibly hot and filled with particles which we have not yet discovered. As the universe expanded and cooled, protons, neutrons, and eventually atomic nuclei, atoms, and matter formed. Unraveling the microscopic world of particles and atomic nuclei means exploring the history of the universe itself. At IPNS, we pioneer new theories of nature, and test them through experiments. If devices needed to carry out these experiments do not exist, we innovate and create our own, with the aim to unveil the laws of physics that connect everything from particles to the universe.

ut stella—Like stars, IPNS continues to illuminate the unknown.

*[*ut stella*] in Latin translates to "like a star"

Cover Visual	An illustration depicting particle tracks from particle reactions captured by KEK's bubble chamber. The equations represent "Einstein's equations of gravity" and "equations of the electromagnetic, strong, and weak forces acting on particles."

Multilateral research spanning from the microscopic world to the universe.



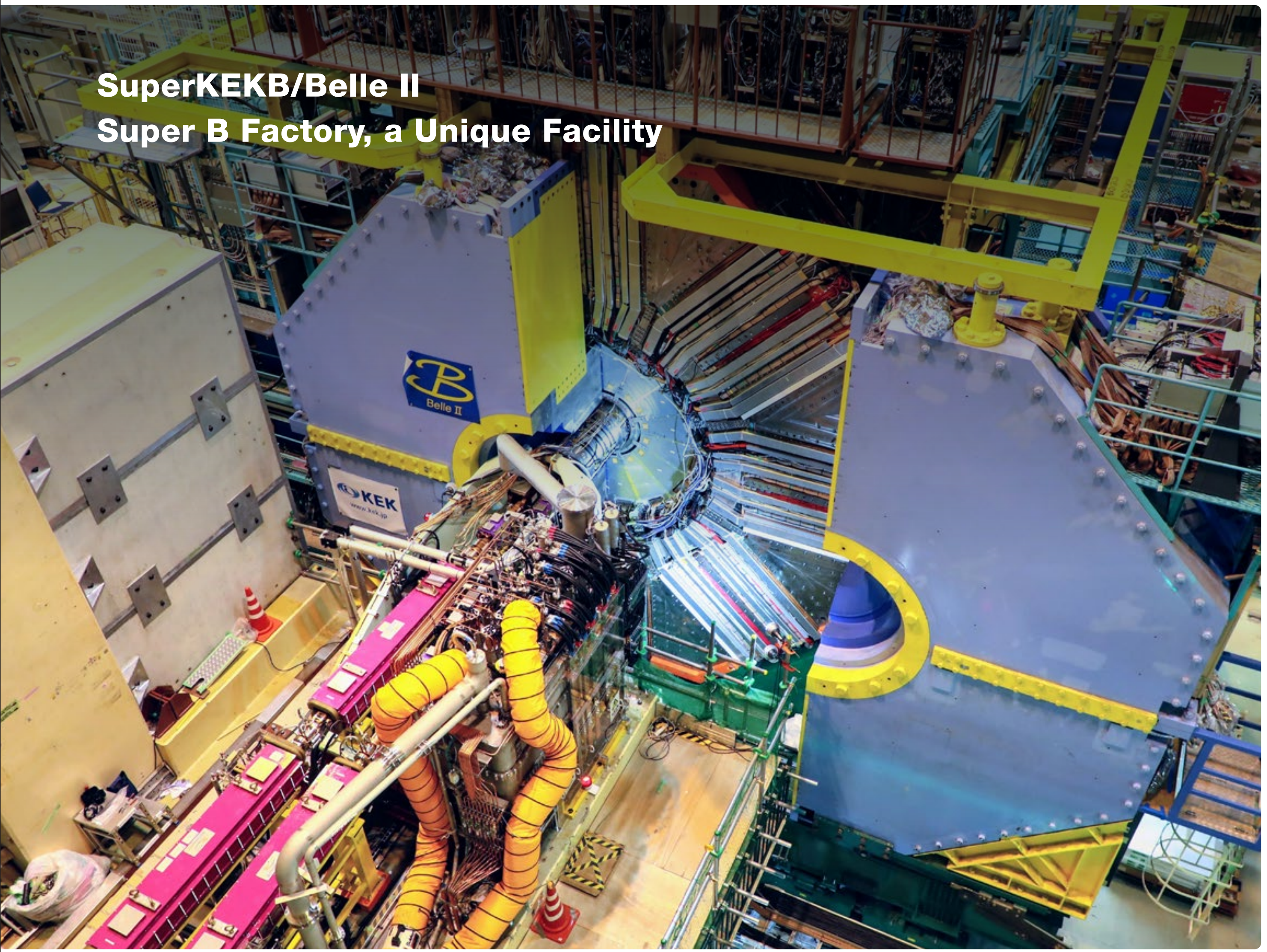
★ Energy Frontier	Exploring the new physics at unprecedented energies.
★ Hadron Nuclear	Exploring the nature of atomic nuclei and the 'strong force' which binds them.
★ Flavor Physics	Searching for new laws of physics by precisely studying properties and interactions of particles.
★ Particle Astrophysics	Exploring space observation through particle physics.
★ Theory	Conducting fundamental theoretical research into particle and nuclear physics.

[IPNS: Institute of Particle and Nuclear Physics] The logo shows"IPNS", the Institute's abbreviation. The ellipse with an "i" dot represents both an electron in an atom and a particle accelerator or collider, while the "P" and "N" are woven together, as are the fields of particle and nuclear physics.

Belle II Experiment

Quest for New Physics with the World's Highest-Luminosity Accelerator

The Belle II experiment explores new physics phenomena that are the keys to solving the mysteries of the universe. By precisely studying the decay patterns of particles produced by the SuperKEKB accelerator, in which we produce extremely rare phenomena of the universe such as the break-down of the particle-antiparticle symmetry, we reveal the nature of yet-unknown new particles and forces. Our aim is to unveil new laws of physics, which would be a step towards solving the mysteries of the antimatter disappearance from the universe and the nature of dark matter.



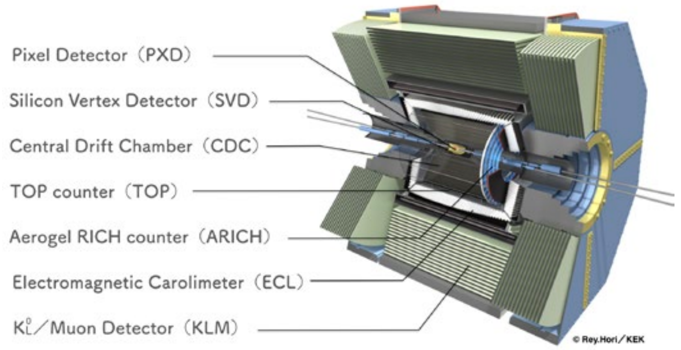
SuperKEKB/Belle II Super B Factory, a Unique Facility

