

**Date:**        **February 14**

**Time:**        **11:00 AM**

**Location:**   **Ames 234**

**Speaker:**    **Dr. Gary Glatzmaier**  
                 **Earth Sciences Department, University of California**

**Title:**        **"Challenges for computer simulations of stellar and  
planetary dynamos"**

### **Abstract**

Three-dimensional numerical simulations have been used for two decades to study the generation of global magnetic fields in the deep fluid interiors of stars and planets. However, no global convective dynamo simulation has yet been able to afford the spatial resolution required to simulate turbulent convection, which surely must exist in the low-viscosity interiors of stars and planets, including the Earth's liquid core. They have all employed greatly enhanced eddy diffusivities to stabilize the low-resolution numerical solutions and crudely account for the transport and mixing by the unresolved (subgrid scale) turbulence. An alternative approach would be to approximate the nonlinear cascade of energy to and from the subgrid scale turbulence. Dynamo models for stars and giant gaseous planets present an additional complication: the large variation of density with radius. Numerical simulations, both 2D and 3D, are presented that illustrate these issues.