

Abstract Submitted  
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**Progress in 21st Century Large Scale Dynamo Theory and Connections to Accretion Disks** ERIC BLACKMAN, University of Rochester — Understanding the growth and non-linear saturation of magnetic fields on spatial or temporal variation scales larger than those of the underlying forcing is the subject of large scale dynamo (LSD) theory. Large scale fields are not only observed in stars and galaxies but also likely play a dynamical role in accretion disks. They are now commonly found in simulations of the latter. The existence of large scale patterns and the need for a practical modeling tool motivates semi-analytic mean field theories that distill the essential physics. But traditional 20th century textbook mean field theory has been challenged for its linearity, its lack of inclusion of small scale field growth, and inability to predict LSD saturation. I will discuss how 21st century mean field theories have led to substantial progress in overcoming these shortcomings and offer promise for future work. I will also argue that traditional accretion disk theory and LSD theory actually comprise two complementary mean field theories which should actually be combined into a single theory of accretion that includes both radial and vertical transport.

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