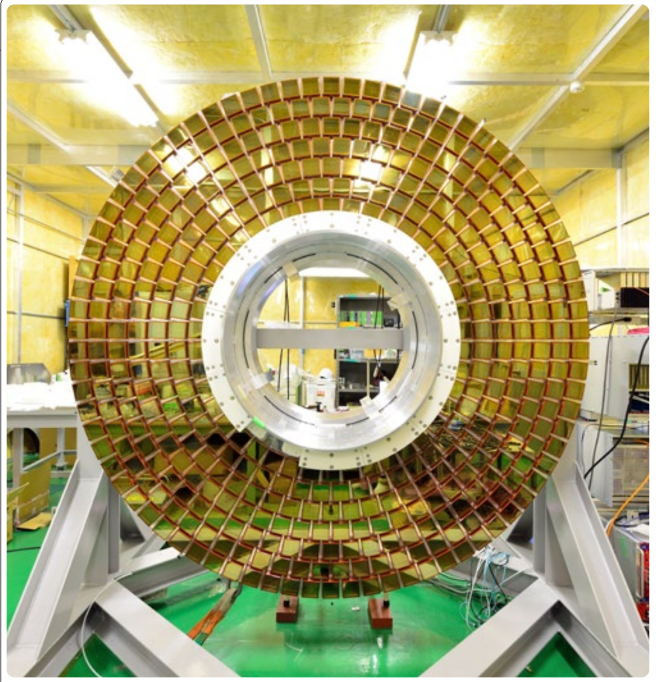
A Large-Scale Detector, Belle-II

The Belle II detector is about 8 m in width and 8 m in height, with a weight of around 1,400 t. It contains multiple detector components optimized for various measurements in a multi-layer cylindrical structure around the collision point of the SuperKEKB particle beams. Belle II is an international collaboration of over 1,100 researchers from 125 universities and research institutions in 28 countries and regions, and KEK is the host lab. Belle II is aiming to collect 50 times more data of B-meson decay events than the previous Belle experiment.

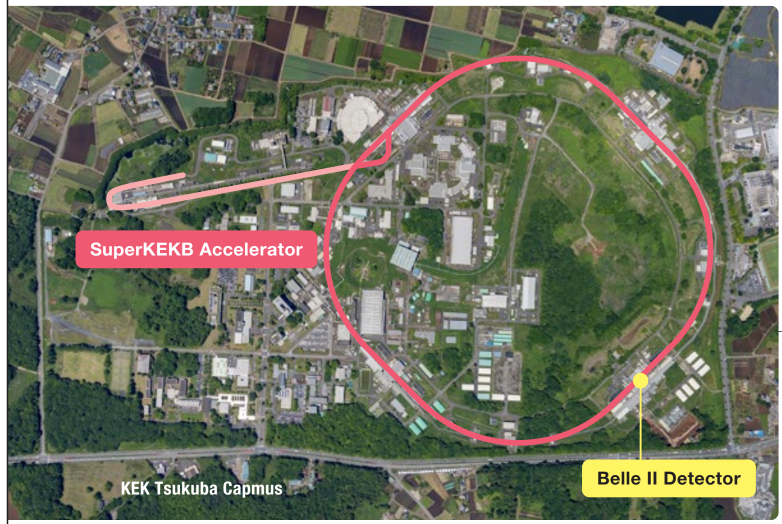
Inside the Belle II Detector

Secondary particles produced in decays, such as electrons, photons, muons, pions, kaons and protons, are measured precisely with these detector components.





The ARICH detects Cherenkov photons with accurate position information to identify the particle type.

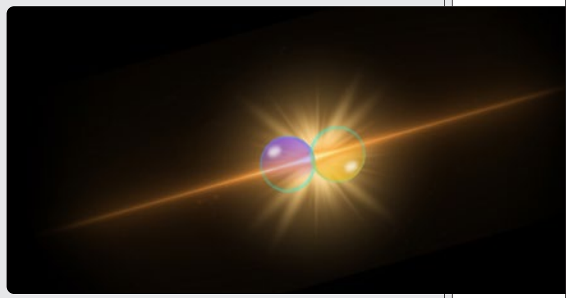


SuperKEKB Accelerator – Luminosity World Record Holder

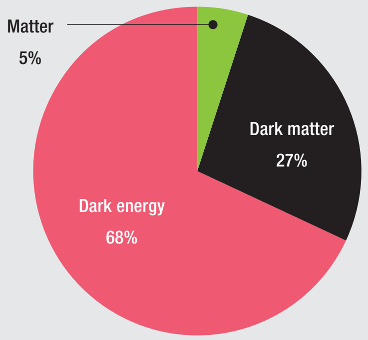
The SuperKEKB, a 3-km circumference electron-positron collider, holds the current world record for luminosity (collision performance). Multiple improvements, including reducing the size of the beam at the collision point and increasing the beam currents, will allow SuperKEKB to further increase its luminosity, achieving a collision rate tens of times higher than that of the previous KEKB accelerator.

The Mysteries Behind the Disappearance of Antimatter from the Universe

We believe that an equal amount of matter and antimatter were produced by the Big Bang at the very beginning of our universe. However, the universe we observe today is filled only with matter. Physicists think that the break-down of charge and parity (CP) symmetry is one of the keys to explain this. CP symmetry represents that the laws of physics are identical for particles that form matter and antiparticles that form antimatter. This symmetry is slightly violated, i.e., the laws of physics differ slightly for particles and antiparticles, as proved by measurements and described in the Standard Model (SM) of Particle Physics. The Kobayashi-Maskawa (KM) theory, which was proposed in 1973, explained the mechanism of violation of CP symmetry. The Belle was built to test the KM theory in B meson decays and confirmed it. However, known sources of CP violation are too small to explain why the antimatter disappeared, so this remains a major mystery of particle physics.



When a particle and its antiparticle meet, they annihilate and transform into pure energy.



Unveiling the Nature of Dark Matter

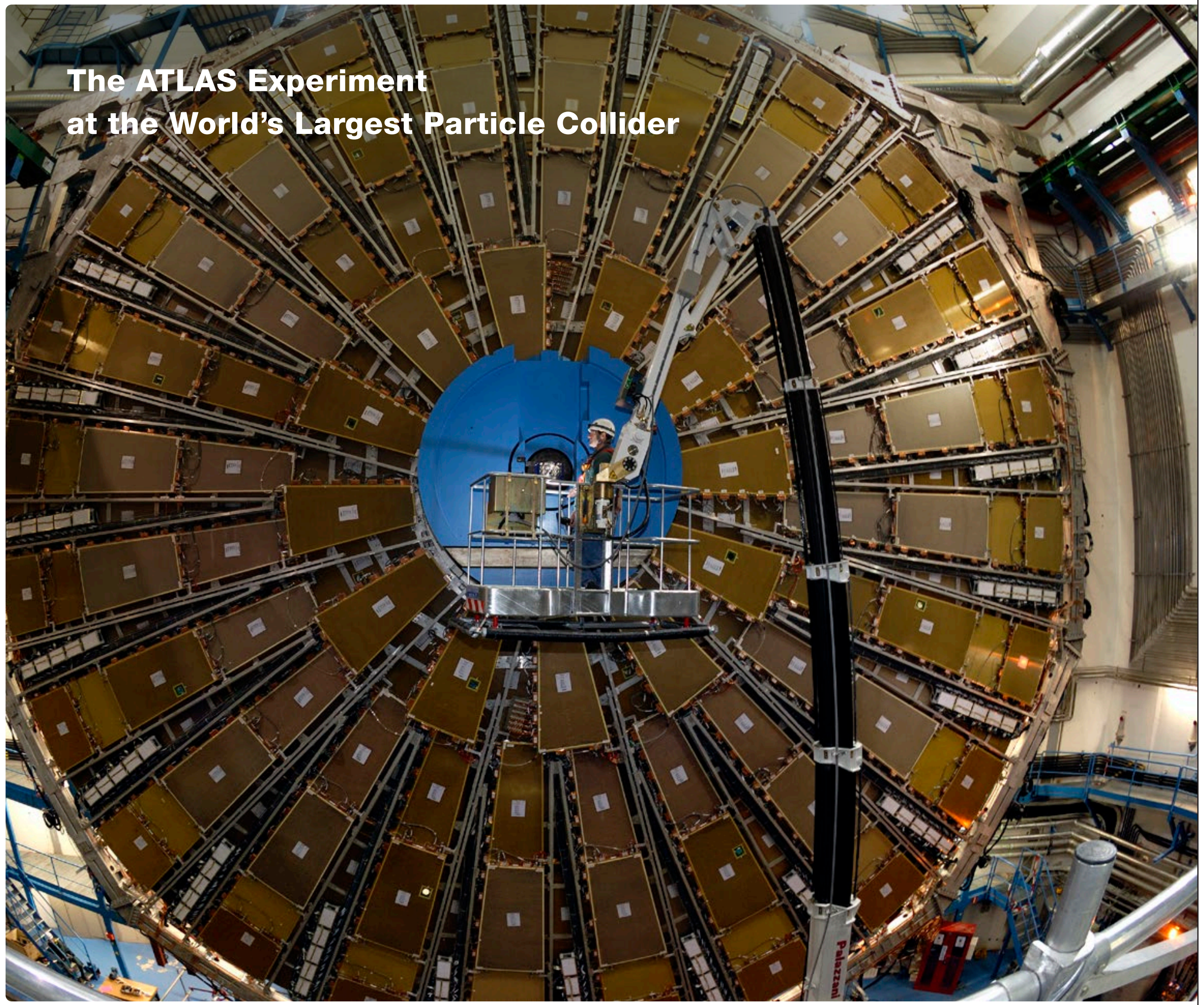
According to the latest cosmological observations, the matter described by the SM constitutes only 5% of the entire universe, and unidentified dark matter and dark energy constitute the remaining 95%. We know nothing about the microscopic nature of dark matter, except that it is not made of SM particles. Belle II also focuses on dark matter as one of the main research programs. For example, a hypothetical particle called a Z prime boson is proposed to extend the SM as a possible connection between dark and ordinary matter. We make every possible attempt to search for such yet-unknown clues to dark matter.

