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THE UNIVERSITY of WISCONSIN MADISON

Department of Physics Colloquium

Friday, February 12, 2010 • 4:00 P.M. • 2241 Chamberlin Hall

cookies & coffee served at 3:30 p.m

Magnetohydrodynamic Turbulence

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Magnetic fields are ubiquitous in the universe. Their interaction with an electrically conducting fluid gives rise to a complex system—a magnetofluid—whose dynamics is quite distinct from that of either a non conducting fluid, or that of a magnetic field in a vacuum. The scales of these interactions vary in nature from meters to megaparsecs and in most situations, the dissipative processes occur on small enough scales that the resulting flows are turbulent.There are significant differences between regular fluid turbulence and magnetohydrodynamic turbulence. We are constantly immersed in regular turbulence. We have a direct experience of it in our everyday life. Thus our development of models and theories of regular turbulence is strongly guided by experimental data and intuitions. Not so for magnetohydrodynamic (MHD) turbulence. Even though MHD turbulence is very widespread in the universe, we have practically no direct experience of it in our daily pursuits. Rather, we have to rely on numerical simulations and, to a lesser extent, observations and experiments. The purpose of this talk is to discuss what is currently known about the properties of magnetohydrodynamic turbulence.