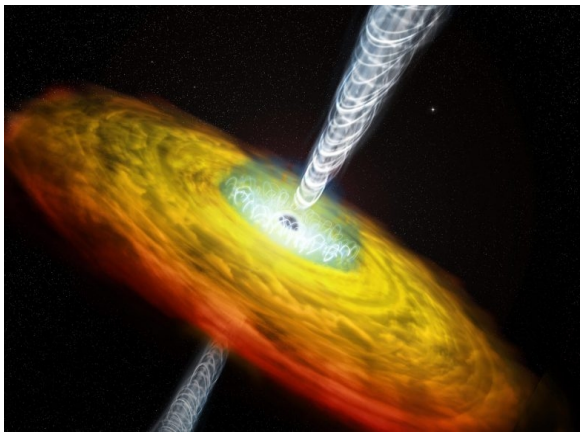
Plasma Astrophysics.



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The study of magnetized plasma has been a longstanding research activity within the Section of Astrophysics, Astronomy, and Mechanics (AAM) and includes three main components. The first is related to the study of instabilities in magnetized plasmas. Understanding the physics behind various instabilities and determining their growth timescales is a significant challenge in both astrophysical and laboratory plasmas. These instabilities are analyzed through numerical simulations but primarily through analytical work in the linear regime. The second research focus is the investigation of magnetic acceleration mechanisms in astrophysical jets. Jet formation in various astrophysical environments is often attributed to the action of magnetic fields, which effectively extract rotational energy from the source and accelerate plasma to high velocities. The AAM research team has explored this issue in both non-relativistic and relativistic flows within the framework of special relativity and is continuing to study it within the framework of general relativity, aiming to understand how the spacetime around a rotating black hole influences jet acceleration and collimation. The third research topic focuses on how the dynamics of astrophysical jets are affected by ohmic resistance, including changes in mass acceleration and collimation, as well as the characteristics of discontinuities and jump conditions.

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