Sydney Spring School 2022

Report of Contributions

https://indico.global/e/12913

Contribution ID: **1** Type: **not specified**

Dark matter 1

Wednesday 30 November 2022 10:00 (1 hour)

Presenter: MAMBRINI, Yann

Contribution ID: **2** Type: **not specified**

Dark matter 2

Wednesday 30 November 2022 11:20 (1 hour)

Presenter: MAMBRINI, Yann

Contribution ID: **3** Type: **not specified**

Flavour anomalies 1

Wednesday 30 November 2022 13:20 (1 hour)

Presenter: EGEDE, Ulrik (Monash University (AU))

Contribution ID: **4** Type: **not specified**

Flavour anomalies 2

Wednesday 30 November 2022 14:20 (1 hour)

Presenter: EGEDE, Ulrik (Monash University (AU))

Contribution ID: **5** Type: **not specified**

Experimental techniques for dark matter detection

Wednesday 30 November 2022 15:50 (1 hour)

Presenter: FRUTH, Theresa

Contribution ID: **6** Type: **not specified**

Opening/Introductions

Wednesday 30 November 2022 09:45 (15 minutes)

Contribution ID: **7** Type: **not specified**

Pub dinner and drinks

Friday 2 December 2022 18:00 (2 hours)

Contribution ID: **8** Type: **not specified**

Discussion

Wednesday 30 November 2022 16:50 (30 minutes)

Contribution ID: **9** Type: **not specified**

Dark matter 3

Thursday 1 December 2022 10:00 (1 hour)

Presenter: MAMBRINI, Yann

Contribution ID: **10** Type: **not specified**

Flavour physics 3

Thursday 1 December 2022 11:20 (1 hour)

Presenter: EGEDE, Ulrik (Monash University (AU))

Contribution ID: **11** Type: **not specified**

Neutrino astrophysics 1

Thursday 1 December 2022 13:20 (1 hour)

Presenter: ADAMS, Jenni (University of Canterbury)

Contribution ID: **12** Type: **not specified**

Neutrino astrophysics 2

Thursday 1 December 2022 14:20 (1 hour)

Presenter: ADAMS, Jenni (University of Canterbury)

Contribution ID: **13** Type: **not specified**

Phenomenology of ultralight scalar dark matter

Thursday 1 December 2022 15:50 (1 hour)

Presenter: Dr STADNIK, Yevgeny (The University of Sydney)

Contribution ID: **14** Type: **not specified**

Discussion

Thursday 1 December 2022 16:50 (30 minutes)

Contribution ID: **15** Type: **not specified**

Cosmology 3

Presenter: SHAPOSHNIKOV, Mikhail

Contribution ID: **16** Type: **not specified**

Axions

Friday 2 December 2022 13:20 (1 hour)

Presenter: O'HARE, Ciaran (Sydney)

Contribution ID: **17** Type: **not specified**

Neutrino astrophysics

Friday 2 December 2022 10:00 (1 hour)

Presenter: ADAMS, Jenni (University of Canterbury)

Contribution ID: **18** Type: **not specified**

Student talks

Contribution ID: **19** Type: **not specified**

Stellar Probes of BSM Physics

Friday 2 December 2022 15:50 (1h 30m)

Presenter: DEROCCO, William

Contribution ID: **20** Type: **not specified**

Student talks/discussion

Contribution ID: **22** Type: **not specified**

Phenomenology of the companion-axion model

Friday 2 December 2022 14:20 (20 minutes)

We study the phenomenology of the ‘companion-axion model’consisting of two coupled QCD axions. The second axion is required to rescue the Peccei-Quinn solution to the strong-CP problem from the effects of colored gravitational instantons. We investigate here the combined phenomenology of axion-axion and axionphoton interactions, recasting present and future single-axion bounds onto the companion-axion parameter
space. Most remarkably, we predict that future axion searches with haloscopes and helioscopes may well discover two QCD axions, perhaps even within the same experiment

Author: PIEROBON, Giovanni

Contribution ID: **23** Type: **not specified**

Decaying warm dark matter

Friday 2 December 2022 14:40 (20 minutes)

During the recent years, decaying dark matter models have received renewed interest as proposed solutions to the current cosmological tensions, mainly due to their flexible expansion histories and clustering properties. While much focus has been on decaying cold dark matter, in this talk, I will present our recent work on decaying warm dark matter based on our recent preprint arXiv:2205.13628. Decaying warm dark matter generalises its cold counterpart, and interpolates between a wide range of cosmological models, admitting considerable customisability with few model parameters. Among other things, I will present results from a comprehensive MCMC analysis, evaluating the consequence of the model on the Hubble and ⊠8 tensions. Lastly, I emphasise the power of agnosticism with respect to the underlying particle physics realisation and discuss applications to majorons and neutrino decays, both of which can be described as decaying warm dark matter.

Authors: HOLM, Emil Brinch; HANNESTAD, Steen (Aarhus University); BULOW, Thomas Tram (Institute of Physics and Astronomy-Aarhus University)

Contribution ID: **26** Type: **not specified**

Sensitivity of Dark Matter-Nucleus Interactions to Nuclear Structure

Friday 2 December 2022 15:00 (20 minutes)

Non-relativistic effective field theory (NREFT) is one approach used for describing the interaction of WIMPS with ordinary matter. Among other factors, these interactions are expected to be affected by the structure of the atomic nuclei in the target. The sensitivity of the nuclear response components of the WIMP-nucleus scattering amplitude is investigated using shell model calculations for ^{19}F, ^{23}Na, ^{28,29,30}Si, ^{40}Ar, ^{127}I, ^{70,72,73,74,76}Ge and ^{128,129,130,131,132,134,136}Xe. Resulting integrated nuclear response values are shown to be sensitive to some specifics of the nuclear structure calculations. The potential uncertainties that may arise from the nuclear components of WIMP-nucleus scattering amplitudes due to nuclear structure theory and modelling are thus highlighted.

Author: ABDEL KHALEQ, Raghda (Australian National University (ANU))

Co-authors: STUCHBERY, Andrew (The Australian National University); SIMENEL, Cedric

Contribution ID: **28** Type: **not specified**

Primordial black holes

Friday 2 December 2022 11:20 (1 hour)

Presenter: COLE, Pippa