Energy Frontier

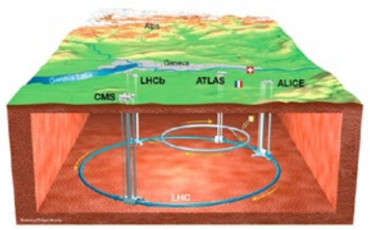
Exploring the Laws of Physics at Unprecedented High Energies

Energy Frontier experiments use high energy accelerators to recreate and measure particles and phenomena that governed the early universe. The LHC/ATLAS experiment at CERN near Geneva, Switzerland, is now investigating the Higgs boson discovered at the LHC and searching for new particles.

The ATLAS Experiment at the World's Largest Particle Collider

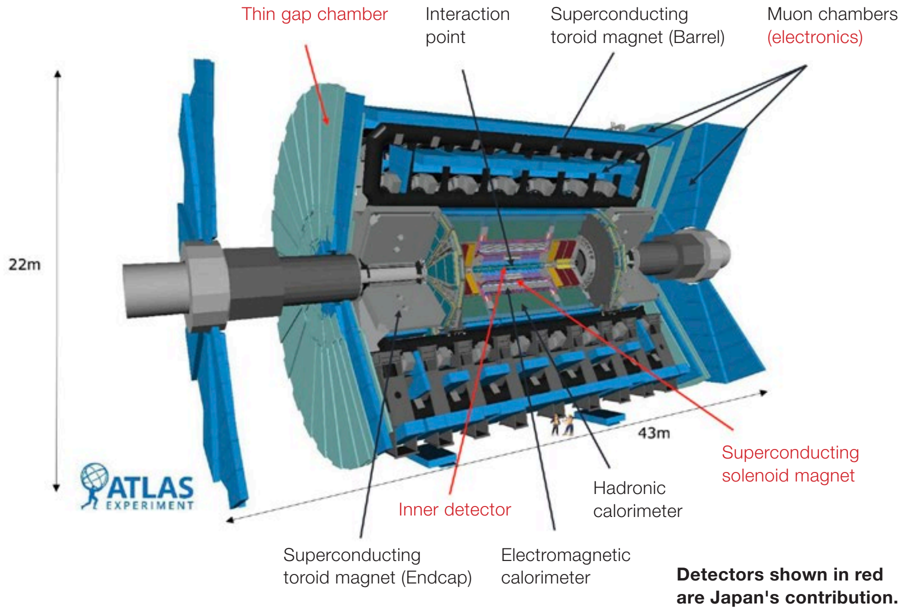


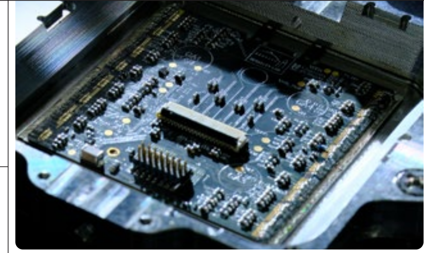
The LHC (Large Hadron Collider) is the world's highest energy collider. Interactions at one of the collision points are observed by the ATLAS detector, which is 22 m in diameter, 43 m long, and weighs 7,000 t.
ATLAS is operated by an international collaboration of over 5,900 members of 103 nationalities. The Energy Frontier (EF) Group plays a central role in ATLAS, from the construction of the detector to physics analysis.



The LHC, with a circumference of 27 km, is the world's largest circular accelerator, colliding protons at facilities approximately 100 m below the surface.

Japan's Contribution to the ATLAS Experiment





Pixel semiconductor detector modules in the inner tracker for the HL-LHC experiment will measure charged particle trajectories with improved precision.

The ATLAS detector consists of various sub-systems which measure the large number of particles produced in proton-proton collisions. The ATLAS Japan group plays a crucial role in developing, constructing, and operating the inner tracker, superconducting solenoid magnet and muon trigger detector. We have also significantly contributed to data analyses and resulting physics achievements, including the Higgs boson discovery. The LHC is progressing towards High-Luminosity LHC (HL-LHC), intensifying proton collision rates. ATLAS Japan leads the upgrade of the inner tracker and muon trigger detector electronics to prepare for HL-LHC.

Developing Detectors for the Future Energy Frontier Experiments

Various next-generation experiments are planned to investigate the energy scale of new physics unveiled by the LHC and HL-LHC experiments. The International Linear Collider (ILC) is a prime example. IPNS-KEK collaborates with domestic and international universities and research institutions to advance detector development for future energy frontier experiments such as the ILC.

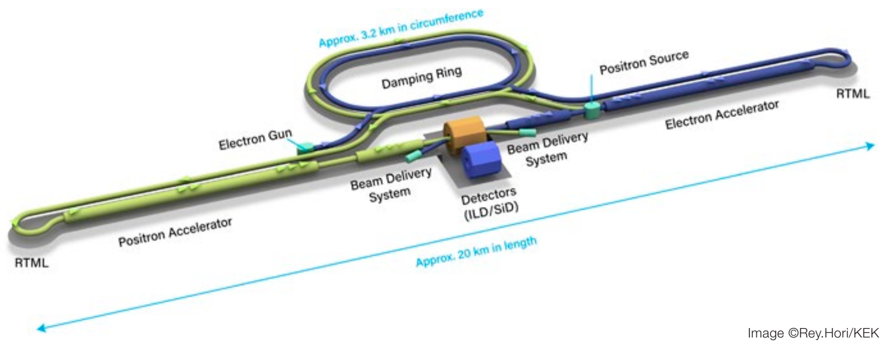
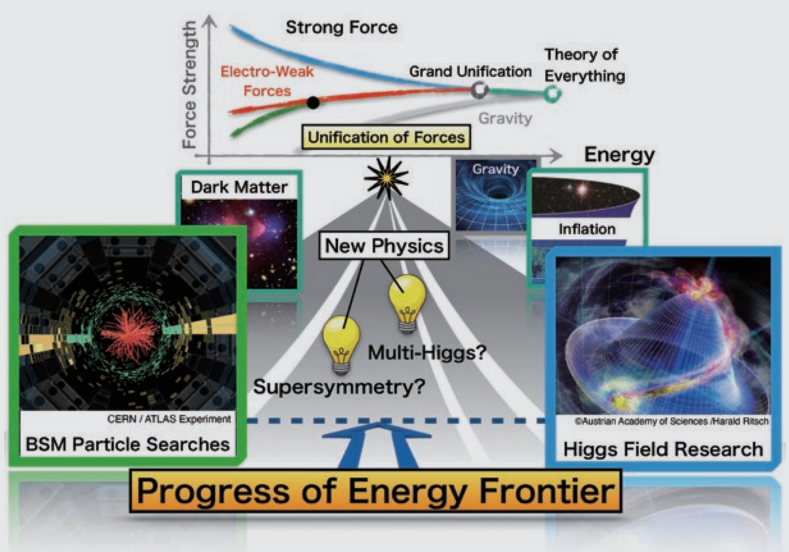


