

Cosmo-Astro-Particle Symposium (CAP 2025) & The 19th TeV Workshop

December 11-15, 2025

Conference Handbook



清华大学物理系

Department of Physics, Tsinghua University

清华大学高能物理研究中心

Center for High Energy Physics, Tsinghua University

Introduction

The search for new physics beyond the Standard Model represents one of the most exciting and challenging frontiers in modern science. While the Standard Model has been remarkably successful in describing fundamental particles and their interactions, it leaves many profound questions unanswered — such as the nature of dark matter, the origin of neutrino masses, the baryon asymmetry of the universe, and the origin of large-scale structure. These unresolved issues highlight the necessity of exploring new physics through interdisciplinary approaches, combining insights from particle physics, cosmology, and astrophysics.

Cosmological observations provide a unique window into the early universe and its evolution, offering clues to new physics. At the same time, astrophysical phenomena serve as natural laboratories to test theories under extreme conditions. Meanwhile, particle physics experiments, from colliders to underground detectors, directly probe energy and intensity frontiers. The synergy among these fields has become increasingly vital in guiding theoretical models and designing future experiments to uncover signatures of new physics.

We are pleased to announce that the First Cosmo-Astro-Particle Symposium (CAP 2025) will be held from **December 11 to 15**. The symposium is organized by Department of Physics and Center for High Energy Physics, Tsinghua University. This symposium is a natural continuation of the annual TeV workshops with expanded scopes and topics. The symposium aims to bring together leading experts and young researchers from around the world to discuss recent progress, exchange ideas, and foster collaborations in these rapidly evolving areas. Topics will include but are not limited to:

- Dark matter theory and detection
- Primordial cosmology and large-scale structures
- Baryon asymmetry and neutrino physics
- Gravitational waves and multi-messenger astronomy
- New physics beyond the Standard Model in cosmology
- Progress from collider experiments and particle phenomenology

The event will feature invited talks, contributed presentations, and discussion sessions designed to encourage in-depth conversations and collaborative efforts.

Conference Information

Dates:

December 10, 2025: Arrival and on-site registration

December 11–15, 2025: Conference

December 16, 2025: Departure

Transportation:

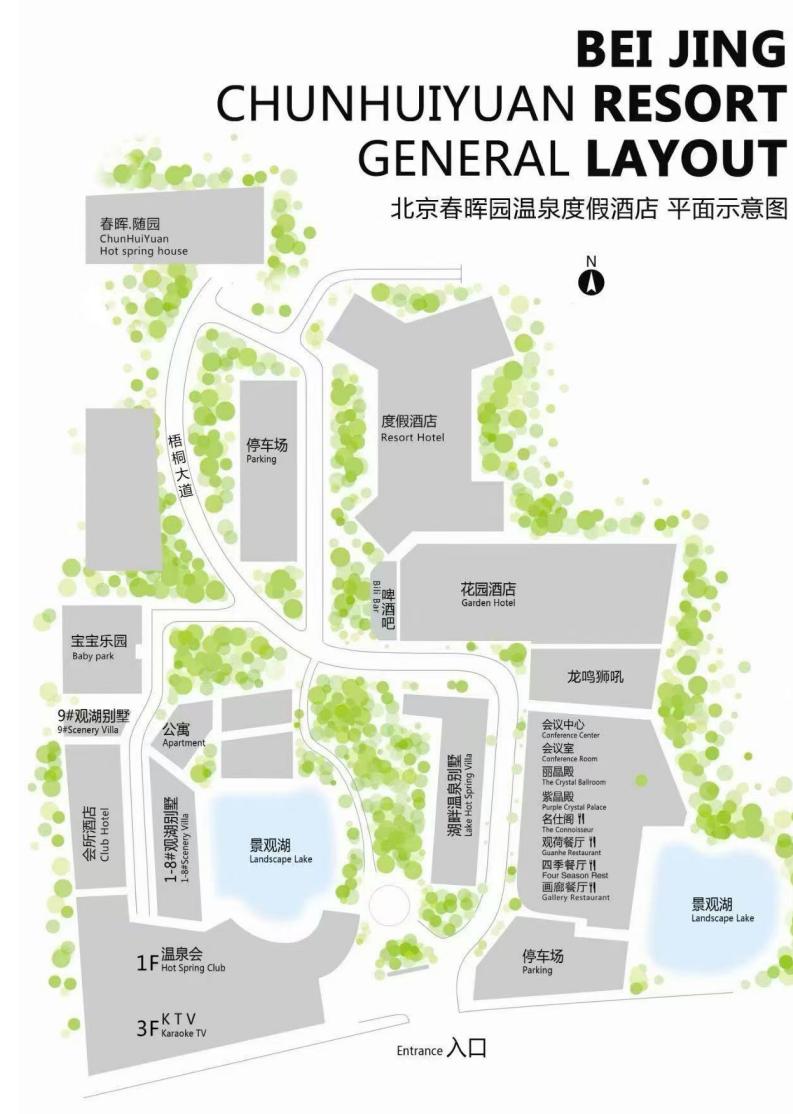


Address:

