Dark matter and black holes

Report of Contributions

https://indico.ipmu.jp/e/DM_BH

Contribution ID: **204** Type: **not specified**

Conservative Thoughts on Black Holes

Monday 1 December 2025 10:00 (30 minutes)

Presenter: RAJENDRAN, Surjeet

Session Classification: Plenary 1-2: Surjeet Rajendran and Jonathan Tan

Contribution ID: **205** Type: **not specified**

The Origin of Supermassive Black Holes from Pop III.1 Seeds and Implications for Particle Physics and Cosmology

Monday 1 December 2025 10:30 (30 minutes)

The origin of supermassive black holes (SMBHs) is a key open question for contemporary astrophysics and cosmology. Here we discuss the predictions of a model of SMBH formation from Pop III.1 protostars, i.e., metal-free stars forming in locally isolated dark matter minihalos, where dark matter annihilation has a chance to alter the structure of the star allowing growth to supermassive scales (Banik, Tan & Monaco 2019; Singh, Monaco & Tan 2023; Cammelli et al. 2025; Nandal et al. 2025; Sanati et al. 2025a,b; for a review see Tan et al. 2024 and this project page: http://cosmicorigins.space/smbh). The model predicts that all SMBHs form very early in the Universe (i.e., by z ~ 20) with a spatial distribution that is initially relatively unclustered. It also makes predictions for SMBH occupation fractions, host galaxy properties, frequency of binary SMBHs and the gravitational wave background. These predictions are compared to latest results from the Hubble Space Telescope, James Webb Spact Telescope and pulsar timing array observations. Another key prediction of the model is an early phase of "flash"ionization of the universe at z~20, which can help alleviate cosmological tensions (Hubble tension, dynamical dark energy, negative neutrino masses) (Tan 2025; Komatsu & Tan 2025). Finally, since the Pop III.1 mechanism relies on the process of WIMP dark matter self-annihilation, there are implication for the nature of the dark matter particle.

Presenter: TAN, Jonathan

Session Classification: Plenary 1-2: Surjeet Rajendran and Jonathan Tan

Contribution ID: **206** Type: **not specified**

Searches for dark sector particles at Belle and Belle II

Monday 1 December 2025 11:20 (20 minutes)

I will give an update on important and recent results on dark sector particle searches at Belle and Belle II

Presenter: DEY, Sourav

Session Classification: Contributed talks

Contribution ID: **207** Type: **not specified**

Finding Macroscopic Dark Matter

Monday 1 December 2025 11:40 (20 minutes)

Presenter: ZACHARY PICKER

Session Classification: Contributed talks

Contribution ID: **208** Type: **not specified**

Fermionic freeze-in from flavon portal

Monday 1 December 2025 12:00 (20 minutes)

We investigate the phenomenology of a non-thermal dark matter (DM) candidate in the context of flavor models that explain the hierarchy in the masses and mixings of quarks and leptons via the Froggatt-Nielsen (FN) mechanism. A flavor-dependent U(1)FN symmetry explains the fermion mass and mixing hierarchy, and also provides a mechanism for suppressed interactions of the DM, assumed to be a Majorana fermion, with the Standard Model (SM) particles, resulting in its FIMP (feebly interacting massive particle) character. Such feeble interactions are mediated by a flavon field through higher dimensional operators governed by the U(1)FN charges. We point out a natural stabilizing mechanism for the DM within this framework with the choice of half-integer U(1)FN charge n for the DM fermion, along with integer charges for the SM fermions and the flavon field. In this flavon portal scenario, the DM is non-thermally produced from the decay of the flavon in the early universe which becomes a relic through the freeze-in mechanism. We explore the allowed parameter space for this DM candidate from relic abundance by solving the relevant Boltzmann equations. We find that reproducing the correct relic density requires the DM mass to be in the range (100–300) keV for n=7.5 and (3–10) MeV for n=8.5 where n is the U(1)FN charge of the DM fermion.

