

Physics

Newsletter

April | 2025

Visit to the world's largest and deepest underground laboratory

On 14 March 2025, Prof. Jeremy Lim and his postdoctoral fellow Dr. Amruth Alfred paid a visit to the China Jinping Underground Laboratory (中国锦屏地下实验室). Located 2,400 meters below the Jinping Mountains in southwest China, the China Jinping Underground Laboratory is the world's largest and deepest underground laboratory. Several research projects are being conducted by various top universities in China at this laboratory.

Our main goal was to visit the PandaX experimental program led by Shanghai Jiaotong University. Founded in 2009, PandaX is dedicated towards searching for Weakly-Interacting Massive Particles (WIMPs), a hypothetical particle that is a candidate for Dark Matter. Dark Matter comprises 85% of all matter in the Universe: yet, the particle that constitutes Dark Matter remains a mystery. The nature of Dark Matter is a focus of the research group led by Prof. Lim, who use astronomical observations of gravitational lensing to address whether WIMPs or Axions (a hypothetical ultra-light particle) constitute Dark Matter. Identifying the Dark Matter particle is one of the most urgent problem in all of Physics, which if successful will herald a new era of science by pointing the correct path towards New Physics beyond the Standard Model of particle physics. Thanks to Prof. Jianglai Liu of Shanghai Jiaotong University, the leader of the PandaX experiment, Prof. Lim and Dr. Alfred were permitted to visit the clean room where the experiment is located. Perhaps their visit coincided with the first WIMP detection?

Next to the China Jinping Underground Laboratory is the Yalong River Hydropower Plant, the world's tallest dam. Thanks to the construction of this dam, extra tunnels were dug into the mountain to form the China Jinping Underground Laboratory. We went away deeply impressed by the grandeur of the dam and surrounding landscape, as well as the grandeur of the experiments being conducted at the China Jinping Underground Laboratory to address some of the biggest questions in Physics.



Prof. Jeremy Lim and Dr. Amruth Alfred at Yalong River Hydropower Plant - turns out there are plans for many hydropower plants along the Yalong.



The xenon detectors setup for PandaX program.

Other Staff Movement

- Mr. Tak Hong Chan has just joined the department as Technical Officer.
- Ms. Anastasia Tsui has just joined the department as Clerk II.
- Ms. Muses Wong has just joined the department as Clerk II.
- Dr. Jianqiu Huang, Technical Officer, has left the department. She joined us in 2022.

Editors:

Dr. Kai-Ming Lee
Prof. Shizhong Zhang (acting)



<https://www.physics.hku.hk/>

Promotions, Awards, Research Highlights

- Prof. Chenjie Wang has been promoted to Associate Professor.
- Prof. Yi Yang has been awarded the 2024 Xplorer Prize. <https://www.xplorerprize.org/#/awardees-m>
- Prof. Meng's paper "Momentum Space Quantum Monte Carlo on Twisted Bilayer Graphene", published in CHINESE PHYSICS LETTERS: <http://iopscience.iop.org/article/10.1088/0256-307X/38/7/077305>, has been awarded an IOP Publishing Top Cited Paper Award for China. The awards are calculated from reviewing the top 1% of the most cited articles which have been published over the past three years in an IOP Publishing journal (2021 – 2023).
- Prof. Chenjie Wang received the Frontiers of Science Award in International Congress of Basic Sciences in July 2024, for the work on "Braiding Statistics of Loop Excitations in Three Dimensions", Physical Review Letters (2014). <https://www.icbs.cn/site/pages/index/index?pagelId=2cd3eaea-5f56-4cb1-9276-5a3a9ca39223>
- Prof. Luu's team published a paper "High-harmonic spectroscopy probes lattice dynamics" in Nat. Photon. 18, 792-798 (2024), where the first and second authors are postdoc and PhD student respectively. <https://doi.org/10.1038/s41566-024-01457-4>
- Prof. Meng's team published two papers: "Spectral evidence for Dirac spinons in a kagome lattice antiferromagnet", Nature Physics 20, 1097-1102 (2024), in which they collaborate with experimental team to discover the evidence for the existence of Dirac Spin Liquid state in the quantum antiferromagnet. Another one is published on Science Advances, Menghan Song et al. "Evolution of entanglement entropy at SU(N) deconfined quantum critical points", Sci. Adv. 11, eadr0634 (2025). DOI: 10.1126/sciadv.adr0634. This work demystifies the confusion and controversy on the deconfined quantum critical points in the past two decades.
- Prof. Yang's team has published a paper: "Maximal Quantum Interaction between Free Electrons and Photons", Xie et al. Physical Review Letters 134, 043803 (2025).
- Collaborating with Alpha Power Solutions (APS), research group of Prof. Francis Ling developed a new Al-implantation-annealing doping procedure in mass production of SiC diodes and MOSFETs. Leakage current is reduced by more than 30 times via defect engineering. APS adopts the procedure in the production line for all of their SiC devices, and 23M units of devices have already been manufactured. Full story can be found at: <https://www.ke.hku.hk/story/innovation/sic-devices>

Student Research

- Two graduates students from Prof. Meng's group, were interviewed by the Croucher foundation about their research discoveries: A new glimpse into the "spooky" world of quantum physics. <https://croucher.org.hk/en/news/a-new-glimpse-into-the-spooky-world-of-quantum-physics>
- Mr. Tom Kwan, a Ph.D. student of Prof. Dai, has a research visit to New York. In his own words: "In the latter half of 2024, I had the incredible opportunity to conduct research at the Flatiron Institute's Center for Computational Astrophysics (CCA) in New York City, supported by the Simons Foundation. This was made possible through my acceptance into their highly prestigious and competitive Pre-Doctoral Program—a dream coming true for any PhD in computational astrophysics. Generously, the CCA covered all travel and living expenses for the duration of my stay.

During these transformative months, I collaborated with world-leading experts on black hole accretion, initiating several cutting-edge projects. The CCA's



dynamic, supportive environment and vast computational resources greatly enriched my professional and personal growth. I also connected with fellow early-career astrophysicists from around the world who participated in the program. Beyond research, exploring New York City's landmarks and hiking Beacon Mountain added unforgettable personal experiences to my time there. I am deeply grateful to my supervisor, Prof. Dai, for introducing me to this program and guiding me through the application process. The knowledge and skills I gained will undoubtedly shape my future research, and I look forward to applying them in my work."