

CoEPP-CAASTRO Workshop 2014

Report of Contributions

Contribution ID: 0

Type: **not specified**

Housekeeping & Welcome

Monday 29 September 2014 09:00 (15 minutes)

Presenters: Ms GUN, Kate; MOZE, Oscar

Contribution ID: 1

Type: **not specified**

Detecting Dark Matter: Overview, Issues, and Perspectives

Monday 29 September 2014 09:15 (1 hour)

With overwhelming evidence via gravitational observations that the preponderance of mass in the universe is in a new, unseen, and as-yet undetermined form of matter, the quest is on to identify this “dark” matter. A new type of particle(s) is the leading candidate for this dark matter. I will discuss various particle candidates, with a focus on those that have a small (weak), but non-zero interaction with ordinary matter. The three main modes of detecting such particles—collider, direct, and indirect searches—and their current status will be presented. I will discuss various issues to be addressed and provide my perspectives on the future of the dark matter field.

Presenter: SAVAGE, Chris

Contribution ID: 2

Type: **not specified**

Collider Constraints

Monday 29 September 2014 10:15 (30 minutes)

Presenter: BELL, Nicole (University of Melbourne)

Contribution ID: 3

Type: **not specified**

Optical Surveys and Dark Matter

Monday 29 September 2014 11:15 (30 minutes)

A new generation of large astronomical surveys is getting underway. I'll briefly talk review some of the major upcoming optical surveys, (with a bias towards those with Australian-participation), and the kinds of information about dark matter that they might provide. I'll focus on the Dark Energy Survey (which despite the name will also have something to say about dark matter), OzDES, SkyMapper, KiDS, DESI, and 4MOST.

Presenter: DAVIS, Tamara

Contribution ID: 4

Type: **not specified**

Exploring the high-energy Universe with neutrinos in IceCube

Monday 29 September 2014 16:00 (30 minutes)

The kilometre-scale IceCube detector has been fully operational for several years, and has already met one design goal with the discovery of a flux of high-energy neutrinos (~ 60 TeV - 2 PeV) coming from beyond our solar system. The next step is to determine the nature of the sources - likely a mix of galactic and extra-galactic, and to continue to explore other science with IceCube, including searches for potential dark matter signatures.

Presenter: HILL, Gary

Contribution ID: 5

Type: **not specified**

Galactic and subgalactic problems with dark matter

Monday 29 September 2014 13:30 (1 hour)

Presenter: KAPLINGHAT, Manoj

Contribution ID: 6

Type: **not specified**

Measurements of the CMB polarization

Monday 29 September 2014 14:30 (30 minutes)

The cosmic microwave background (CMB) is revolutionizing our understanding of the Universe. The CMB is the strongest single piece of evidence that we live in a geometrically flat Universe, dominated by non-baryonic cold dark matter and dark energy. Many outstanding questions remain around this basic framework: Did inflation occur, and what physics was responsible for it? What is dark energy? What are the neutrino masses? Are there new particle species that we can detect cosmologically? Remarkably the CMB can shed light on all of these questions. I will give an overview of the state of CMB polarization experiments, and then focus on the latest results from two specific CMB polarization experiments: SPTpol and PolarBear. I will also discuss the forecasts for upcoming experiments.

Presenter: REICHARDT, Christian

Contribution ID: 7

Type: **not specified**

Dark Matter Halos and Cosmic Evolution

Monday 29 September 2014 15:00 (30 minutes)

Dark matter annihilation, decay, or other particle interactions have the potential to affect early structure formation by injecting energy into local gas. I will discuss major unsolved problems relevant to the abundance and structure of dark matter halos, and how these uncertainties affect predictions of dark matter's influence over cosmic time. [Paper: arXiv:1309.7783]

Presenter: MACK, Katie

Contribution ID: 8

Type: **not specified**

What I think about when I think about dark matter

Monday 29 September 2014 11:45 (30 minutes)

Presenter: VOLKAS, Raymond (The University of Melbourne)

Contribution ID: 9

Type: **not specified**

Indirect searches for dark matter with gamma-rays

Monday 29 September 2014 16:30 (30 minutes)

I will review the recent results of indirect searches for dark matter using space-based and ground-based gamma-ray facilities. My talk will conclude with a look at the future prospects for HESS-II and CTA in dark matter studies.

