

# **KPS Pioneer session - Present and Future of the LHC Program at CERN**

## **Report of Contributions**

Contribution ID: 1

Type: **not specified**

# The Path Towards the Future Circular Collider at CERN

*Thursday 26 October 2023 14:00 (25 minutes)*

The proposed Future Circular Collider (FCC) at CERN aims to continue the exploration of open questions in particle physics beyond the LHC and its high-luminosity upgrade in a staged research programme, integrating in sequence lepton (FCC-ee) and hadron (FCC-hh) collider programmes, and with the option of a hadron-electron collider (FCC-he), to achieve further understanding of the Standard Model and of electroweak symmetry breaking, and to maximise the potential for the discovery of phenomena beyond the Standard Model. This seminar will present the status of the FCC Feasibility Study, launched to address the recommendation of the update in 2020 of the European Strategy for Particle Physics with the objective to provide an analysis of the technical and financial feasibility of a new collider infrastructure at CERN through a global collaboration of universities, scientific institutes and high-tech companies.

**Presenter:** TSESMELIS, Emmanuel (CERN)

Contribution ID: 2

Type: **not specified**

## Physics at FCC

*Thursday 26 October 2023 17:15 (25 minutes)*

The Future Circular Collider (FCC) is CERN's flagship proposal for a post-LHC accelerator facility. Similarly to the LEP/LHC sequence, it foresees the sequence of an  $e^+e^-$  collider (optimized for precision measurements of Higgs, EW and top quark properties), and a successive 100 TeV pp collider, both hosted in a new  $\sim 100$ km tunnel. A process is ongoing to assess its feasibility (from the technological, technical, financial and political perspectives), and to fully explore its overall physics potential. This talk discusses the science motivations supporting the need for a future generation of high-energy colliders and outlines the physics opportunities offered by the FCC.

**Presenter:** MANGANO, Michelangelo (CERN)

Contribution ID: 3

Type: **not specified**

## Beyond Collider Physics

*Thursday 26 October 2023 15:15 (25 minutes)*

Firstly, I'll briefly report the current activities of CERN Korea Theory Collaboration. Then I'll discuss possible future directions for productive collaborations with CERN based on current status of high energy physics and the composition of current/future theory community in Korea. The topics include neutrino platforms, gbar, cosmology with gravitational waves, the 5th force and the axion search in addition to the LHC experiments.

**Presenter:** KIM, Hyung Do (Seoul National University (KR))

Contribution ID: 4

Type: **not specified**

## Precision timing with the CMS MIP Timing Detector (MTD) for High Luminosity LHC

*Thursday 26 October 2023 14:50 (25 minutes)*

The Compact Muon Solenoid (CMS) detector at the CERN Large Hadron Collider (LHC) is undergoing an extensive upgrade program to prepare for the challenging conditions of the High-Luminosity LHC (HL-LHC). A new timing detector in CMS will measure minimum ionizing particles (MIPs) with a time resolution of  $\sim 30$ -60 ps. The precision time information from this MIP timing detector (MTD) will bring new capabilities to the CMS detector for precision measurement and searches of rare processes. The MTD will be composed of an endcap timing layer (ETL), instrumented with low-gain avalanche diodes and a barrel timing layer (BTL), based on LYSO:Ce crystals coupled to SiPMs, read out with dedicated ASICs. In this talk we present the motivations and an overview of the MTD design, describe the latest progress towards prototyping and production, and show test beam results demonstrating the time resolution achieved.

**Presenter:** TABARELLI DE FATIS, Tommaso (Universita & INFN, Milano-Bicocca (IT))

Contribution ID: 5

Type: **not specified**

## Present and future of the CMS

*Thursday 26 October 2023 14:25 (25 minutes)*

The Compact Muon Solenoid (CMS) is a particle detector operating at CERN's Large Hadron Collider (LHC), situated 100 meters below the surface in France. The CMS experiment is one of the largest international scientific collaborations, with more than 3000 physicists and 1000 engineers from 255 institutes all around the world. Analysis of the experiment's data led to the discovery of the Higgs boson 11 years ago and it is still a unique tool for precision measurements of parameters of the standard model of particle physics and the search for possible "new physics". The current status and the prospects for the High Luminosity LHC phase will be presented in this talk.

**Presenter:** ADAM, Wolfgang

Contribution ID: 6

Type: **not specified**

## Impact of the Korea CMS on the CMS results

*Thursday 26 October 2023 16:00 (25 minutes)*

The Korea-CMS team consists of around 120 researchers from 10 institutes in Korea. The team has been contributing to building the CMS (Compact Muon Solenoid) detector at the LHC (Large Hadron Collider). The CMS machine allows us to explore nature and solve many unanswered questions such as the Higgs mass, dark matter, and matter-antimatter symmetry, etc. The Korea-CMS is heavily involved in those broad physics programs of the Higgs boson, top quark, and beyond standard model searches. The team has been also taking a leading role in the muon system of the RPC (Resistive Plate Chamber) and GEM (Gas Electron Multiplier) since the beginning of the LHC and recently started to contribute to the MTD (MIP Timing Detector), which requires cutting-edge technology. In this talk, I will present the achievements and prospects of the Korea-CMS up to now.

**Presenter:** KIM, Tae Jeong (Hanyang University (KR))

Contribution ID: 7

Type: **not specified**

## The future of ALICE

*Thursday 26 October 2023 16:25 (25 minutes)*

The ALICE experiment currently underway at the CERN Large Hadron Collider is one of the largest and most challenging scientific enterprises ever realized in the field of nuclear and subnuclear physics. Its main mission is to characterize the properties of the quark-gluon plasma, the state of matter that is thought to have existed in the early instants of the Universe after the Big Bang. Such a state of matter can be created in the laboratory by colliding beams of heavy nuclei, which are accelerated to reach a velocity close to the speed of light, and its properties are studied by measuring with complex detectors the thousands of particles that flyout from the collision region. The progress in this research field strongly relies on the continuous improvement of particle colliders and detectors, with increasing collision energies and rates and with higher precision, respectively. In my talk, after a brief introduction on the ALICE's experiment, I will present its long-term plans and the scientific and technological opportunities they open.

**Presenter:** MUSA, Luciano (CERN)



Contribution ID: 8

Type: **not specified**

## The footprint of the Korean ALICE experiment team

*Thursday 26 October 2023 16:50 (25 minutes)*

Next year marks the 70th anniversary of the CERN. From 1990's, Korean researchers participated in CERN experiments individually from 1970's and the government officially made a MoU to support group research at CERN in 1996. In this talk, the activity of the Korean ALICE experiment team (KoALICE) will be reviewed and the current status of the KoALICE group will be reported. Also the future project leading by the KoALICE group and its contribution will be discussed.

**Presenter:** Prof. YOON, Jin Hee (Inha University (KR))

Contribution ID: 9

Type: **not specified**

## **CERN-KCMS MOU Sign-up Ceremony for CMS MTD project**

*Thursday 26 October 2023 15:40 (15 minutes)*

**Presenters:** MOON, Chang-Seong (Kyungpook National University (KR)); KIM, Tae Jeong (Hanyang University (KR)); TABARELLI DE FATIS, Tommaso (Universita & INFN, Milano-Bicocca (IT)); ADAM, Wolfgang (HEPHY-Vienna)