

Title: Extrapolating Solar Dynamo Models Throughout the Heliosphere

Name: Taylor Cox

School: Bridgewater College

Facility: High Altitude Observatory

Mentors: Mark Miesch, Kyle Auguston, Nick Featherstone

Abstract:

There are multiple theories that aim to explain the behavior of the solar dynamo, and their associated models have been fiercely contested. The two prevailing theories investigated in this project are the Convective Dynamo model that arises from the pure solving of the magnetohydrodynamic equations, as well as the Babcock-Leighton model that relies on sunspot dissipation and reconnection. Recently, the supercomputer simulations CASH and BASH have formed models of the behavior of the Convective and Babcock-Leighton models, respectively, in the convective zone of the sun. These models show the behavior of the models within the sun, while much less is known about the effects these models may have further away from the solar surface. The goal of this project is to determine any fundamental differences between the Convective and Babcock-Leighton models of the solar dynamo outside of the sun and extending into the solar system via the use of potential field source surface extrapolations implemented via python code that operates on data from CASH and BASH. From this process it has been determined that the Babcock-Leighton model, as represented by BASH, maintains complex magnetic fields much further into the heliosphere before reverting into a basic dipole field.