千葉大学大学院理学研究科附属
ハドロン宇宙国際研究センター
ICEHAP International Center for Hadron Astrophysics

# July ICEHAP Seminar

Date **July 28th Friday 14 : 00～16 : 00**

Location **ICEHAP Office (Engineering Research Bldg.1 Room609-1)**

By **Professor Toshihiro Fujii , ICRR, Tokyo University**

Title **『Observation of the universe's highest energetic particles and a next-generation observatory』**


## Abstract

Cosmic rays above 10^{18} eV are known as ultrahigh-energy cosmic rays (UHECRs).

Since UHECRs are the most energetic particles in the universe, their origins are ostensibly related to extremely energetic astrophysical phenomena, such as gamma-ray bursts, active galactic nuclei, or other exotic processes such as the decay or annihilation of super-heavy relic particles created in an early phase of the development of the universe.

However, their origins are still unknown. The nature and origin of UHECRs is one of the most intriguing mysteries in particle astrophysics.

Given their minute flux, less than one particle per century per square kilometer at the highest energies, a very large area must be instrumented to collect significant statistics.

The energy, arrival direction, and mass composition of UHECRs can be inferred from studies of the cascades of secondary particles produced by their interaction with the Earth’s atmosphere.

Two well-established techniques are used for UHECR detection: (1) arrays of detectors (e.g. plastic scintillators, water-Cherenkov stations) sample EAS particles reaching the ground;

(2) large-field-of-view telescopes allow for reconstruction of the shower development in the atmosphere by imaging UV fluorescence light from atmospheric nitrogen excited by EAS particles.

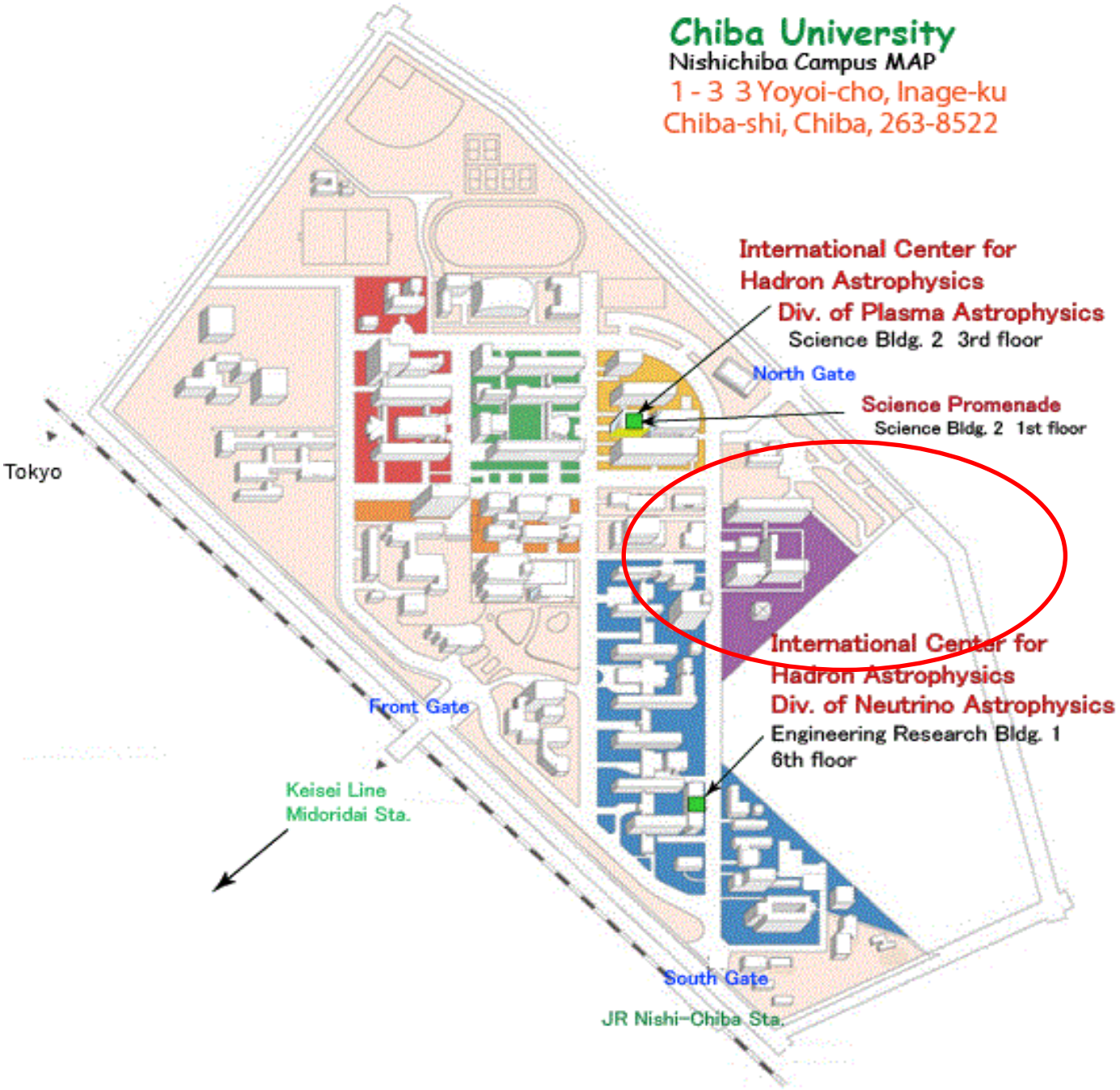
The Pierre Auger Observatory (Auger) and the Telescope Array Experiment (TA) are the largest UHECR experiments in operation, combine the two techniques, with arrays of particle detectors overlooked by fluorescence detector (FD) telescopes.

I will review cosmic ray physics, detection techniques and latest results from Auger and TA.

Also I will highlight a proposed next-generation experiment which is a Fluorescence detector array of Single-pixel Telescopes (FAST).

Location:　Neutrino Astrophysics Department

@ Engineering Research Bldg. 6th floor

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