# Astrophysical and Planetary Sciences Colloquium

Monday, January 13, 2020 at 4:00 PM

JILA Auditorium

*Refreshments served 30 minutes prior to start of talk in front of the JILA Auditorium.*

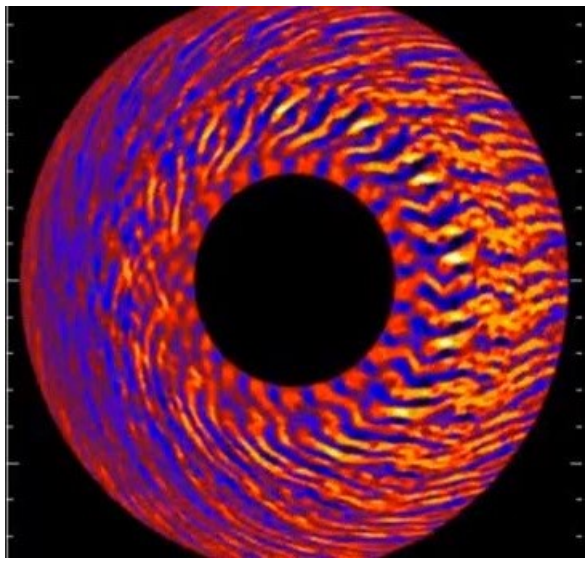
## Nuno Loureiro, MIT

## "New Insights into Plasma Turbulence"


**Abstract**

Many plasmas of interest – in astrophysical applications, in space, and in the laboratory – exhibit very large Reynolds numbers, implying that they are invariably found to be in a turbulent state. This pervading turbulence thus becomes a critical element in the understanding of phenomena such as energy dissipation, particle acceleration, magnetic field generation and dynamics, transport properties, etc.

Because these plasmas are magnetized, theoretical descriptions of plasma turbulence have to take into account the dynamic interaction between the plasma and the magnetic field. This implies that ideas inherited from Kolmogorov's description of neutral fluid turbulence require non-trivial modifications when applied to plasma turbulence: the presence of magnetic fields implies a natural spatial anisotropy, so dimensional analysis is no longer sufficient to describe how energy is transferred across different scales.



Modern theories of plasma turbulence take these features into account; but, as will be argued in this talk, they predict turbulent magnetic field configurations that cannot be realizable on stability grounds. We have recently proposed a modification of current models of plasma turbulence that eliminates this inconsistency, and leads to a series of interesting predictions, notably the existence of a new, sub-inertial range.


Astrophysical & Planetary Sciences

UNIVERSITY OF COLORADO **BOULDER**