Presenter: NANDINI DAS

Session Classification: Contributed talks

Contribution ID: **209** Type: **not specified**

TBA

Presenter: FULLER, George

Session Classification: Plenaries 3: Kazunori Kohri

Contribution ID: **210** Type: **not specified**

Verifying primordial black holes as dark matter by mergers, evaporation, and occasionally the memory burden effect

Monday 1 December 2025 14:30 (30 minutes)

I will discuss methods for verifying primordial black holes to be dark matter in terms of mergers, evaporation, and occasionally the memory burden effect

Presenter: KOHRI, Kazunori

Session Classification: Plenaries 3: Kazunori Kohri

Contribution ID: **211** Type: **not specified**

Bosonic dark matter dynamics in neutron stars

Monday 1 December 2025 15:30 (20 minutes)

Excessive dark matter (DM) capture in neutron star (NS) via DM-nucleon scattering, leads to transmutation of NS into solar mass black hole. The formation of such black hole depends on the thermal properties of captured DM particles, particularly if DM particles are bosons. In this work, we study the capture of bosonic particle and subsequent dynamics inside the star, taking the NS temperature evolution into account. In particular, formation of Bose-Einstein condensate (BEC) out of DM particles have been studied along with its consequence on the subsequent black hole formation. We have shown distinct upper bounds on the DM-nucleon cross-section for both BEC and non-BEC scenarios from the existence of old NS. From our dynamical analysis, we find that the DM-nucleon cross-section for DM masses at the electroweak scale is unbounded from NS observations, thereby the direct detection experiments remain important at this regime.
Ref : K. Dutta, D. Ghosh, B. Mukhopadhyaya, JCAP 12 (2024) 053, arxiv: 2408.16091

Presenter: GHOSH, Deep

Session Classification: Contributed talks

Contribution ID: **212** Type: **not specified**

A Dark Matter Probe in Accreting Pulsar–Black Hole Binaries

Monday 1 December 2025 15:50 (20 minutes)

The accretion of dark matter (DM) into astrophysical black holes slowly increases their mass. The rate of this mass accretion depends on the DM model and the model parameters. If this mass accretion effect can be measured accurately enough, it is possible to rule out some DM models, and, with the sufficient technology and the help of other DM constraints, possibly confirm one model. We propose a DM probe based on accreting pulsar-black hole binaries, which provide a high-precision measurement on binary orbital phase shifts induced by DM accretion into black holes, and can help rule out DM models and study the nature of DM.

Presenter: AKIL, Ali

Session Classification: Contributed talks

Contribution ID: **213** Type: **not specified**

Dark matter spikes with strongly self-interacting particles

Monday 1 December 2025 16:10 (20 minutes)

An unavoidable prediction of scenarios with Dark Matter (DM) self-interactions is the existence of number changing processes that convert n initial DM particles into m final ones ($n \to m$ processes), possibly accompanied by Standard Model particles. We argue that the $n \to m$ processes could be probed in DM spikes at the center of galaxies, where the high density may allow sizable rates. We systematically study the implications of the $n \to m$ processes in DM spikes, including other possible interactions involving DM, such as annihilation and self-scattering. We find that for $n \geq 3$, the spike is significantly depleted for $n \to m$ cross-sections favored by DM production via thermal freeze-out. On the other hand, the semi-annihilation of two DM particles into one DM particle and one Standard Model particle preserves in general the structure of the spike. Such density modifications significantly affect phenomenological studies of both astrophysics and particle DM processes around DM spikes.