Image ©Rey.Hori/KEK

Approaching Theories of the Origin of the Universe: Grand Unified Theory and Theory of Everything

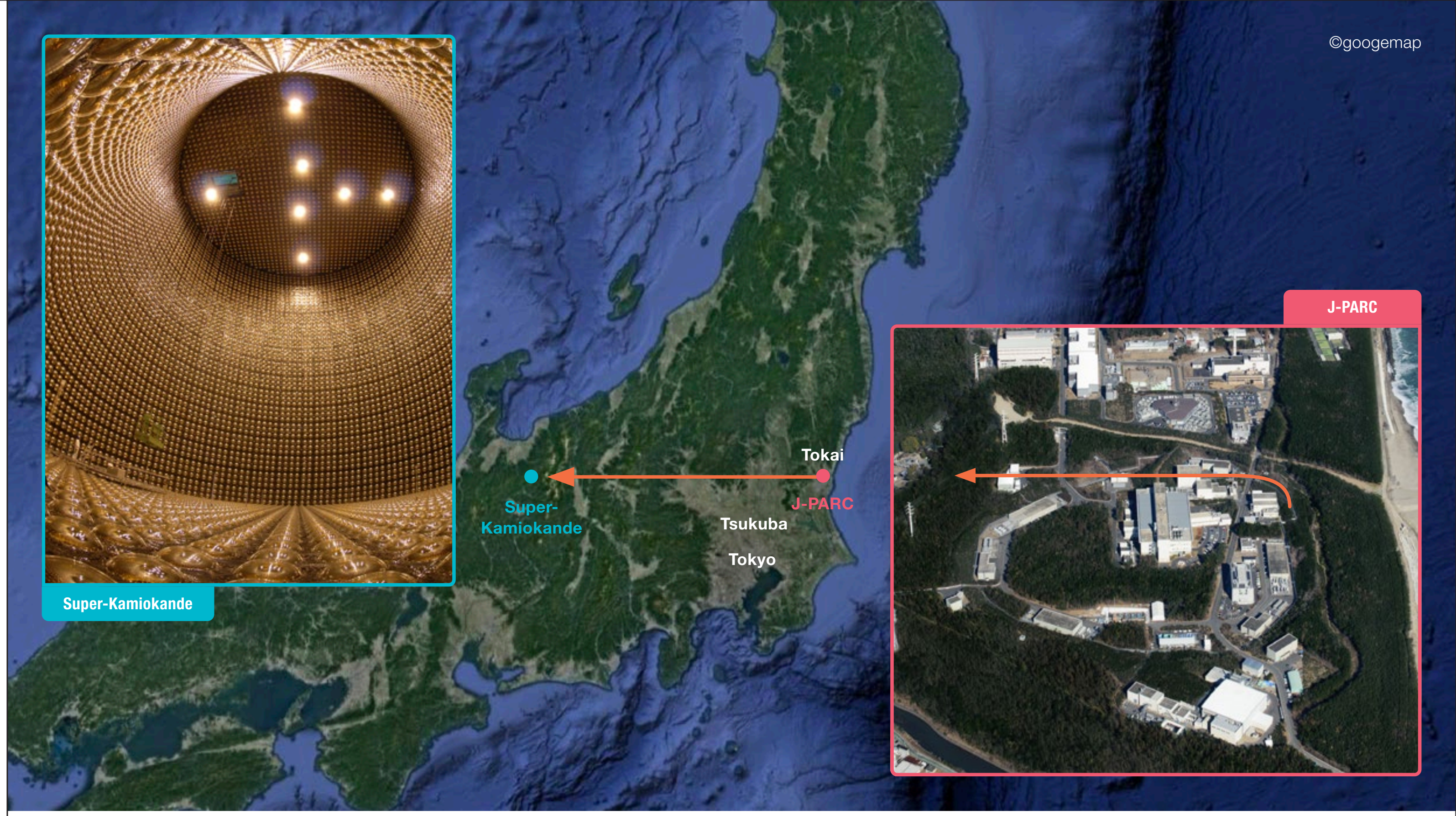


What is matter made of? What was the universe like right after its birth? Energy Frontier experiments tackle these questions experimentally. The discovery of the Higgs boson at the LHC in 2012 revealed that particles gain mass through interactions with a Higgs field that fills the universe. However, the nature of the Higgs boson is still not well understood, it may hold clues to laws of physics beyond the Standard Model (SM). We know that dark matter fills the universe, but the SM cannot explain it. To unravel such mysteries, it is crucial to thoroughly study the Higgs boson to explore higher energy scales in the search for new physics, and to search for new particles such as supersymmetric partners of the SM particles. Future Energy Frontier experiments will bring us closer to a 'Grand Unified Theory' that unifies the electromagnetic, weak, and strong forces, and ultimately towards a 'Theory of Everything' that unifies even gravity.

T2K Experiment

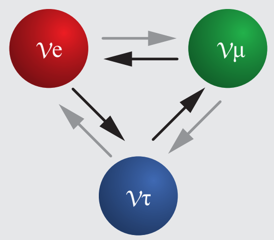
Approaching the Mysteries of Matter and Antimatter in the Universe through Neutrino Oscillations

T2K (Tokai-to-Kamioka) is a long-baseline neutrino-oscillation experiment - neutrinos produced at the Japan Proton Accelerator Research Complex (J-PARC) in Tokai are observed at the Super-Kamiokande detector 295km away. In 2013, T2K discovered the oscillation of muon neutrinos to electron neutrinos. Since 2014, the experiment has been operating using not only neutrino beams but also antineutrino beams to examine why the universe is made of matter, and not antimatter.



Three Types of Neutrinos that Change Into One Another

Neutrinos are electrically neutral particles which have less than one-millionth the mass of electrons and the lightest quarks. Neutrinos seldom interact with other matter, so we cannot sense them while they are around us. Hundreds of trillions of neutrinos emitted from the Sun are passing through our bodies every second. There are three types (generations) of neutrinos: electron, muon, and tau neutrinos. It is known that the type of the neutrino changes from one to another as the neutrino travels. For example, even if a 100% pure muon neutrino beam is produced by an accelerator, some of the muon neutrinos can be observed as tau neutrinos after they travel over some distance. This phenomenon is called "neutrino oscillation". T2K is studying the full picture of neutrino oscillations between the three neutrino generations.

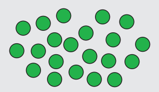


T2K aims to establish neutrino oscillations between the three neutrino generations.

