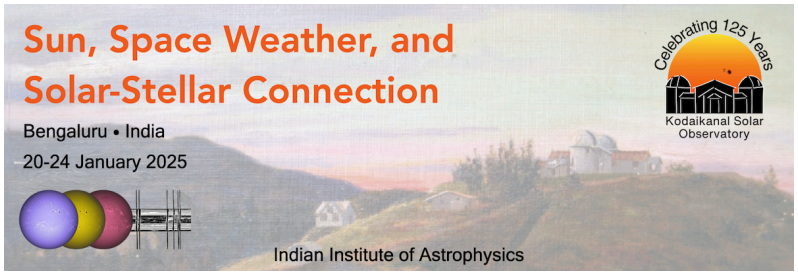

Contribution ID: **116** Type: **Invited review talk**

Nonlinearities, Stochasticity, and Long-term Modulations in Solar and Stellar Dynamos

Monday, January 20, 2025 2:00 PM (25 minutes)

The basic concepts underlying our current understanding of solar and stellar magnetic activity cycles as being due to an internal dynamo process were laid out in more or less their current form some 70 years ago. Yet, at this writing, there exist no concensus "dynamo model of the solar cycle"; be it at the level of the relative importance of various potential inductive processes, of the nonlinear backreaction on inductive flows regulating the amplitude of magnetic cycles, or on the mechanism(s) driving long-term cyclic variability, including both quasi-periodic amplitude modulationand aperiodically recurring "Grand Minima" in activity. In this talk I will discuss results from non-kinematic mean-field-like dynamo simulations exploring the interaction between different nonlinear magnetic backreaction mechanisms acting concurrently, in the presence or absence of stochastic forcing. My presentation will be in the form of "vignettes" illustrating a number of interesting and often counter-intuitive effects of jointly acting nonlinearities, including (1) cycle amplitude regulation and modulation, (2) chaos and its suppression, and (3) stochastic amplification of deterministic long-term modulations.

Contribution Type

Theme

Solar Magnetism over Long-Time Scales

Primary author: CHARBONNEAU, Paul (Université de Montréal, Canada)

Presenter: CHARBONNEAU, Paul (Université de Montréal, Canada)

Session Classification: Dynamo Models and Observations