Presenter: TAKASHI TOMA

Session Classification: Contributed talks

Contribution ID: **214** Type: **not specified**

Supermassive Stars: evading (temporarily!) the inevitable with Dark Matter

Tuesday 2 December 2025 10:00 (30 minutes)

Presenter: GEORGE FULLER

Session Classification: Plenaries 4-5:George Fuller and Yifan Lu

Contribution ID: **215** Type: **not specified**

Dark Matter and the Formation of Direct Collapse Supermassive Black Holes

Tuesday 2 December 2025 10:30 (30 minutes)

The surprising abundance and properties of supermassive black holes (SMBHs) observed at high redshifts have opened a new window into the interplay between cosmology and dark matter physics. While explaining how SMBHs are assembled within the first few hundred million years after the Big Bang remains a major challenge, an attractive route is the direct collapse of pristine, metal-free gas clouds, provided that catastrophic cooling and fragmentation of the cloud are effectively suppressed. In this talk, I will present several mechanisms through which the dark sector can give rise to the conditions necessary for direct collapse. Energy injection from evaporating primordial black holes or photon emission from decaying relic particles, such as axion-like particles or Majorons, can sustain the monolithic collapse of protogalaxies, suggesting a potential link between the origin of early SMBHs and the underlying physics of the dark sector.

Presenter: LU, Yifan

Session Classification: Plenaries 4-5:George Fuller and Yifan Lu

Contribution ID: **216** Type: **not specified**

20 GeV halo-like gamma-ray excess: dark matter annihilation?

Tuesday 2 December 2025 11:20 (30 minutes)

Fifteen years of the Fermi Large Area Telescope (LAT) data in the halo region of the Milky Way (MW) are analyzed to search for gamma rays from dark matter annihilation. Gamma-ray maps within the region of interest (|l| < 60 deg, 10 < |b| < 60 deg) are modeled using point sources, the GALPROP models of cosmic-ray interactions, isotropic background, and templates of Loop I and the Fermi bubbles, and then the presence of a halo-like component is further examined. A statistically significant halo-like excess is found with a sharp peak around 20 GeV, while its flux is consistent with zero below 2 GeV and above 200 GeV. Examination of the fit residual maps indicates that a spherically symmetric halo component fits the map data well. The radial profile agrees with annihilation by the smooth NFW density profile, and may be slightly shallower than this, especially in the central region. Various systematic uncertainties are investigated, but the 20 GeV peak remains significant. In particular, the halo excess with a similar spectrum is detected even relative to the LAT standard background model, which does not depend on GALPROP or other model templates. The halo excess can be fitted by the annihilation spectrum with a mass m_χ~ 0.5-0.8 TeV and annihilation cross section <sigma v> ~ (5-8)×10^{-25} cm^3 s^{-1} for the $b\bar{b}$ channel. This cross section is larger than the upper limits from dwarf galaxies and the canonical thermal relic value, but considering various uncertainties, especially the density profile of the MW halo, the dark matter interpretation of the 20 GeV "Fermi halo" remains feasible. The prospects for verification through future observations are briefly discussed. (preprint: arXiv:2507.07209, JCAP in press)

Presenter: TOTANI, Tomonori

Session Classification: Contributed talks

Contribution ID: **217** Type: **not specified**

Microlensing of Black Hole shadow

Presenter: SARMAH, Priyanka

Session Classification: Contributed talks

Contribution ID: **218** Type: **not specified**

Vacuum relics in ultra-slow-roll inflation

Tuesday 2 December 2025 11:50 (20 minutes)

We study the formation of vacuum bubbles in ultra-slow-roll inflation. Our results show that these bubbles play a significant role in the dynamics of the system and provide an important contribution to the primordial black hole population, potentially accounting for a substantial fraction of dark matter.

Presenter: ALBERT ESCRIVÀ

Session Classification: Contributed talks

Contribution ID: **219** Type: **not specified**

LVK O4a Constraints on Primordial Black Holes

Tuesday 2 December 2025 14:00 (30 minutes)

I will review various methods for constraining primordial black holes through gravitational wave observations and discuss the latest results from the O4a run of the LIGO-Virgo-KAGRA collaboration.

