Contribution ID: **68** Type: **Invited Talk**

MUSE 'observations' of coronal heating simulations.

Tuesday, 28 February 2023 13:55 (13 minutes)

The Sun's atmosphere is powered by the complex convective motions which continuously churn the solar surface and stress the atmospheric magnetic field. However, describing the specifics of the resulting energy cycle, including the processes which ultimately drive energy dissipation and atmospheric heating remains a significant challenge. With this in mind, the community is continuously developing sophisticated MHD simulations to examine the atmospheric energy and mass cycles in more detail.

In this talk, I will review recent results from coronal heating simulations which show how a variety of processes (e.g. reconnection, MHD waves, turbulence) can contribute to maintaining atmospheric conditions. As the location, frequency and magnitude of energy release differs between proposed models, so does the plasma response. This includes the evolution of coronal temperatures and densities, and the generation of field-aligned plasma flows. Since these differences are potentially observable (e.g. with sufficient resolution and cadence), they can provide distinguishing signatures which can constrain the prevalence of each of these heating mechanisms in the Sun's atmosphere. Using synthetic emission derived from numerical models, I will discuss how signatures of elementary heating events may manifest in current and future observational datasets. In particular, I will consider how well the true nature of simulated plasma is reflected in synthetic intensities and spectral diagnostics, and thus detail what inferences can be made from real observations. By focussing on the observational capabilities of the upcoming MUSE mission, I will discuss which features of atmospheric evolution and heating it will unveil for the first time.

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Session Classification: Corona

Track Classification: Corona