Ellen Zweibel – Colloquium 1/30/2020
University of Wisconsin-Madison

Title: The Ups and Downs of Parker's Instability

Abstract:
Parker's Instability, first introduced in 1966, can occur in astrophysical disks that are supported against gravity by the pressure of magnetic fields and cosmic rays . It is thought to set a limit on the fraction of pressure support that can be nonthermal, and has been accused of enabling galactic star formation, being a key step in the galactic dynamo, and initiating astrophysical jets. Because of the importance of the instability, we carried out both a linear stability analysis and nonlinear simulations in the light of modern theories of cosmic ray transport. We found that the existence and subsequent development of the instability depend strongly on cosmic ray physics, that the instability has observable signatures, and that it can play an important role in structuring the interstellar medium.