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Synergistic approaches to particle transport in magnetized turbulence: from the laboratory to astrophysics

April 15-17, 2024
Room 407, Jadwin Hall

Organizers
David Hosking, Philipp Kempski, Vinicius Duarte,
Robert Ewart, Rajsekhar Mohapatra,
Arno Vanthieghem, Muni Zhou, Matthew Kunz,
Eliot Quataert, Anatoly Spitkovsky
Synergistic approaches to particle transport in magnetized turbulence

Monday, April 15, 2024 – Thermal Particle Transport

8:30  Coffee & light breakfast at PCTS
9:00-9:15  Welcome/Introduction

9:15-9:45  Archie Bott
Firehose-induced collisionality

9:45-10:15  Evan Yerger
An effective collision operator for whistler turbulence

10:15-10:45  James Drake
A self-consistent model of electron scattering by oblique whistler waves in high beta plasma relevant to galaxy clusters

10:45-11:15  Coffee Break at PCTS

11:15-11:30  Martin Laming
The first ionization potential effect in the solar corona and wind

11:30-11:45  Amitava Bhattacharjee
Relaxation of weakly collisional plasmas and galaxies

11:45-12:00  Uddipan Banik
Relaxation of weakly collisional plasmas: decaying echoes and transition to the fluid limit

12:00-12:15  Robert Ewart
Universal collisionless equilibria

12:15-1:15  Lunch at PCTS

1:15-2:15  Tutorial: Felix Parra Diaz
Gyrokinetics for thermal particle transport in toroidal magnetic confinement devices

2:15-2:30  Coffee Break at PCTS

Monday, April 15, 2024 – Particle Acceleration

2:30-2:45  Rebecca Diesing
From microphysical theory to multi-messenger observations: a semi-analytic approach to diffusive shock acceleration

2:45-3:00  Mikhail Medvedev
What do Weibel filaments do in the shock upstream?

3:00-3:15  Poster Lightning Talks

3:15-3:30  Coffee Break at PCTS

3:30-3:45  Hantao Ji
Non-thermal electron acceleration by magnetically driven reconnection at low beta using laser-powered capacitor coils

3:45-4:00  Luca Orusa
Ion acceleration in 3D hybrid simulations of quasi-perpendicular shocks

4:00-4:15  Xiaochen Sun
Particle acceleration in highly magnetized turbulence

4:15-5:15  Panel Discussion: Matt Kunz, Greg Hammett, Alex Schekochihin, Jena Meinecke, Jim Drake

5:15-7:00  Welcome Reception at PCTS

Tuesday, April 16, 2024 – Particle Acceleration (cont.)

8:30  Coffee & light breakfast at PCTS

9:00-10:00  Dmitri Uzdensky
Relativistic nonthermal particle acceleration in collisionless magnetized plasma turbulence

10:00-10:30  Jena Meinecke
Strong suppression of heat conduction in a laboratory replica of galaxy-cluster turbulent plasmas

10:30-11:00  Coffee break at PCTS
Synergistic approaches to particle transport in magnetized turbulence

Tuesday, April 16, 2024 – Particle Acceleration (cont.)

11:00-12:00 Jack Hare: Astrophysics Colloquium, Peyton Hall and streamed at PCTS

12:00-1:00 Lunch at PCTS

1:00-1:30 Tünde Fülöp
Chasing runaways armed with snowballs

1:30-2:00 Takanobu Amano
Electron injection via stochastic shock drift acceleration at quasi-perpendicular shocks

2:00-2:30 Lorenzo Sironi
Particle acceleration in spider pulsars and GRB afterglows

2:30-3:00 Coffee Break at PCTS

3:00-3:30 Damiano Caprioli
Kinetic simulations of self-generated cosmic ray diffusion

3:30-4:00 Frederico Fiuza
Energy partition and electron acceleration in turbulent collisionless shocks

4:00-5:00 Panel Discussion: Martin Lemoine, Takanobu Amano, Frederico Fiuza, Lorenzo Sironi, Damiano Caprioli, Tünde Fülöp

Wednesday, April 17, 2024 – High Energy Transport

8:30 Coffee & light breakfast at PCTS

9:00-10:00 Ellen Zweibel
Fluid Models for Cosmic Ray Interactions and Transport

10:00-10:15 Rouven Lemmerz
Towards a deeper understanding of cosmic ray-driven instabilities and their saturation

Wednesday, April 17, 2024 – High Energy Transport (cont.)

10:15-10:30 Silvio Sergio Cerri
Revisiting the turbulent damping of cosmic-ray driven Alfvén waves

10:30-11:00 Coffee Break at PCTS

11:00-11:30 Martin Lemoine
Particle transport in magnetized turbulence: a role for structures

11:30-12:00 Siyao Xu
Mirror diffusion of cosmic rays

12:00-12:15 Iryna Butsky
Galactic cosmic-ray scattering due to intermittent structures

12:15-1:15 Lunch at PCTS

1:15-1:45 Patrick Reichherzer
Cosmic ray transport in galaxy clusters: from GeV to EeVs

1:45-2:00 Benedikt Schroer
Saturation of the resonant streaming instability and the role of damping

2:00-2:15 Ka Ho Yuen
Cosmic ray diffusion and heating due to asymmetric resonance broadening

2:15-2:45 Yashika Ghai
Role of energetic particle physics for burn performance of a reactor-level fusion device

2:45-3:15 Coffee Break at PCTS

3:15-3:45 Jeff Lestz
Emergence of a quasilinear transport theory for near-threshold energetic-particle-driven instabilities
Synergistic approaches to particle transport in magnetized turbulence

Wednesday, April 17, 2024 – High Energy Transport (cont.)

3:45-4:00  **Thomas Foster**
Orbits of energetic particles around rational flux surfaces in stellarators

4:00-5:00  **Panel Discussion and Conclusion**
Ellen Zweibel, Siyao Xu, Jeff Lestz, Yashika Ghai