

Weekly CEA FM Seminar: Fall 2017



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Date: **Friday, September 22, 2017**
Time: 11:00 AM
Location: Hodson Hall # 210
Speaker: **Prof. Sabine Stanley** (JHU-EPS & APL)
Title: ***“Planetary Dynamo Scaling Laws:
The Role of Convective Shell Thickness”***

Abstract

Planetary magnetic fields are generated by dynamo action in electrically conducting fluids in their deep interiors. Numerical dynamo simulations have demonstrated that the morphology of the generated field (i.e. how dipole-dominated is the field) depends on the local Rossby number, a diagnostic variable that quantifies the ratio of inertial to Coriolis forces on the average length scale of the flow. Scaling studies have also determined how the local Rossby number depends on non-dimensional control parameters governing the system – specifically the Ekman, Prandtl, magnetic Prandtl, and flux-based Rayleigh numbers. However, these previous scaling studies focused on a single convective shell thickness (that of Earth’s core) and hence do not determine the influence of convective shell thickness on the local Rossby number. In this talk I will discuss scaling studies we have carried out that determine the dependence of convective shell thickness on the local Rossby number. Our results help explain why Uranus and Neptune have multipolar fields and also predict that Earth’s field will become multipolar when the radius of the inner core grows a further 14% of its current size.