HAO Colloquium Series

(Refreshments served)

Speaker: **Nicholas Nelson, CU/JILA**

Time: **1:30–2:30 pm**

Date: **Wednesday, March 6, 2013**

Location: **CG1-1210 South Auditorium**

Title: **The Buoyant Loops and Activity Cycles in a Convective Dynamo Simulation**

Abstract:

Connecting emergent magnetic flux at the solar surface with realistic 3D models of dynamo action in the deep interior is a major outstanding challenge in solar physics. Our global 3D simulations of convection and dynamo action in solar-like stars are revealing that persistent wreaths of strong magnetism can be built within the bulk of the convention zone. With increased levels of turbulence, these models can yield cycles of magnetic activity and reversals of global magnetic polarity. These reversals are the result of a fundamentally turbulent process overcoming resistive diffusion. In our least diffusive models, portions of the magnetic wreaths can be spontaneously amplified by turbulence to field strengths much larger than possible by purely laminar mechanisms. These amplified portions can rise through the convective layer by a combination of magnetic buoyancy and advection by convective giant cells, forming buoyant loops. In this talk, I will focus on the generation, propagation, and physical characteristics of these buoyant loops and the turbulence-enabled magnetic buoyancy paradigm. As we gain a greater understanding of the flux emergence process, observations of surface magnetism may be extrapolated backwards to reveal information about subsurface magnetic fields and the fundamental properties of the solar dynamo.