BEIJING
CHUN HUI YUAN
Resort
春晖园温泉度假酒店

北京春晖园温泉度假村（北京市顺义区高泗路于庄段 37 号）

Address: YuZhuang 37#, Gaoliying Town, Shunyi District, Beijing



Accommodation Location:

Of the Resort Hotel

(Please bring your original ID card or passport for check-in)

Meeting Location:

Conference Hall 12, Second Floor of the Conference Center

Dining Locations:

Breakfast: Gallery Restaurant, Second Floor of the Conference Center

(Time: 06:30–09:00)

Lunch & Dinner: Gallery Restaurant, Second Floor of the Conference Center

(Meals served with buffet coupons)

(Lunch: 11:30–13:30 | Dinner: 17:30–19:00)

Banquet on the Evening of Dec 12:

First Floor, Conference Center (The Crystal Ballroom)

Schedule

Thursday, December 11, 2025

Time	Speaker	Title
09:15-09:30	Haipeng AN (Tsinghua University)	Opening
09:30-10:00	Qing-Hong CAO (Peking University)	Searching for New Physics at Colliders
10:00-10:30	Jing SHU (Peking University)	(New) Physics around the Supermassive Black Hole
10:30-11:00	Tea Break	
11:00-11:30	Xian CHEN (Peking University)	Using the Moon to Detect Gravitational-Wave Background
11:30-12:00	Huan YANG (Tsinghua University)	Kilohertz Gravitational Wave Astronomy
12:00-14:00	Lunch Break	
14:00-14:30	Haifeng LI (Shandong University)	Recent Results from ATLAS Experiment: Higgs to Dimuon and Toponium
14:30-15:00	Sichun SUN (Beijing Institute of Technology)	Detecting Gravitational Waves with Different Systems
15:00-15:20	Baihong ZHOU (TDLI, SJTU)	Combination of ATLAS and CMS Searches for Higgs Boson Pair Production at 13 TeV
15:20-15:40	Xinyang LI (Liaoning Normal University)	Searching for Long-Lived Axion-Like Particles via Displaced Vertices at the HL-LHC
15:40-16:00	Qing CHEN (Anhui University of Science and Technology)	Effective Theory for Light Portal Dark Matter Detection
16:00-16:30	Tea Break	
16:30-17:00	Wei SU (Sun Yat-Sen University)	Complete Long-Lived Particle of 2HDM
17:00-17:20	Hao JIAO (Institute for Basic Science)	Structure Formation with Cosmic Strings
17:20-17:40	Fotis KOUTROULIS (IHEP)	Cosmological Gravitational Particle Production: Sterile Neutrinos as Dark Matter Candidates
17:40-18:00	Jiaxin CHENG (HIAS, UCAS)	GW from Inflaton Decay and Photon Bremsstrahlung
18:00-18:20	Chon Man SOU (Tsinghua University)	Scattering Entanglement Mediated by Heavy Particles
18:20-18:40	Changlong XU (Tsinghua University)	Dark Matter Implications from XENONnT and LZ Data

Friday, December 12, 2025

Time	Speaker	Title
09:00-09:30	Hideki Okawa (IHEP)	New physics searching results from the ATLAS collaboration
09:30-10:00	Zirui WANG (Fudan University)	New Physics Searching Results from the CMS Collaboration
10:00-10:30	Liang SUN (Wuhan University)	Recent New Physics Searching Results from the LHCb Collaboration
10:30-11:00	Group Photo 1 + Tea Break	
11:00-12:30	Haiping PENG (Tsinghua University)	Progress and Physics Goals of the STCF
11:30-12:00	Joao Guimaraes DA COSTA (IHEP)	Latest Progress and Physics Goals of CEPC
12:00-12:30	Xiangdong JI (University of Maryland)	Lattice QCD in Searching for New Physics
12:30-14:00	Lunch Break	
14:00-14:30	Chen ZHOU (Peking University)	Highlights of the HL-LHC Physics Projections by ATLAS and CMS
14:30-15:00	Yun-Long ZHANG (NAOC, CAS)	Chiral Gravitational Wave Background from Axion-Like Fields
15:00-15:20	Jinhan LIANG (Nanjing University)	Probing Lepton Flavor Violating Dark Matter Scenarios via Astrophysical Photons and Positrons
15:20-15:40	Haoming NIE (Tsinghua University)	Probing MeV Dark Matter through Solar Reflection
15:40-16:00	Yang LIU (Tsinghua University)	Unifying Particle Physics and Cosmology in Type IIA String Theory
16:00-16:30	Tea Break	
16:30-17:00	Fangzhou JIANG (Peking University)	Formation of the Little Red Dots from the Core-Collapse of Self-Interacting Dark-Matter Halos
17:00-17:30	Seokhoon YUN (IBS-CTPU-PTC)	Probing Heavy Dark Matter in Red Giants
17:30-18:00	Qing LIN (USTC)	Status and Progress of Dark Matter Direct Detection Experiments
18:00-20:00	Banquet	