Presenter: KUROYANAGI, Sachiko

Session Classification: Plenaries 6-7: Sachiko Kuroyanagi and Stefano Profumo

Contribution ID: **220** Type: **not specified**

Planck relics as dark matter

Tuesday 2 December 2025 14:30 (30 minutes)

I will survey scenarios that produce Planck-mass relics and assess whether they can stably carry electric, magnetic, or dark charge. I'll examine charge retention and neutralization in the late Universe (including Schwinger discharge and plasma capture), and highlight quantum-gravity effects near extremality—especially for magnetically charged and near-extremal black holes. Finally, I'll outline concrete detection avenues.

Presenter: STEFANO PROFUMO

Session Classification: Plenaries 6-7: Sachiko Kuroyanagi and Stefano Profumo

Contribution ID: **221** Type: **not specified**

Exotic defect dynamics in axion cosmology

Tuesday 2 December 2025 15:30 (20 minutes)

We investigate an early history in which topological defects are dynamical within an axion cosmology post-inflation, motivated by the increasing popularity of models predicting primordial black holes formed of defects contributing to present-day dark matter content. We highlight the capabilities of the axionic context, and identify unique features pertaining to the interactions between defects coexisting at an early time, such as monopole-domain wall systems. In particular, our work aims to emphasise non-standard scenarios supported by well-motivated theories, with which we may probe fundamental physics both observationally and analytically.

Presenter: YU KOMIYA

Session Classification: Contributed talks

Contribution ID: **222** Type: **not specified**

PBHs and Dark Matter Regurgitation from First Order Phase Transitions

Tuesday 2 December 2025 15:50 (20 minutes)

First order phase transitions can create a large mass gap between the false and true vacua for dark sector particles, effectively trapping them in false vacuum pockets. After an initial contraction phase, these particles coalesce into semi-stable compact objects, thermal balls and Fermi balls. Further cooling of these objects leads to a final collapse into primordial black holes. We show how this formation mechanism leads to two interesting possibilites: late-forming PBHs which could evade CMB bounds and regurgitated dark matter which form the PBHs from which they are re-emitted as Hawking radiation.

Presenter: PHILIP LU

Session Classification: Contributed talks

Contribution ID: **223** Type: **not specified**

BSM-enhanced PBH Dark Matter

Tuesday 2 December 2025 16:10 (20 minutes)

In this talk I will give an overview of several beyond Standard model theories predicting a large number of additional degrees of freedom. The corresponding softening in equations of state can be significant. I will show that, within these models, it is then possible to achieve a large enhancement in PBH abundance on scales relevant for PBHDM; namely, the asteroid mass and memory burden windows.

Presenter: XAVIER PRITCHARD

Session Classification: Contributed talks

Contribution ID: **224** Type: **not specified**

The role of dark matter in the origin and dynamical evolution of massive black binaries towards the LISA band

Thursday 4 December 2025 10:00 (30 minutes)

The typical binaries of massive black holes that the LISA gravitational wave detector will observe are in the range 10^4-10^6 solar masses. In the low redshift Universe, observations of active galactic nuclei and other types of sources suggest that such black holes preferentially reside in dwarf galaxies. Dwarf galaxies are notoriously dark matter dominated down to their cores. I will
show how the process of pairing and binary formation of massive black holes inside dwarf galaxies is heavily affected by the dark matter density profile. This, in turn, carries information on the nature
of dark matter, with the caveat that baryonic physics effects might also play a role in shaping the evolution of dwarf galaxies' dark matter profiles. In particular, successful formation of a binary of massive black holes seems to be disfavoured in cored dark matter profiles, which are predicted in some dark matter models alternative to Cold Dark Matter. The rate of LISA sources as a function of redshift might thus carry precious information on the nature of the host dark matter halos.
I will conclude with a digression on another important aspect, also relevant to GW astronomy, namely how dark matter might have influenced, directly or indirectly, the formation of the seeds of massive black holes at high redshift.

