

Overview of HEP activities in Hong Kong

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The Chinese University of Hong Kong

On behalf of the Joint Consortium for Fundamental Physics in Hong Kong



The Chinese University
of Hong Kong
香港中文大學



Hong Kong University of
Science and Technology
香港科技大學



University of
Hong Kong
香港大學

French Cloud Meeting 2018, Hong Kong
11-12 April 2018

Joint Consortium for Fundamental Physics



CUHK

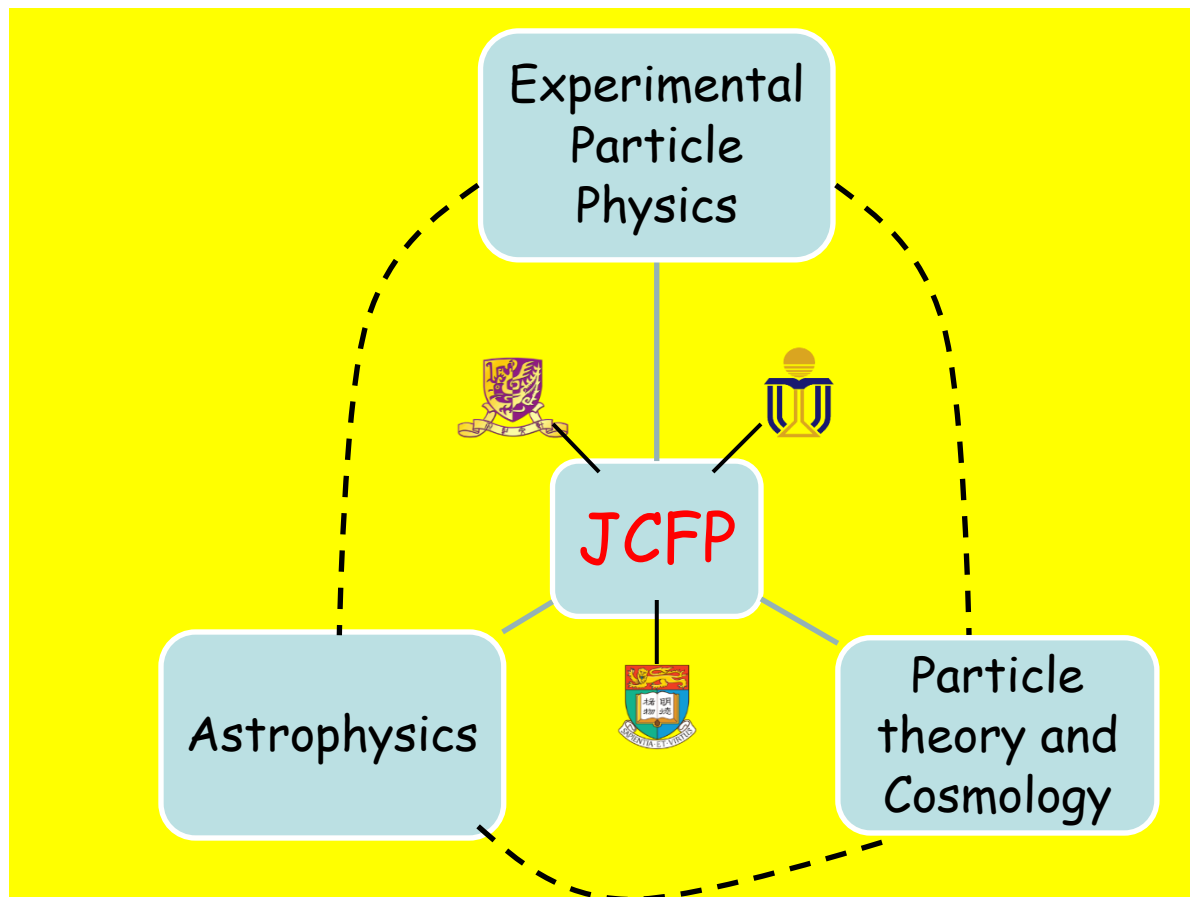


HKUST



HKU

- jointly sponsored by the three universities since 01/2013
- a platform for HK to contribute significantly to global endeavors in fundamental physics