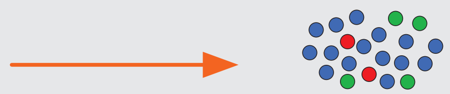
Challenges to Discover "Violation of CP Symmetry" in Neutrinos

Neutrino beam produced at J-PARC

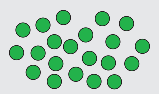
Neutrinos arriving at Super-Kamiokande



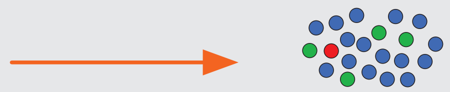
Nearly pure muon neutrino beam



The majority have changed into tau neutrinos.
A small fraction has become electron neutrinos.



Nearly pure muon antineutrino beam



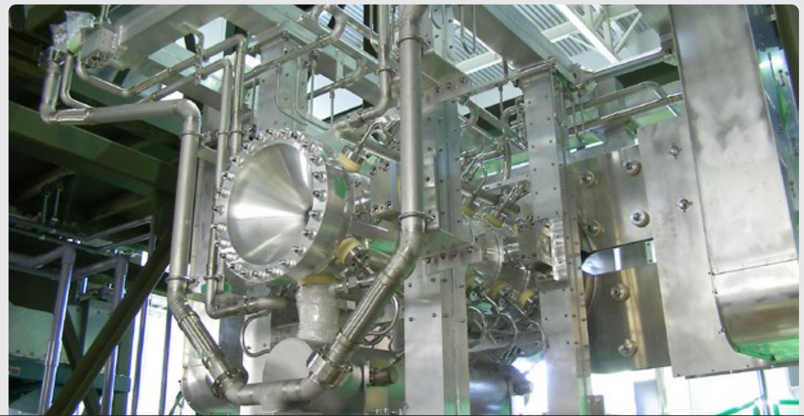
The majority have changed into tau antineutrinos.
A small fraction has become electron antineutrinos.

Experimental Data	Expected number (Assuming no CP symmetry violation)	Observed number
neutrinos	95.4	108
antineutrinos	19.7	16

The latest T2K results show that the appearance of electron neutrinos is larger than the expectation in the case of no CP asymmetry, and the appearance of electron antineutrinos is smaller than the expectation for no CP asymmetry. This discrepancy indicates possible evidence of CP symmetry breaking.

In 2016, T2K observed an indication of a difference in the oscillation probabilities for neutrinos and antineutrinos at the 90% confidence level. An asymmetry between matter and antimatter observed so far in quark sector is not sufficient to explain the origin of the universe made of matter, and the asymmetry in neutrino sector would be a possible candidate to explain it. T2K is aiming to discover the "CP asymmetry" in neutrinos at a 99.7% confidence level by further increasing the intensity of the neutrino beam and increasing the amount of data by a factor of ten.

An electromagnetic horn is a device to focus the neutrino beam in the direction of Super-Kamiokande. The direction of travel of pions which exit the target is bent by a strong magnetic field generated by a pulsed electrical current. Neutrinos, produced in the decay of pions, are focused in the forward direction. An antineutrino beam can be focused if the direction of the horn's electrical current is reversed.



Beam Across Japan

A high-intensity neutrino beam is produced at J-PARC in Tokai, Ibaraki. The beam is sent to Kamioka, Hida-city, Gifu 295 km away, and beam neutrinos are observed by the Super-Kamiokande detector about one millisecond after the beam production.
The near neutrino detector at the J-PARC site observes neutrinos right after neutrino production. From a comparison of the observations at both sites, oscillations during the 295-km journey can be studied. The T2K international collaboration includes more than 500 researchers from 14 countries.

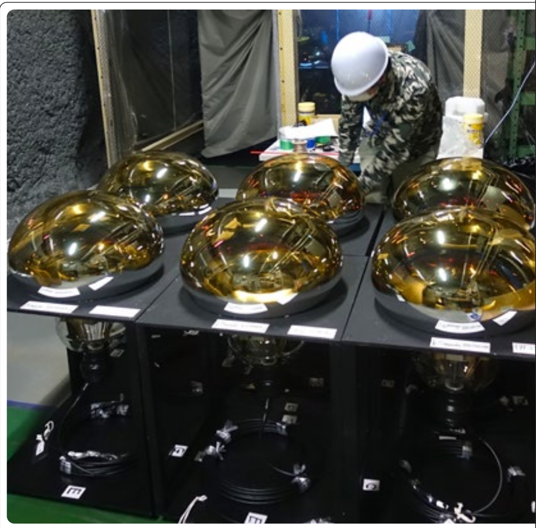
Near Neutrino Detectors

Near Neutrino Detectors

The near neutrino detectors are installed in an underground pit in the neutrino monitoring building. The pit is located 280 m downstream from the target, and is 33.5 m in depth and 17.5 m in diameter. There are two independent detectors: the "INGRID detector", which monitors the stability of the neutrino beam direction and intensity, and the "ND280 detector", which measures the energy distribution of the neutrino beam and the fraction of electron neutrinos in the beam.

Super-Kamiokande

Super-Kamiokande (SK) is a large water Cherenkov detector located 1,000 m underground in the Kamioka mine, and is hosted by the Institute for Cosmic Ray Research, University of Tokyo. The detector consists of a water tank 39.3 m in diameter and 41.4 m in height, filled with 50,000 t of ultra-pure water. The water is viewed by 11,129 highly-sensitive photomultiplier tubes, which detect Cherenkov radiation—light generated by neutrino interactions in the water. The data from photomultiplier tubes can be used to determine the type, direction, and energy of the interacting neutrinos. The detector has been in operation since April 1996, and is continuously observing various kinds of neutrinos from outer space.



The new photosensors developed for HK
Provided by: University of Tokyo, Institute for Cosmic Ray Research, Kamioka Observatory

Hyper-Kamiokande

Hyper-Kamiokande (HK) is the next generation gigantic water Cherenkov detector in Kamioka. In order to dramatically improve the sensitivity of the search for CP violation and proton decay, HK is under construction with the aim of starting observations in 2027. It is planned that HK will observe the enhanced neutrino beam from J-PARC with a detector that has eight times the effective mass of SK and is equipped with newly-developed high-sensitivity optical sensors.

Research at Hadron Experimental Facility

Hadron Nuclear

Flavor Physics

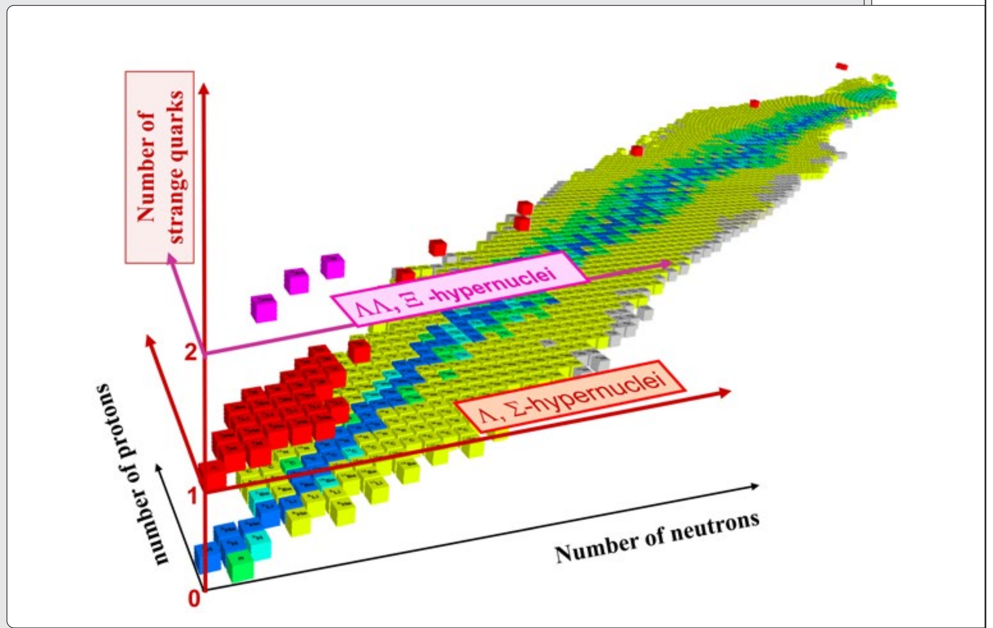
Origin of the Universe and Matter Investigated Using Various Particle Beams

