

Session Program

11-16 Dec 2022



24th Australian Institute of Physics Congress

AIP: Atomic and Molecular Physics

Monday 12 December

11:00

AIP: Atomic and Molecular Physics: ATMOP 1 - Open systems & topology

Session | **Location:** Adelaide Convention Centre, Room R4 | **Convener:** Matthew Davis

11:00-11:30 **Melting of vortex lattice in a two-dimensional BEC**

Speaker

Dr Tyler Neely

11:30-11:45

Rapid production of metastable helium BEC using cross-beam dipole trap

Speaker

Sam Meng

11:45-12:00

Towards an experimental violation of a motional-state Bell's inequality using ultracold helium

Speaker

Kieran Thomas

12:00-12:15

Feedback cooling atomic gases to quantum degeneracy

Speaker

Matthew Goh

12:15-12:30

Gravitation, quantum computing and quantised vortices

Speaker

Tapio Simula

12:30

14:00

AIP: Atomic and Molecular Physics: ATMOP 2 - Superfluidity & vortex lattices

Session | **Location:** Adelaide Convention Centre, Room R4 | **Convener:** Sean Hodgman

14:30-14:45 **Mutual friction and diffusion of two-dimensional quantum vortices**

Speaker

Zain Mehdi

14:45-15:00

Vortex lattice nucleation in dipolar Bose-Einstein condensates

Speaker

Prof. Andy Martin

15:00-15:15

Machine learning optimised stirring of persistent currents in BECs

Speaker

Simeon Simjanovski

15:15-15:30

Emergent Universal Drag Law in a Model of Superflow

Speaker

Maarten Christenhusz

15:30

16:00

AIP: Atomic and Molecular Physics: ATMOP 3 - Atomic clocks**Session** | **Location:** Adelaide Convention Centre, Room R4 | **Convener:** Jacinda Ginges

16:00–16:30

There and Back Again: Demonstration and Future of an Optical Atomic Clock Beyond the Laboratory**Speaker**

Sarah Scholten

16:30–16:45

New optical clocks based on Cu II, Yb III, Hf II, Hf IV, and W VI ions which may be used to search for dark matter and variation of the fine structure constant**Speaker**

Saleh Allehabi

16:45–17:00

Carrier-Envelope-Phase Effect for Multiphoton and Tunneling Excitation**Speaker**

Rohan Glover

17:00–17:15

Radiokrypton Dating using Atom Trap Trace Analysis**Speaker**

Thomas Chambers

17:30

Tuesday 13 December

11:00

AIP: Atomic and Molecular Physics: ATMOP 4 - Spin physics/correlations

Session | Location: Adelaide Convention Centre, Room R4 | Convener: Andy Martin

11:30-11:45 **The exact properties of ultracold polarons**

Speaker
Jia Wang

11:45-12:00

Exploring Quantum Magnetism and Many-Body Localisation in a Dilute Gas of Ultracold Polar Molecules

Speaker
Matthew Davis

12:00-12:15

Berezinskii-Kosterlitz-Thouless transitions in a ferromagnetic superfluid

Speaker
Lewis Williamson

12:15-12:30 **Ultradilute Quantum Droplets**

Speaker
Xia-Ji Liu

12:30

14:00

AIP: Atomic and Molecular Physics: ATMOP 5 - New physics in precision atomic experiments

Session | Location: Adelaide Convention Centre, Room R4 | Convener: Igor Bray

14:00-14:30 **On the hyperfine anomaly and atomic parity violation**

Speaker
Jacinda Ginges

14:30-14:45

Accurate determination of the magnetic hyperfine anomaly in atomic cesium from muonic-atom experiments

Speaker
George Sanamyan

14:45-15:00 **Dark matter detection via atomic interactions**

Speaker
Ashlee Caddell

15:00-15:15

Testing atomic QED theory via a tuneout wavelength and transition measurements using a metastable helium Bose-Einstein condensate

Speaker
Sean Hodgman

15:15-15:30

Coupled-Channel Approach to Proton Scattering on Molecular Hydrogen Using an Effective One-Electron Model

Speaker

Corey Plowman

15:30

Wednesday 14 December

16:00

AIP: Atomic and Molecular Physics: ATMOP 6 - Condensate dynamics

Session | Location: Adelaide Convention Centre, Room R4 | Convener: Brendan Mulkerin

16:00–16:30 **Non-equilibrium dynamics of a strongly interacting Fermi gas**

Speaker

Dr Paul Dyke

16:30–16:45

Breathing oscillations of a harmonically trapped one-dimensional quasicondensate: frequency beating and damping

Speaker

Karen Kheruntsyan

16:45–17:00

Decay of sound waves in ring-shaped Bose-Einstein condensates

Speaker

Andrew Groszek

17:00–17:15

Second sound with ultracold atoms

Speaker

Hui Hu

17:15–17:30

Dynamics of quasi-one-dimensional dipolar condensate droplets

Speaker

Mr Junfan Wang

17:30

Thursday 15 December

16:00

AIP: Atomic and Molecular Physics: ATMOP 7 - Atom/molecule-light interactions

Session | **Location:** Adelaide Convention Centre, Room R4 | **Convener:** Prof. Robert Sang

16:00–16:30

Attosecond delays of high harmonic emissions from isotopes of molecular hydrogen measured by Gouy phase XUV interferometer

Speaker

Igor Litvinyuk

16:30–16:45

Ab Initio Multiconfigurational Dirac-Hartree-Fock Characteristic X-Ray Spectra

Speaker

Hamish Melia

16:45–17:00

Simultaneous Reconstruction and Structural Fitting of the Complex Atomic Fine Structure of Copper and Iron

Speaker

Paul Di Pasquale

17:00–17:15

Phase retrieval by angular streaking of XUV atomic ionization

Speaker

Prof. Anatoli Kheifets

17:15–17:30

New Opportunities in Fundamental Atomic Physics, Solid State Theory and Experiment and Synchrotron Science, including Discovery of new satellites using extended range High Energy Resolution Fluorescence Detection

Speaker

Prof. Christopher Chantler

17:30

Friday 16 December

08:55

AIP: Atomic and Molecular Physics: ATMOP 8 - Session in honour of Michael Brunger

Session | **Location:** Adelaide Convention Centre, Room R4 | **Convener:** Stephen Buckman

08:55–09:00 Remembering Michael Brunger

Speaker

Stephen Buckman

09:00–09:15 Modeling of electron interactions in the Earth's mesosphere

Speaker

Laurence Campbell

09:15–09:30

Experimental investigations of positron-molecule scattering resonances

Speaker

James Sullivan

09:30–09:45

A New Concept in Positron Polarimetry

Speaker

Dr Joshua Machacek

09:45–10:00

Antiproton collisions with excited positronium

Speaker

Igor Bray

10:00–10:15

Calculations of positron scattering from atomic carbon

Speaker

Nicolas Mori

10:15–10:30

Close-Coupling Approach to Differential Ionisation in Ion-Atom Collisions

Speaker

Alisher Kadyrov

10:30