“Transport barriers in tokamak fusion plasmas; L, H and I-mode regimes"

In magnetic fusion energy devices such as tokamaks, hot plasma is confined by strong magnetic fields, leading to reduced transport across closed field lines. However, some radial transport still occurs due to plasma turbulence. In a simple system the turbulence typically increases, sometimes quite sharply, as input power and gradients increase; this makes heating plasmas in the “Low confinement (L) mode” regime inefficient. Fortunately, regimes have been found in which turbulence and transport spontaneously reduce in local regions, above a threshold input power. This is now thought to be due to sheared flows. In the “High Confinement (H) mode regime, both particle and thermal transport are reduced near the plasma edge, giving maximum energy confinement but also issues with transient edge instabilities. More recently the I-mode regime has been discovered in which thermal but not particle transport is reduced and the edge is stable. The physics of this regime is less well understood and the subject of current research at the MIT Plasma Science and Fusion Center and other fusion laboratories.

Refreshments will be served in Olin Hall 109 at 3:30 P.M.