Saturday, December 13, 2025

Time	Speaker	Title
09:00–09:30	Jia LIU (Peking University)	Ultimate Quantum Precision Limit at Colliders: Conditions and Case Studies
09:30–10:00	Lei WU (Nanjing Normal University)	Probing Light Dark Matter in Direct Detection and Neutrino Experiments
10:00–10:30	Yue ZHAO (HKUST)	Probing the Pulsar Explanation of the Galactic-Center GeV Excess Using Continuous Gravitational-Wave Searches
10:30–11:00	Tea Break	
11:00–11:30	Junwu HUANG (Perimeter Institute)	No Cosmological Constraints on Dark Photon Dark Matter from Resonant Conversion
11:30–12:00	Yin-Zhe MA (Stellenbosch University)	Radio Search of Dark Matter
12:00–12:30	Xiao-Jun BI (IHEP)	Recent Results from Inaaso
12:30–14:00	Lunch Break	
14:00–14:30	HongJian HE (TDLI, SJTU)	Origin of Mass and Scattering Amplitudes: from Higgs to Kaluza-Klein and Chern-Simons
14:30–15:00	Xinming ZHANG (IHEP)	Recent Progress in Dynamical Dark Energy and Gravitational-Wave Observations
15:00–15:30	Haibo YU (UC Riverside)	Gravothermal Collapse in Dark Matter Halos: Physics, Predictions, and Evidence
15:30–16:00	Tea Break	
16:00–16:30	Shao-Feng GE (TDLI, SJTU)	Probe Neutrino & Dark Matter with Cosmic Gravitational Focusing
16:30–17:00	Ligong BIAN (Chongqing University)	Numerical Simulation of Symmetry Breaking
17:00–17:30	Wenyu WANG (Beijing University of Technology)	Dark Photon Oscillations in Waveguide

Sunday, December 14, 2025

Time	Speaker	Title
09:00–09:20	Zhenyu DONG (Peking University)	Probing Triple Higgs Production via $4\tau 2b$ Decay Channel at a 100 TeV Hadron Collider
09:20–09:40	Shuntaro AOKI (RIKEN)	TBD
09:40–10:00	Borui ZHANG (Tsinghua University)	Little Red Dots from Small-Scale Primordial Black Hole Clustering
10:00–10:20	Tingyu LI (Tsinghua University)	Gravitational Waves and Primordial Black Holes Produced by Dark Meta Stable Vacuum Decay
10:20–10:50	Tea Break	
10:50–11:10	Xiangwei WANG (Hong Kong University of Science and Technology)	Interact or Twist: Cosmological Correlators from Field Redefinitions Revisited
11:10–11:30	Zhehan QIN (Tsinghua University)	EFTs for Cosmological Correlators
11:30–11:50	Haoyuan LIU (Tsinghua University)	Massive Inflationary Amplitudes: Differential Equations and Complete Solutions for General Trees
11:50–12:10	JiaJu ZANG (Tsinghua University)	Massive Inflationary Amplitudes: New Representations and Degenerate Limits
12:10–14:00	Lunch Break	
14:00–14:30	Masahide YAMAGUCHI (IBS)	Tunneling Rate at Finite Temperature
14:30–15:00	Toshifumi NOUMI (The University of Tokyo)	Inflationary QCD Phase Diagram
15:00–15:30	Hayden LEE (The University of Pennsylvania)	A Hidden Pattern in Cosmological Correlators
15:30–16:00	Group Photo 2 + Tea Break	
16:00–16:30	Minho SUN (Korea Advanced Institute of Science and Technology)	Flowing One-Point Correlator in QCD
16:30–17:00	Huatke GUO (ICTP-AP, UCAS)	Search Results for Physics Beyond the Standard Model with LIGO-Virgo-KAGRA's O1-O4a Runs
17:00–17:30	Shu LI (TDLI, SJTU)	Search for Dark Higgs and Triple Higgs at ATLAS
17:30–18:00	Bo FENG (South China Normal University)	Symbolic Reduction of Multi-loop Feynman Integrals via Generating Functions

Monday, December 15, 2025

09:00–17:00 Free Discussion