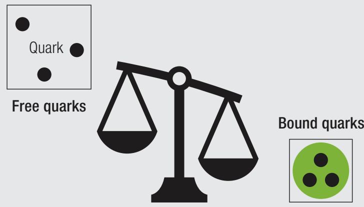
"Hadrons" are types of particles which experience the strong interaction. At the Hadron Experimental Facility (HEF), the origin of matter is investigated on the microscopic scale to answer questions such as: what are the ultimate building blocks of matter? what forces bind them together? The nuclear force is studied by producing non-standard nuclei including particles other than protons and neutrons. Experiments are conducted into a wide range of topics in nuclear and particle physics.

Hypernuclei – Into the Unknown Matter World

The nuclei of ordinary matter on Earth are composed of nucleons (protons and neutrons), however in hadron experiments it is possible to create "hypernuclei," nuclei that contain strange quarks, which are not found in ordinary matter. Nucleons are attracted to one another and bind together to form nuclei, but when nucleons are brought even closer, they feel a strong repulsive force. The origin of this repulsive force is still unknown. The study of the properties of hypernuclei is expected to clarify the nature of the nuclear force at short distances.

Neutron stars in the universe are made of extremely dense matter, more than 10^{14} times the density of the Sun. "Hyperons," particles that contain strange quarks, are thought to exist inside neutron stars. Studying hypernuclei and hyperons may shed light on the contents and properties of matter inside neutron stars.





Why are bound quarks haevier?

Mass without Mass Puzzle

Exploring the Mystery of Hadron Mass

Hadrons are made up of quarks, however the hadron mass is nearly a hundred times larger than that of the bare mass of the quarks. Dr. Yoichiro Nambu proposed a model called "spontaneous chiral symmetry breaking" to explain this discrepancy. According to this model, in a high-temperature, high-density environment such as the early universe, interaction with surrounding matter is expected to reduce the number of the so-called quark condensates, resulting in a lighter mass. At HEF we create phi mesons within the nuclei to investigate how their mass changes under such conditions.

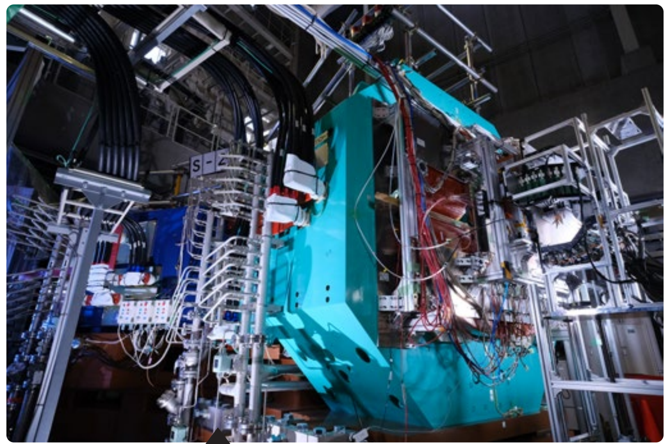
Beyond the Standard Model of Particle Physics

Large quantities of strange quarks and muons are produced at HEF and they are used to explore physics phenomena that are expected to occur extremely rarely in the Standard Model. The KOTO experiment searches for rare decays of neutral K mesons that break CP symmetry. The COMET experiment searches for muon-electron conversion. These experiments play a part in the IPNS's multifaceted approach to searching for signs of physics beyond the Standard Model.

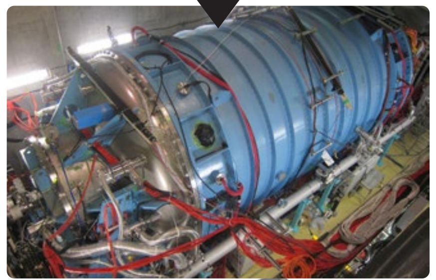
Hadron Experimental Facility

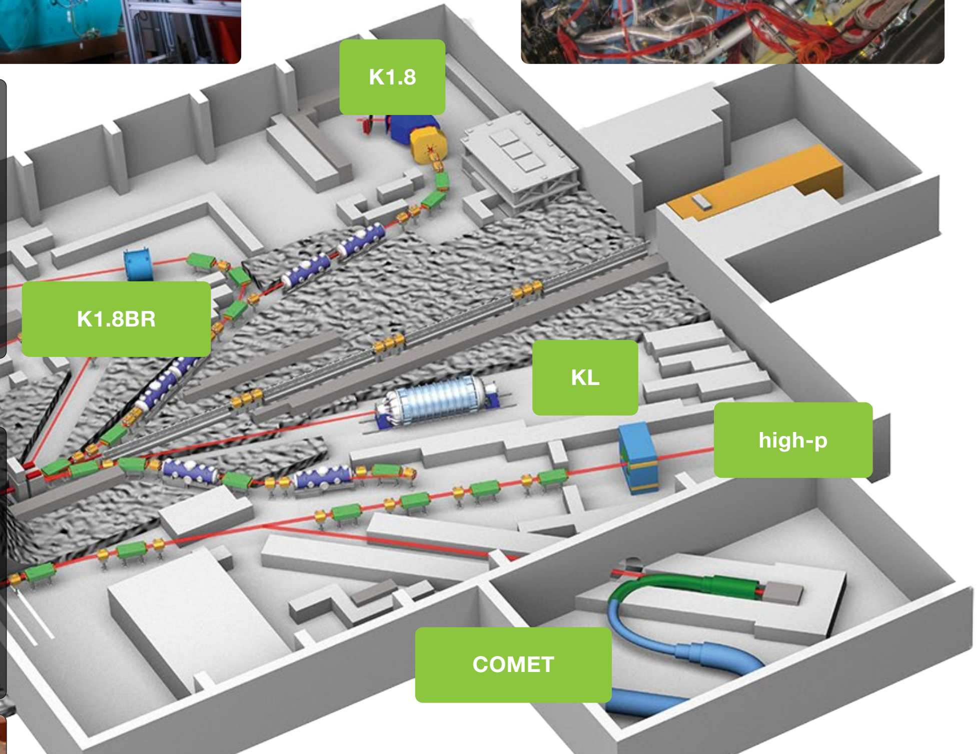
Hadron Experimental Hall and South Experimental Building

The Hadron Experimental Hall, 58 m wide and 56 m long, is the central building of HEF, and houses the primary proton beamlines that guide the 30 GeV proton beam from the accelerator, a secondary particle production target, beam dumps, secondary beamlines, and experimental equipment. Three secondary beamlines — K1.8BR, K1.8, and KL — are currently installed in the A-line, the main primary proton beamline, each with its own experimental area. Experiments using primary proton beams are conducted on the high-momentum ("high-p") B-line at which a small fraction of the proton beam from the accelerator is extracted and transported. The C line transports the 8-GeV proton beam from the accelerator to the Hadron South Experimental Building, where the COMET experiment searches for muon-electron conversion events.



[KOTO detectors at KL beamline]
KOTO experiment is searching for a decay mode of the neutral K meson which breaks CP symmetry.