Experimental Particle Physics



CUHK



HKUST



HKU



Luis Flores Castillo



Kirill Prokofiev



Yanjun Tu 屠艷瑤



Ming-chung Chu
朱明中



Charles Young
楊重凱

Experimental Particle Physics



CUHK



HKUST



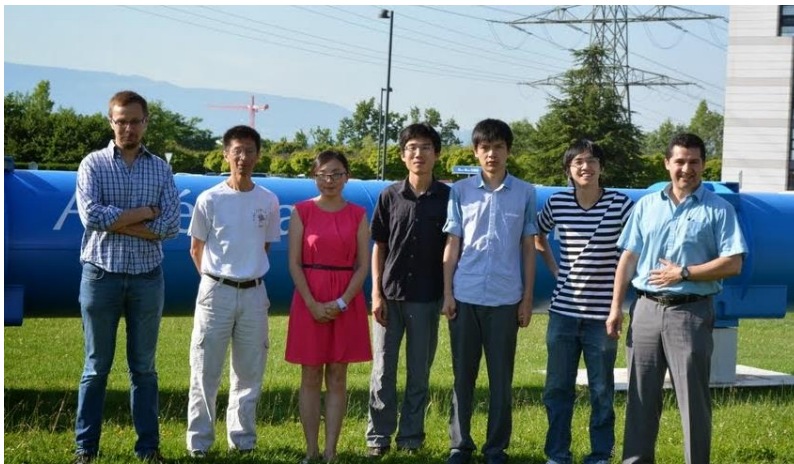
HKU

The HK ATLAS group: 4 faculties, 4 postdocs, 3 Research Assistants, 12 grad students

- Physics measurements and searches
 - Higgs boson studies: involved in $H \rightarrow ZZ^* \rightarrow 4l$ and $H \rightarrow \tau\tau$ analyses groups, development of Monte Carlo, EFT approaches and analysis tools. Will expand into $t\bar{t}H$.
 - Searches for BSM Physics: Lepton Flavor Violation ($e\mu$) resonances. Charginos and neutralinos in final states with two same-sign leptons, Higgs+missing p_T . Searches for New Physics in final states including top quarks: $t\bar{t}+hf$, 4 top. Additional Higgs bosons searches.
- Detector infrastructure
 - ATLAS upgrades (next slide)
 - ATLAS muon reconstruction software
- Computing
 - Tier-2 computing cluster in Hong Kong
 - Initial involvement in the new ATLAS core software



Part of the HK team, 2015



ATLAS Upgrades



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- **Muon Spectrometer**
 - **Phase 1** (New Small Wheel): with Engineering department HKUST, participating in testing Trigger Data Serializer ASIC chips: radiation, temperature, functionality. Taking part in production of 768 strip Front End Boards, Pads and Wire FEBs.
 - **Phase 2** Production and testing of readout electronics (Chamber Service Motherboard) for MDTs and RPCs. Possible construction of RPCs.
- **Silicon pixel detector Phase 2 (ITk pixel)**
 - Collaborating with LAL/Orsay on characterization of planar pixel sensors for the ITk barrel. Learning the characterization process using their setup.
 - Participating in beam tests of irradiated sensors.
 - With the help of LAL/Orsay, accepted as members of the ATLAS ITk Collaboration in Autumn 2017.
 - Expected contribution: QA testing of silicon sensors and modules in HKUST. Planning to set-up (or to find) measurement facilities on-site: clean room, probe station, micro-amperometer, climate chamber etc.

Related activities



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The Daya Bay Reactor Neutrino Experiment

- Highest precision measurement of θ_{13} (4%) and $|\Delta m_{ee}^2|$ (3%)
- Reactor antineutrino flux and spectrum: 4σ deviation from prediction
- Set new limit to light sterile neutrinos

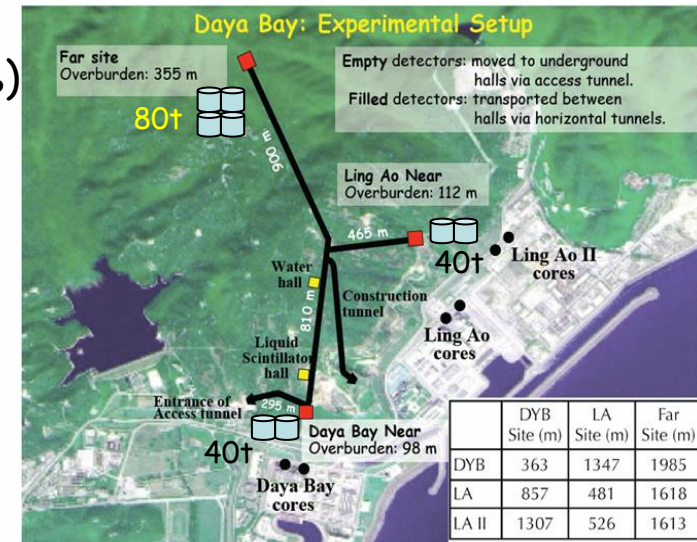
The LIGO Gravitational-wave Observatory

- 5 mergers discovered so far
- Collision of neutron stars \rightarrow multi-messenger astronomy
- Strong-field tests of GR

Scientific computing and data science

- Use of network coding to improve distributed data storage
- Distributed machine learning to assist Big Data analysis

Outreach



Particle theory and Cosmology



CUHK



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HKU



GU Zhengcheng 顧正澄

Topological aspects of fundamental particles and unification of three generations.



Henry Tye 戴自海

Particle physics, string theory, cosmology



Gary Shiu 蕭文禮

String Cosmology, particle physics



Yi Wang

Inflation and cosmic perturbations



Ming-chung Chu
朱明中

CMB, Dark matter cosmology, N-body simulation



Tao Liu

Particle phenomenology, Higgs physics

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