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Abstract for an Invited Paper
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**New Frontiers for Diagnosing the Turbulent Nature of the Multiphase Magnetized Interstellar
Medium**
BLAKESLEY BURKHART, Harvard

Magnetic fields and turbulence are vital components in galactic processes, including cosmic ray transport, ISM structure formation and star formation. However turbulence is difficult to measure observationally and the role of simulations is vital for both testing theories of ISM turbulence and gauging observational diagnostics via synthetic observations. In this talk I will discuss the origins of turbulence in galaxies, and its connection to the star formation process, both from observations and the turbulence simulations. I will also highlight how turbulence can be measured using novel techniques applied to spectral line observations of molecular clouds and diffuse gas in galaxies in order to constrain and test simulations as well as obtain important properties of turbulence such as the injection scale, spectral index and Mach number.