Presenter: MAYER, Lucio

Session Classification: Plenaries 8-9: Lucio Mayer and John Silverman

Contribution ID: **225** Type: **not specified**

TBA

Thursday 4 December 2025 10:30 (30 minutes)

Presenter: SILVERMAN, John

Session Classification: Plenaries 8-9: Lucio Mayer and John Silverman

Contribution ID: **226** Type: **not specified**

Primordial Black Hole formation from power spectrum with finite width

Thursday 4 December 2025 11:20 (20 minutes)

Primordial black holes (PBHs) can form from gravitational collapse of large overdensities in the early Universe, giving rise to rich phenomena in astrophysics and cosmology. We develop a novel, general, and systematic method based on theory of density contrast peaks to calculate the abundance of PBHs for a broad power spectrum of curvature perturbations with Gaussian statistics. We introduce a window function to account for the relevant perturbation scales associated with PBHs of different masses, along with a filter function that removes unphysical contributions from super-horizon-scale overdensities. While some uncertainties remain due to the limited understanding of the nonlinear collapse process, our approach substantially reduces the discrepancy previously observed between peaks theory and the Press–Schechter formalism.

Presenter: JIANING WANG

Session Classification: Contributed talks

Contribution ID: **227** Type: **not specified**

When Tiny Halos Stir Spacetime: Gravitational Waves from the Fifth Forces

Thursday 4 December 2025 11:40 (20 minutes)

Dark matter fermions interacting via attractive fifth forces mediated by a light mediator can form dark matter halos in the very early Universe. Motivated by the scenario, we discovered that the bound systems composed of such halos, even very light, are capable of generating Gravitational Wave (GW) signals detectable today.
Due to the additional strong force that contributes to the acceleration of the orbit, such binaries can lead to strong gravitational waves with initially extremely high frequencies–and cosmological redshift shifts these signals into the observable frequency bands today, i.e., the PTA surveys.
The resulting gravitational wave from a single event can carry distinctive features in the waveform that enable future observations to distinguish them from conventional ones solely due to gravitational interaction, providing a new avenue to probe the macroscopic properties of dark matter through gravitational wave observations.

Presenter: WANG, Xinpeng

Session Classification: Contributed talks

Contribution ID: **228** Type: **not specified**

Exploring Ultra-Slow-Roll Inflation in Composite Pseudo-Nambu–Goldstone Boson Models: Implications for Primordial Black Holes and Gravitational Waves

Thursday 4 December 2025 12:00 (20 minutes)

We study inflation driven by a scalar potential arising from composite-sector dynamics, inspired by generalized composite Higgs models. The introduction of a non-minimal coupling, possessing the same functional form as the potential, induces a flattening at large field values that enables successful inflation. We analyze the conditions for ultra-slow-roll inflation, which leads to enhanced curvature perturbations, by combining analytical criteria near the inflection point with comprehensive numerical scans of the parameter space. The region consistent with Cosmic Microwave Background constraints and yielding approximately $N_e \approx 55$–60 e-folds also predicts primordial black holes with masses in the range 10^3–10^5 g. Although such ultra-light primordial black holes are typically expected to have evaporated, recent proposals invoking evaporation suppression via memory-burden effects could allow their survival as viable dark matter candidates. Under this assumption, the predicted gravitational wave signal lies in a frequency range currently inaccessible to any existing or proposed detectors. Although no experimental proposals presently reach this frequency band, our results provide strong motivation to push the frontiers of gravitational wave detection towards these unexplored high-frequency regimes.

Presenter: MARCO MERCHAND MEDINA

Session Classification: Contributed talks

Contribution ID: **229** Type: **not specified**

Evaporating black holes: how the burden of their memory stabilizes them

Thursday 4 December 2025 14:00 (30 minutes)

The memory burden effect describes how an object's stored information resists its own decay. This mechanism is especially pronounced in saturons—systems that saturate unitarity bounds on entropy—with black holes providing the prime example. I will show how memory burden can halt Hawking evaporation and dynamically stabilize black holes against complete decay. Crucially, this phenomenon is not exclusive to gravity: it arises naturally in generic quantum many-body systems and renormalizable field theories, underscoring its broader theoretical relevance. I will then discuss the phenomenological consequences, focusing on potential signatures in the early Universe and today. In particular, memory-stabilized black holes can produce distinctive high-energy cosmic-ray signals and leave characteristic imprints on the CMB, offering correlated cosmological and astrophysical probes of this peculiar form of dark matter.

