

2025 年紫金山暗物质研讨会

Report of Contributions

Contribution ID: 2

Type: **not specified**

太阳邻域的暗物质粒子速度分布及其对暗物质粒子探测实验的影响

前人的工作大多默认太阳邻域暗物质的速度服从麦克斯韦-玻尔兹曼分布，而近些年来对银河系早期主并合事件的研究表明，真实的速度分布会一定程度偏离标准暗晕模型，这对暗物质直接探测实验中的年度调制效应和排除曲线有一定的影响，从而影响对实验结果的解读。

Presenter: SHEN, Juntai (上海交通大学)

Session Classification: Session 1

Contribution ID: 4

Type: **not specified**

First Direct Observation of Migdal Effect in Neutral Projectiles

The Migdal effect, a phenomenon in which a nucleus emits an electron following a perturbation, is considered one of the most sensitive methods for detecting sub-GeV dark matter to date. However, for over 80 years, direct observational evidence has been lacking. This presentation will showcase the gas pixel detector we designed for the direct observation of the Migdal effect, along with the experiments and results obtained using neutron beams. We will report the first direct observation of the Migdal effect in neutral beam collisions, as well as the measurement of its cross-section.

Presenter: Prof. 刘, 倩 (中国科学院大学)

Session Classification: Session 1

Contribution ID: 5

Type: **not specified**

talk title

Presenter: Prof. 葛, 韶锋 (上海交通大学)

Session Classification: Session 1

Contribution ID: 6

Type: **not specified**

Dark Photon Dark Matter Detection \boxtimes with Radio Telescopes

Presenter: Prof. 刘, 佳 (北京大学)

Session Classification: Session 1

Contribution ID: 9

Type: **not specified**

Probing Dark Matter with Gravitational-Wave Laser Interferometers in Space

Presenter: Prof. 汤, 勇 (中国科学院大学)

Session Classification: Session 1

Contribution ID: **10**

Type: **not specified**

talk title

Presenter: Prof. 张, 永超 (东南大学)

Session Classification: Session 1

Contribution ID: **11**

Type: **not specified**

Gravitational wave spectrums arising from dark matters

Presenter: Prof. 晁, 伟 (北京师范大学)

Session Classification: Session 1

Contribution ID: 12

Type: **not specified**

Novel Light Dark Matter Detection with Quantum Parity Detector Using Qubit Arrays

Presenter: Prof. SONG, Ningqiang (中科院理论物理所)

Session Classification: Session 1

Contribution ID: 13

Type: **not specified**

Supernova Constraints on Lepton Flavor Violating Axions

Presenter: Prof. 刘, 佐伟 (南京大学)

Session Classification: Session 1

Contribution ID: 14

Type: **not specified**

talk title

Presenter: Prof. 李, 玉峰 (中国科学院高能物理研究所)

Session Classification: Session 1

Contribution ID: 15

Type: **not specified**

Probing nonthermal dark matter through large-scale structure observations

Presenter: Prof. 韩, 成成 (中山大学)

Session Classification: Session 1

Contribution ID: 16

Type: **not specified**

Searching for long-lived particles at Belle II

Searching for long-lived particles (LLPs) has emerged as an important research direction in the quest for physics beyond the Standard Model. Such searches can be performed at various terrestrial facilities including colliders, beam-dump experiments, and neutrino experiments. In this talk, I will focus on the ongoing Belle II experiment at the SuperKEKB collider in Tsukuba, Japan. I will present a series of phenomenological studies on light LLPs at Belle II, illustrating the experiment's discovery potential. Different theoretical models, production mechanisms, and experimental signatures will be discussed, along with the projected sensitivities.

Presenter: Prof. WANG (王), Zeren (泽人) (合肥工业大学)

Session Classification: Session 1

Contribution ID: 17

Type: **not specified**

Searching for ALP DM in Alkali-Noble-Gas Haloscopes

Presenter: Prof. 王, 小平 (北京航空航天大学)

Session Classification: Session 1

Contribution ID: **18**

Type: **not specified**

talk title

Presenter: Prof. GAO, Christina (南方科技大学)

Session Classification: Session 1

Contribution ID: 21

Type: **not specified**

Constraints on Strongly-Interacting Dark Matter from the James Webb Space Telescope

Direct detection searches for dark matter are insensitive to dark matter particles that have large interactions with ordinary matter, which are stopped in the atmosphere or the Earth's crust before reaching terrestrial detectors. We use “dark” calibration images from the James Webb Space Telescope to derive novel constraints on sub-GeV dark matter candidates that scatter off electrons. In this talk, I will show that for a 0.4% subcomponent of dark matter that interacts with an ultra-light dark photon, we disfavor all previously allowed parameter space at high cross sections, and constrain some parameter regions for subcomponent fractions as low as $\sim 0.01\%$.