[A new high-resolution spectrometer, S-2S at K1.8 beamline]
Detectors were set up in front of and behind the three newly installed large electromagnets in 2022, aiming to investigate the structure of hypernuclei and interactions affecting hyperons.

[Curved solenoid at COMET beamline]
COMET explores muon-to-electron conversion, in which a muon converts to an electron without emitting neutrinos. Discovering this phenomenon would be a remarkable sign of new physics beyond the Standard Model.

[FM Spectrometer at High-p beamline]
Studying the properties of hadrons in nuclei, to explore the origin of hadron mass.

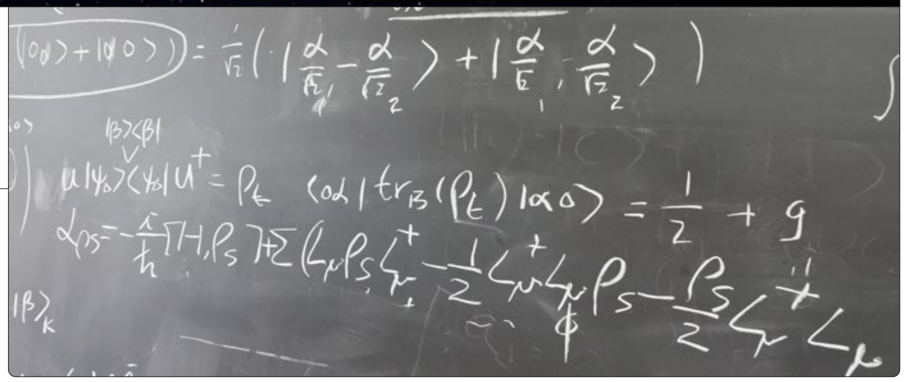
Theory | Energy Frontier | Hadron Nuclear | Flavor Physics | Particle Astrophysics

Theory Center

Quest for the Ultimate

What laws govern the universe? How did the universe begin? Various experimental projects at IPNS are dedicated to unraveling these fundamental questions. Underpinning these projects is theoretical research. What are the laws of particles? What are the properties of nuclei? What is the true nature of dark matter? What defines space, time, and quanta? At the Theory Center, through a blend of experimental data, mathematics, computational tools, and imagination, we are on the quest for the "ultimate".

Broad Research Fields for Unraveling Nature's Mysteries



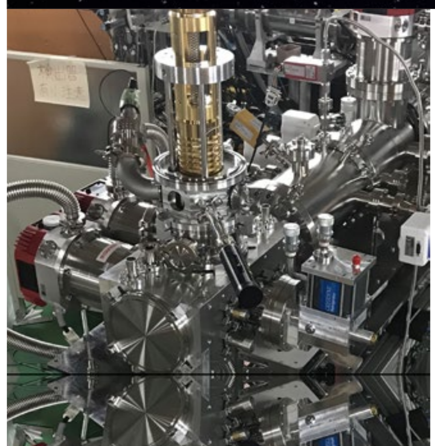
Simple mathematical equations can describe the complex properties of particles and nuclei as well as the history of the universe. For instance, Einstein's theory of relativity stemmed from basic principles about space and time, yet solving these equations unveils a wealth of knowledge about gravity and cosmic laws. The Kobayashi-Maskawa theory showed that CP symmetry naturally breaks if elementary particles have three generations. Simple principles lead to diverse outcomes, and that's why understanding these principles is vital in theoretical research.
In particle physics, the biggest challenge lies in establishing theories that go beyond the current Standard Model of particles. To achieve this, the initial step is to find clues leading toward a solution. The task is to explore how to verify these clues through experiments and observations.
Nuclei, which shape today's universe, consist of protons and neutrons, but numerous other hadrons also exist. Researchers delve into the world of quarks, studying various hadronic substances produced in accelerators. This exploration ranges from conditions within neutron stars, where ultra-high density exists, to the superheated early universe. Sometimes, simulations with supercomputers are used to comprehend this quark-made world.
The study of particle physics and the universe are inseparable. Dark matter, firmly inferred from astronomical observations, challenges the Standard Model of particle physics. Additionally, the properties of particles impact structures beyond galaxies in the universe. Exploring concepts like the origin of the universe through cosmic theories and superstring theory might bring scientific answers to such unfathomable questions.

Hadron Nuclear

Wako Nuclear Science Center

Exploring the Origins of the Elements

Wako Nuclear Science Center (WNSC), located at RIKEN in Wako, Saitama, artificially creates short-lived nuclides by using KISS, an internationally unique nuclear experimental device developed by KEK and provides them for joint use experiments. Collaborating with the RIKEN Nishina Center for Accelerator-Based Science, we aim to discover new isotopes and elucidate the origin of heavy elements in the universe.



KISS is particularly well suited for producing neutron-rich, short-lived nuclides, which are the origin of gold, platinum, and uranium. The newly developed Multi-Reflection Time-of-Flight (MRTOF) Mass Spectrographs are used in comprehensive mass measurement programs to determine the elements' origin, and the mass measurement of the superheavy elements such as isotopes of nihnium. MRTOF is not only the basis for the identification of new elements but will also contribute to the discovery of "islands of stability," which are much heavier and longer-lived than the currently known superheavy nuclides.

Internal structure of MRTOF: It enables mass measurement of short-lived nuclides and application to analysis of chemical compounds in the environment.

Particle Astrophysics

Experimental Cosmophysics Group

Uncovering the Fundamental Laws of Physics in the Universe Experimentally

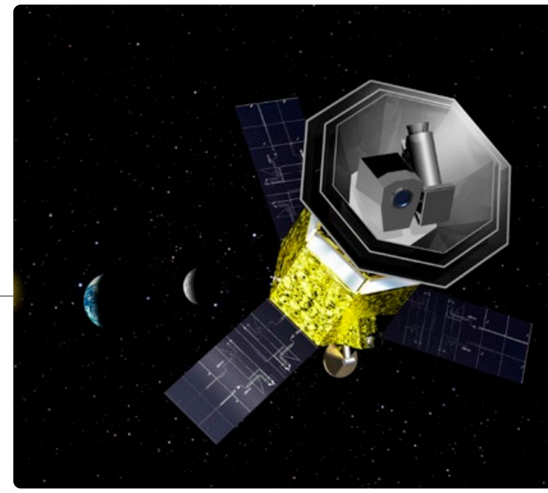
The universe began 13.8 billion years ago from a rapid expansion known as "inflation," before the ultra-hot Big Bang. Observations of the oldest light in the universe, the Cosmic Microwave Background (CMB), are being conducted to seek definitive evidence for this theory. If we can observe a specific type of polarization mode within the CMB called "degree-scale B-mode polarization," it would serve as evidence for inflation, marking one of the greatest discoveries in the history of science. The Experimental Cosmophysics group is dedicated to studying and observing this effect.

[Ground-based Experiment: POLARBEAR/Simons Array]

Observations of CMB polarization are being conducted in the Atacama Desert in Chile, aiming to achieve the world-highest level of sensitivity for CMB polarization measurements using a telescope equipped with detectors based on superconducting technology.

[Satellite Project: LiteBIRD]

LiteBIRD aims to measure CMB polarization with a sensitivity 100 times greater than prior studies, equipped with a wide-field millimeter-wave polarimetric telescope carrying space-qualified superconducting detectors. The goal is to thoroughly verify the inflationary cosmology.