Presenter: ZANTEDESCHI, Michael

Session Classification: Plenaries 10-11: Michael Zantedeschi and Haibo Yu

Contribution ID: **230** Type: **not specified**

Seeding Supermassive Black Holes from the Dark Sector

Thursday 4 December 2025 14:30 (30 minutes)

I will present a novel mechanism for forming supermassive black holes through dark matter dynamics. In the self-interacting dark matter framework, halos can undergo gravothermal collapse, producing black hole seeds that subsequently grow via baryonic Eddington and dark Bondi accretion. This process can naturally account for the massive black holes observed at high redshift, including the JWST Little Red Dots. I will discuss the underlying dynamics, the connection to halo evolution across cosmic time, and potential observational signatures in strong lenses, stellar streams, and dwarf satellites.

Presenter: YU, Haibo

Session Classification: Plenaries 10-11: Michael Zantedeschi and Haibo Yu

Contribution ID: **231** Type: **not specified**

The trichotomy of PBH initial conditions

Thursday 4 December 2025 15:50 (20 minutes)

We show that the threshold to form a black hole, in an asymptotically flat and radiation dominated Friedman-Robertson-Walker (FRW) Universe, is not solely (mainly) determined by the behaviour of the compaction function at its maximum, as earlier thought, but also by the three-dimensional curvature at smaller (but super-horizon) scales, which we call "the core". We find three classes of initial conditions characterized by an open (O), closed (C), or flat (F) FRW core surrounded by a shell with higher three-dimensional curvature. In the C case, the core helps the collapse so that the black hole formation threshold is there the lowest among all cases. Type-II black holes might only be generated by Type-O or F (each of those with different thresholds, with O being the highest) or by a Type-C with an effective F core.

Presenter: LAIA MONTELLÀ

Session Classification: Contributed talks

Contribution ID: **232** Type: **not specified**

Primordial black holes from inflation and their observational imprints (online)

Thursday 4 December 2025 15:30 (20 minutes)

Primordial black holes (PBH) have recently emerged as a very interesting candidate for the cold dark matter in the universe. We study their generation in a single field inflationary model with an inflection point potential and found that PBHs can be produced in our scenario in the asteroid-mass window with a nearly monochromatic mass fraction, accounting for the total dark matter in the universe. Further, we study the induced stochastic gravitational waves background (ISGWB) arising from the second order scalar perturbations. We found that the ISGWB in our scenario can be generated in the frequencies range from nanoHz to kHz that covers the observational scales corresponding to future space based GW observatories such as IPTA, LISA, DECIGO and ET as well as Advanced LIGO and BBO. Moreover, we also explore various observational imprints on ISGWB due to the Hawking evaporation of ultralight PBH and from the memory burden effect.

Presenter: RAJEEV KUMAR JAIN

Session Classification: Contributed talks

Contribution ID: **233** Type: **not specified**

Primordial black hole formation from the merger of oscillons

Thursday 4 December 2025 16:10 (20 minutes)

We show that the merger of oscillons results in a broad spectrum of the oscillon mass. A huge number of oscillon samples obtained from numerical lattice simulations reveal that the oscillon mass distribution has an exponential tail in a heavy-mass region. This enables us to infer the fractional abundance of heavy oscillons. Using the criterion for the primordial black hole (PBH) formation from the oscillon collapse obtained in previous studies, we estimate the abundance of PBHs and conclude that a sizable number of PBHs can be produced from oscillons. It can be an alternative PBH formation mechanism without employing the tuning of the inflaton potential to enhance the small-scale density fluctuations in the conventional PBH formation scenario.

