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Oral
Oscillations are observed throughout the solar environment, from the solar interior to the outer heliosphere. The spectrum of these oscillations can be affected by the development of a turbulent cascade, though where and how this occurs is not fully known. For example, recent in-situ measurements from Parker Solar Probe published by Chen et al. show a steepening of the power spectrum of magnetic oscillations from a spectral index of -3/2 near 0.1 AU to an index of -5/3 near 1 AU. Among the possible explanations for this trend is an evolution in the presence and nature of turbulence with radial distance from the Sun. Other observations can probe this trend at additional locations; for example, Tomczyk & McIntosh used CoMP Doppler images to produce a velocity power spectrum of coronal oscillations near 0.1 solar radii, also with a spectral index of -3/2. This may suggest that the nature of the turbulent driving does not change in any major qualitative way between the low corona and 0.1 AU. We are preparing techniques to measure the transverse motions of photospheric bright points in DKIST observations, which will characterize the driving of multiple wave modes in the flux tubes which are anchored in these bright points and which reach to the corona---waves which are the source of some portion of the oscillations seen in the corona and heliosphere. We will present the results of our techniques applied to a MURaM simulation of DKIST-like resolution, with which we produce power spectra of this wave driving and find a spectral index near -1.2. Unless these waves are only a minor contributor to the oscillations observed by CoMP and PSP, this shallower spectrum suggests processing of the oscillation spectrum also occurs within the chromosphere and lower corona. This analysis illustrates the utility of photospheric observations in providing bottom-boundary constraints for the larger, heliospheric processes PUNCH will observe. This topic also illustrates an open question which PUNCH can help address, by seeking to measure the spectrum of oscillations within its field of view to constrain where and how the oscillatory spectrum evolves.
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