Primary author: Prof. 杜, 佩之 (中国科学技术大学)

Presenter: Prof. 杜, 佩之 (中国科学技术大学)

Session Classification: Session 1

Contribution ID: 22

Type: **not specified**

Axion dark matter from topological defects

Presenter: Prof. 边, 立功 (重庆大学)

Session Classification: Session 5

Contribution ID: 23

Type: **not specified**

Axion Star Tidal Effects and Bosenova

Presenter: Prof. 高, 宇 (高能所)

Session Classification: Session 1

Contribution ID: 24

Type: **not specified**

Detection of ALPs with black hole superradiance

Presenter: Prof. 张, 宏 (山东大学)

Session Classification: Session 1

Contribution ID: 25

Type: **not specified**

Glueball Dark Matter

We explore a generic class of composite dark matter candidates arising from confining dark sectors, where phase transitions—especially deconfinement-confinement and chiral symmetry breaking—can generate stochastic gravitational waves. Using a combination of lattice results and effective field theory approaches such as the Polyakov Loop and PNJL models, we analyze the dynamics of these phase transitions and demonstrate that the resulting gravitational wave signals are highly sensitive to the fermionic content and representation in the dark sector. These signals are significantly enhanced near conformal symmetry and may be detectable by upcoming experiments such as DECIGO and the Big Bang Observer.

As a concrete realization, we focus on glueball dark matter arising from a pure Yang-Mills sector, where glueballs develop axion-like couplings to photons through radiative effects induced by heavy fermion portals. These glueball ALPs (GALPs) feature a coupling-mass relation determined by two fundamental scales: the dark fermion mass and the confinement scale. Without requiring fine-tuning or large mass assumptions, GALPs naturally populate previously unexplored ALP parameter space with suppressed electromagnetic interactions. Importantly, our framework yields a robust prediction for the GALP relic abundance—an order of magnitude below previous estimates—providing a new benchmark for both cosmological modeling and future detection strategies.

Presenter: Prof. 王, 志伟 (电子科大)

Session Classification: Session 1

Contribution ID: 26

Type: **not specified**

talk title

Presenter: Prof. 于, 江浩 (中科院理论物理研究所)

Session Classification: Session 1

Contribution ID: 27

Type: **not specified**

Unconventional axion theory and detection

Presenter: Prof. 李, 佟 (南开大学)

Session Classification: Session 1

Contribution ID: **28**

Type: **not specified**

超重暗物质的产生新机制及其引力波信号

Presenter: Prof. 黄, 发朋 (中山大学)

Session Classification: Session 1

Contribution ID: 29

Type: **not specified**

Heating effects of fuzzy dark matter in galaxies

Presenter: Prof. YIN, Peng-Fei (Institute of High Energy)

Session Classification: Session 1

Contribution ID: **30**

Type: **not specified**

talk title

Presenter: Prof. 姜, 方周 (北京大学)

Session Classification: Session 1

Contribution ID: 31

Type: **not specified**

Unexpected clustering pattern in dwarf galaxies challenges formation models

Presenter: Prof. 王, 慧元 (中国科技大学)

Session Classification: Session 1

Contribution ID: 32

Type: **not specified**

talk title

Presenter: Prof. 廖, 世鸿 (国家天文台)

Session Classification: Session 1

Contribution ID: 33

Type: **not specified**

Mapping Dark Matter in the Milky Way

Presenter: Prof. 张, 岚 (国家天文台)

Session Classification: Session 1

Contribution ID: 40

Type: **not specified**

talk title

Presenter: Prof. 韩, 家信

Session Classification: Session 1

Contribution ID: 41

Type: **not specified**

Dynamical evolutions in globular clusters and dwarf galaxies

We present a new two-fluid conduction scheme to simulate the evolution of an isolated, self-gravitating, equilibrium cluster of stars and collisionless dark matter on secular (gravothermal) timescales. We integrate the equations in Lagrangian coordinates via a second-order, semi-implicit algorithm, which is unconditionally stable when the mass of the lighter species is much less than that of the heavier species. The method can be straightforwardly generalized to handle a multispecies system with a population of stars or components beyond collisionless dark matter and stars. We apply the method to simulate the dynamical evolution of stellar-dark matter systems, exploring the consequences of mass segregation and gravothermal core collapse, and assessing those effects for observed globular clusters and dwarf galaxies in the Local Volume.

Presenter: Prof. 钟, 益鸣 (香港城市大学)

Session Classification: Session 1

Contribution ID: 44

Type: **not specified**

Dilution Effect on Freeze-in Dark Matter from a Phase Transition

Presenter: Prof. 张, 阳 (河南师范大学)

Session Classification: Session 1

Contribution ID: 45

Type: **not specified**

PandaX 实验进展

PandaX 实验

Presenter: Prof. 孟, 月 (上海交通大学)

Session Classification: Session 1

Contribution ID: 46

Type: **not specified**

Recent status and prospects of CDEX @CJPL

Presenter: Prof. YANG, Li-Tao (清华大学)

Session Classification: Session 1

Contribution ID: 47

Type: **not specified**

talk title

Presenter: Prof. 高, 飞 (清华大学)

Session Classification: Session 1

Contribution ID: 48

Type: **not specified**

RECODE program for reactor neutrino CEvNS detection and Dark Matter

Presenter: Prof. 吴, 永成 (南京师范大学)

Session Classification: Session 1

Contribution ID: 49

Type: **not specified**

TBD

Presenter: Prof. 周, 宇峰 (中科院理论物理所)

Session Classification: Session 1

Contribution ID: 57

Type: **not specified**

Dark matter searches with low-energy cosmic antinuclei

GAPS 实验组

Presenter: Prof. XIAO, Mengjiao (上海交通大学)