Presenter: NAOYA KITAJIMA

Session Classification: Contributed talks

Contribution ID: **234** Type: **not specified**

Observational search of PBH

Friday 5 December 2025 10:00 (1 hour)

Gravitational microlensing is a powerful probe of PBHs, and I will give a review of the microlensing searches for PBHs.Gravitational microlensing is a powerful probe of PBHs, and I will give a review on the microlensing search of PBH

Presenters: TAKADA, Masahiro; SUGIYAMA, Sunao

Session Classification: Plenaries 12-13: Masahiro Takada and Sunao Sugiyama

Contribution ID: **235** Type: **not specified**

Discovery of a Little Red Dot candidate at z ~ 10

Friday 5 December 2025 11:20 (20 minutes)

Deep IR observations by JWST have discovered a new population of high-redshift compact objects known as “little red dots” (LRDs) with a characteristic V-shape SED. Based on the detection of broad Balmer emission lines, previous studies suggested that LRDs are low-luminosity AGNs, possibly linked to super-Eddington accretion shortly after seed BH formation. In this study, we propose a new color selection technique for identifying LRDs at z~10, utilizing both NIRCam and MIRI photometry to extend the redshift frontier of LRD studies. Applying this method to COSMOS-Web, the largest NIRCam-MIRI joint survey, we find one solid candidate with a compact morphology, a clear F115W dropout, and a V-shape SED. This candidate with the photometric redshift of ~10.5 may represent one of the most distant SMBH so far, potentially representing the era just after seed BH formation. In the talk, we will present the first constraints on the luminosity function of LRDs at z~10 and discuss the implications of this discovery for our understanding of SMBH evolution in the early Universe.

Presenter: TAKUMI TANAKA

Session Classification: Contributed talks

Contribution ID: **236** Type: **not specified**

Neutrino signals from Dark Stars seeding SMBHs

Friday 5 December 2025 11:40 (20 minutes)

Dark Stars (DS), powered by dark matter annihilation may form in the place of Pop. III stars. They can grow to
$gtrsim10^5\ M_\odot$ and collapse to black holes making them excellent candidates to seed supermassive black holes. We establish first constraints on DSs as SMBH progenitors based on DM annihilations using data from Super-Kamiokande and IceCube neutrino experiments, while remaining consistent with James Webb Space Telescope observations. Upcoming experiments such as Hyper-Kamiokande, DUNE, and JUNO will be able to explore DS properties with enhanced sensitivity.

Presenter: THOMAS SCHWEMBERGER

Session Classification: Contributed talks

Contribution ID: **237** Type: **not specified**

Revisiting the merger rate of primordial black holes

Friday 5 December 2025 12:00 (20 minutes)

The merger rate of binary black holes inferred by the LIGO-Virgo-KAGRA (LVK) collaboration is potentially compatible with primordial black holes (PBHs). Reexamining the latest merger rate calculations for Poisson-distributed PBHs, we find that they did not fully implement the binary formation conditions required for PBH pairs to decouple from the Hubble flow. Once these conditions are properly taken into account, the predicted merger rate becomes comparable to, or even inconsistent with, current observational constraints from the cosmic microwave background (CMB). Motivated by this, we revisit the binary formation criteria in a more realistic framework and extend the calculation to scenarios with primordial clustering. With these improvements, we show that PBHs can still account for the LVK merger rate.

Presenter: SHUNSUKE NEDA

Session Classification: Contributed talks

Contribution ID: **238** Type: **not specified**

Sub-GeV dark matter detection around SMBH.

Friday 5 December 2025 14:00 (30 minutes)

Presenter: MATSUMOTO, Shigeki

Session Classification: Plenary 14-15: Shigeki Matsumoto and Shunsaku Horigome

Contribution ID: **239** Type: **not specified**

TBA

Friday 5 December 2025 14:30 (30 minutes)

Presenter: SHUNSAKU HORIUCHI

Session Classification: Plenary 14-15: Shigeki Matsumoto and Shunsaku Horigome