



University
of Victoria

PHYSICS AND ASTRONOMY SEMINAR (In-person)

Dr. Mateusz Ruszkowski
University of Michigan

**“The role of cosmic rays, magnetic fields, and turbulence in
AGN feedback”**

Abstract

AGN play central role in shaping the properties of galaxies and solving the decades-old cooling flow problem. In this talk, I will discuss recent developments in the field of AGN jet feedback. I will focus on the role of cosmic rays, magnetic fields, and turbulence in shaping the observational properties of hot gaseous halos and on theoretical aspects of the energy transfer from the AGN jets to the ambient medium, i.e., the circumgalactic and intracluster medium (CGM and ICM, respectively). I will begin by discussing an example of supermassive black hole (SMBH) feedback in our own Galactic “backyard” — the Fermi Bubbles observed by Fermi in gamma-rays, Planck in microwaves, and, most recently, by eROSITA in X-rays. I will then discuss AGN jet feedback in elliptical galaxies and galaxy clusters. Specifically, I will discuss three new surprising findings: (i) that cosmic ray streaming heating is an important new channel for the AGN energy thermalization in the feedback process, (ii) that even extremely weak magnetic fields can dramatically alter the dynamics of the cold gas precipitation out of the CGM and ICM and feeding the SMBH, and (iii) that, contrary to textbook expectation, turbulence in the CGM/ICM may be non-Kolmogorov in nature. All of these findings have implications for the interpretation of observational results and for our understanding of AGN feedback in general.

Wednesday, February 1, 2023

11:30 a.m.

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