Presenter: ROWELL, Gavin

Contribution ID: **10**

Type: **not specified**

Great Planes of Dwarfs: A challenge for cosmology?

Monday 29 September 2014 17:00 (30 minutes)

Presenter: LEWIS, Geraint

Contribution ID: 11

Type: **not specified**

Experimental review concentrating on Gran Sasso

Tuesday 30 September 2014 09:00 (30 minutes)

A review of the Dark Matter experiments at Gran Sasso National Laboratory will be given

Presenter: RAGAZZI, Stefano

Contribution ID: 12

Type: **not specified**

WIMPs and their direct searches

Tuesday 30 September 2014 09:30 (45 minutes)

This session is TBC

Presenter: MASIERO, Antonio

Contribution ID: 13

Type: **not specified**

Results form the first DarkSide-50 argon run

Tuesday 30 September 2014 10:15 (20 minutes)

DarkSide-50 (DS-50) at Gran Sasso underground laboratory, Italy, is a direct dark matter search experiment based on a TPC with liquid argon from underground sources. The DS-50 TPC, with 50 kg of active argon and a projected fiducial mass of >33 kg, is installed inside an active neutron veto based on a boron-loaded organic scintillator. The neutron veto is built inside a water cherenkov muon veto. DS-50 has been taking data since Nov 2013, collecting more than $2e7$ events with atmospheric argon. This data represents an exposure to the largest background, beta decays of Ar-39, comparable to the full three-year run planned for DS-50 with underground argon. When analyzed with a threshold that would give a sensitivity in the full run of about $1e-45 \text{ cm}^2$ at a WIMP mass of $100 \text{ GeV}/c^2$, there is no Ar-39 background observed. The detector design and performance will be presented as well as results from the atmospheric argon run still in progress. Plans for the underground argon run and for a ton-scale detector within the same neutron veto vessel will be presented.

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Presenter: D'ANGELO, Davide (Universita' degli Studi Milano)

Contribution ID: 14

Type: **not specified**

Influence of baryons on DM predictions

Presenter: DUFFY, Alan

Contribution ID: 15

Type: **not specified**

Stella: The facility for low background techniques at LNGS

Tuesday 30 September 2014 11:15 (30 minutes)

Particle physics experiments searching for rare events such as neutrino interactions, neutrinoless double beta decay and dark matter, have to fight against background of different origin. Besides building the experiments in a deep underground site, it is extremely important to shield against environmental backgrounds and to minimise the intrinsic radioactive contaminations of the experimental setup by carefully selecting radiopure materials. This is the main motivation for a facility for low background techniques at LNGS, the underground laboratory of INFN in Italy. In this talk we describe the main background sources that affect particle experiments in a deep underground site and the material screening techniques and other low background activities carried out at LNGS, outlining the present status and possible future improvements.

Presenter: TOMEL, Claudia (INFN)

Contribution ID: 16

Type: **not specified**

The mine: measurements of the background and working environment

Tuesday 30 September 2014 11:45 (30 minutes)

Presenters: BARBERIO, Elisabetta (University of Melbourne (AU)); Dr VOLPI, Matteo (University of Melbourne (AU))

Contribution ID: 17

Type: **not specified**

Axions and WISP

Tuesday 30 September 2014 13:30 (30 minutes)

Axions and WISPs are compelling dark matter candidates with sub-eV masses. I will provide an overview of direct detection efforts, focusing primarily on the most mature and promising approach involving resonant cavity structures. I will also discuss previous work performed at The University of Western Australia and our plans for the future.

Presenter: PARKER, Stephen

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

Annual and diurnal modulation signals with mirror dark matter

Tuesday 30 September 2014 14:00 (30 minutes)

The possible annual and diurnal signals expected in a direct detection experiment located in the southern hemisphere are discussed in the context of mirror dark matter.