Flavor Physics

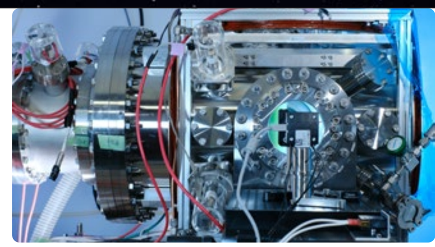
Muon-Neutron Group

Approaching New Physics Laws of Particles through Ultra-Precision Measurements

In quantum mechanics, various particles briefly appear and disappear under the uncertainty principle, a.k.a. quantum loop effect. The particles and interactions within these quantum loops contain unknown physical laws not included in the Standard Model. This effect directly appears in the anomalous magnetic moment (g-2) and electric dipole moment (EDM).

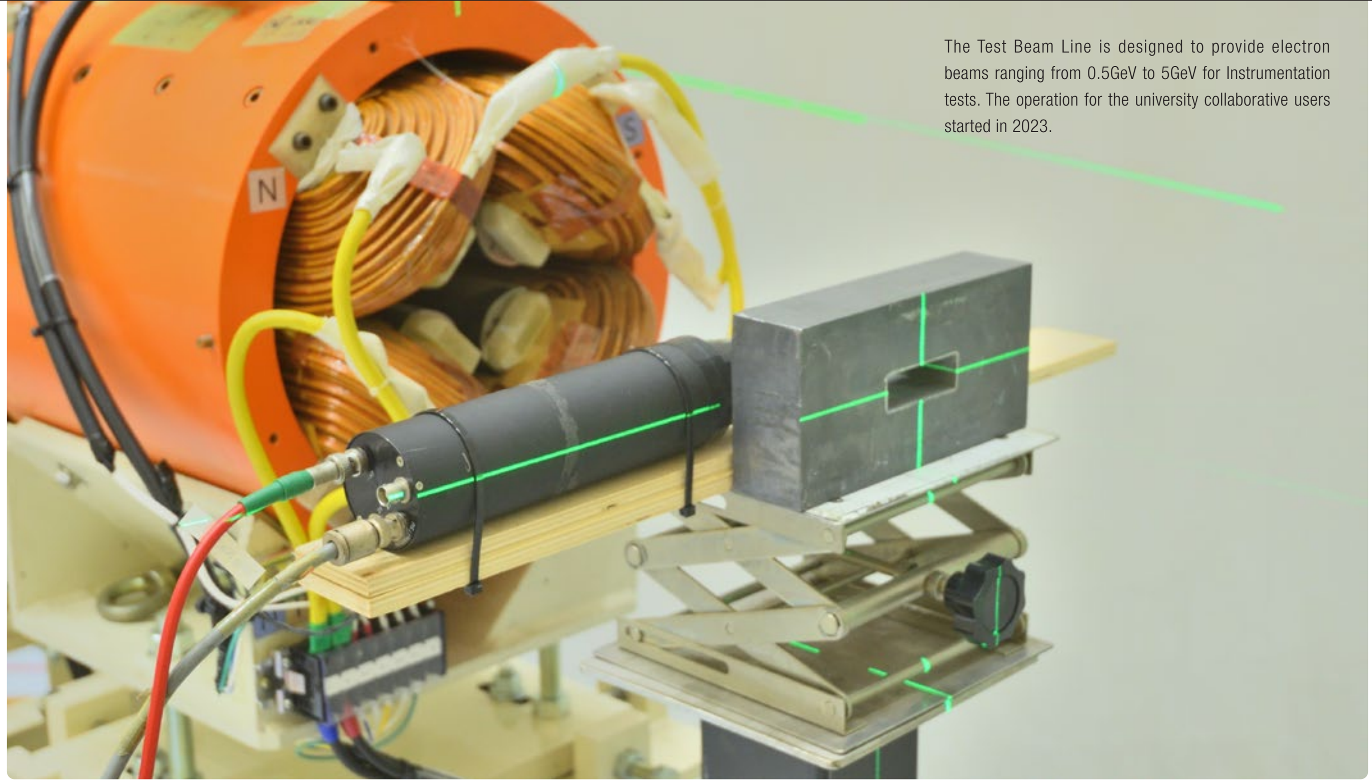
Muon g-2/EDM Experiment

The g-2 value has implied deviations from theoretical predictions in previous experiments. The experiment at J-PARC aims to verify these discrepancies. Using the world's first low emittance beam of positive muons by adopting muon cooling, the experiment seeks to measure muon g-2 with a precision of one part in ten million.



TUCAN Experiment

This experiment searches for the neutron EDM by confining very low-energy neutrons called ultracold neutrons (UCNs) inside a special bottle and observing their spin precession in an electromagnetic field with unprecedented precision. At TRIUMF, Canada's particle accelerator center, the world's most intense ultra-cold neutron source has been constructed, aiming to discover the neutron EDM.



The Test Beam Line is designed to provide electron beams ranging from 0.5GeV to 5GeV for Instrumentation tests. The operation for the university collaborative users started in 2023.

Instrumentation Technology Development Center

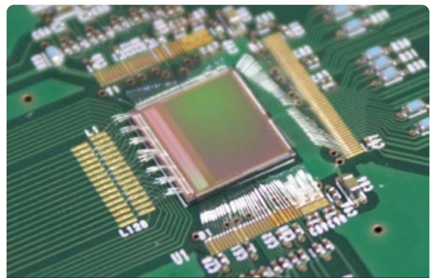
New Instrumentation Discovers the Unknown

Instrumentation Technology Development Center (ITDC) is a center established for the operation of the Instrumentation Development Test Beam Line as a hub for the development in various fields and for researcher exchange, working with university collaborative users. Our goal is to nurture new ideas by facilitating interactions among researchers from a wide range of fields, without confining it to particle and nuclear physics fields, and to create a place for young researchers with innovative ideas.

Support Experiments and Researches

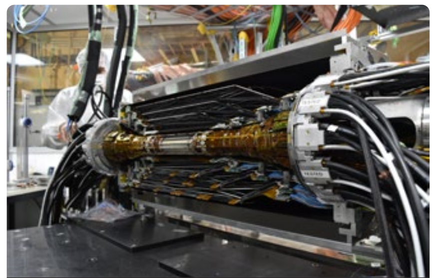
Cryogenic Group

The group carries out research and development, and builds and operates instruments related to superconductivity and cryogenics.



Electronics System Group

The group develops and maintains sensors, highly integrated high-speed signal processing, and a distributed data processing control system.



Mechanical Engineering Group

The group provides design and technical development of various structures such as detectors, test equipment, and precision assembly mounts.

Safety Group

Their mission is to establish safety in the experimental environment and to promote safety awareness.

Computing Research Group

The group conducts development, improvement, and operational support for computers and software.

International Collaboration and Fostering Next Generations

Collaboration with international researchers is crucial to advancing research on particles, nuclei, and the universe, through cooperation, leveraging their expertise, and sometimes even competition.
Researchers from the following countries and regions regularly visit IPNS to collaborate on various physics studies and experiments.
IPNS researchers are dedicated to acquiring new knowledge that will become a common property of all humankind through collaboration and competition with exceptional researchers from around the world.
We are also committed to fostering outstanding researchers who will advance the progress of research in the future.

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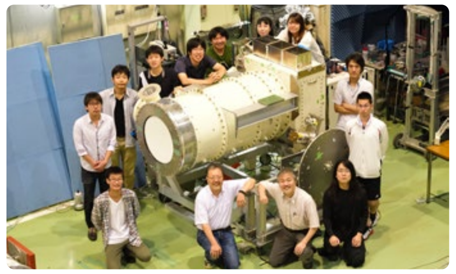

Institute of Particle and Nuclear Studies, High Energy Accelerator Research Organization

1-1 OHO, TSUKUBA, IBARAKI, 305-0801
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