Presenter: FOOT, Robert

Contribution ID: **19**

Type: **not specified**

Thermal dark matter and new physics below 100 TeV

Tuesday 30 September 2014 14:30 (30 minutes)

Presenter: BALAZS, Csaba (Monash University)

Contribution ID: 20

Type: **not specified**

Next steps in collaboration with INFN

Presenter: DISCUSSION

Contribution ID: 21

Type: **not specified**

Summary document

Tuesday 30 September 2014 15:30 (45 minutes)

Presenter: DISCUSSION

Contribution ID: 22

Type: **not specified**

Detecting DM annual modulation with SABRE

Tuesday 30 September 2014 10:35 (20 minutes)

SABRE (Sodium-iodide with Active Background REjection) is a new NaI(Tl) experiment designed to test the DAMA/LIBRA claim for a positive WIMP-dark matter annual modulation signal. SABRE will consist of highly pure NaI(Tl) crystals in an active liquid scintillator veto that will be placed deep underground. The scintillator vessel will provide a veto against external backgrounds and those arising from detector components, especially the 3 keV signature from the decay of ^{40}K in the crystal. It will therefore allow for a sensitive measurement of the ^{40}K levels in the crystals as they are developed. Through the use of the veto and crystal purification techniques, we aim for a ^{40}K background 10 times lower than that of the DAMA/LIBRA experiment. The Neutron Veto of the DarkSide experiment provides a natural environment for testing the crystals.

Presenter: D'ANGELO, Davide (Universita' degli Studi Milano)

Contribution ID: 23

Type: **not specified**

Dark matter self-annihilation and its impact on the intergalactic medium and early galaxy formation

Monday 29 September 2014 17:30 (20 minutes)

Presenter: Ms AVRAM, Cassandra

Session Classification: Posters Session

Contribution ID: 24

Type: **not specified**

Leptophilic Dark Matter with Z' Interactions

Monday 29 September 2014 17:30 (20 minutes)

Presenter: Ms LEANE, Rebecca

Session Classification: Posters Session

Contribution ID: 25

Type: **not specified**

Dark Matter Annihilation in Early Halos

Monday 29 September 2014 17:30 (1 hour)

Presenter: Ms SCHON, Sarah

Session Classification: Posters Session

Contribution ID: 26

Type: **not specified**

Can the entire dark sector be dissipative?

Monday 29 September 2014 17:30 (1 hour)

Presenter: Mr VAGNOZZI, Sunny

Session Classification: Posters Session

Contribution ID: 27

Type: **not specified**

Generic DM Models Confronting GC Gamma-ray Excess

Monday 29 September 2014 17:30 (20 minutes)

Recently, Daylan et al. re-analyzed data from the Fermi-LAT and found excess flux of Gamma-rays from the direction of the Galactic Center. They concluded that the 1³ GeV Gamma-ray signal is statistically significant and appears to originate from dark matter particles annihilating rather than standard astrophysical sources (T. Daylan, D. P. Finkbeiner, D. Hooper, T. Linden, S. K. N. Portillo, N. L. Rodd and T. R. Slatyer, arXiv:1402.6703 [astro-ph.HE]).

Inspired by the excess of Gamma-rays from the Galactic Center, we confront a series of simplified dark matter models with experimental data. Assuming a single dark matter particle coupled to standard matter via a spin-0 mediator, we compare Majorana fermion, real scalar and real vector dark matter candidates. We consider dark matter annihilation into various fermionic final states contributing to the observed differential Gamma-ray flux.

Using Bayesian inference we confine the mass and couplings strengths of the dark matter and mediator particle. Our results show that, if the Gamma-ray excess is due to dark matter the above parameters are well constrained by the measurements including Gamma-ray, relic density and direct detection

Presenter: Mr LI, Tong

Session Classification: Posters Session

Contribution ID: 28

Type: **not specified**

Annihilating Dark Matter and the Central Galactic Gamma Ray Excess in Natural Supersymmetry

Monday 29 September 2014 17:30 (1 hour)

Presenter: Mr TROTT, Timonthy

Session Classification: Posters Session