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The Ubiquity of Ion-Driven Microinstabilities in the Inner Heliosphere[1] KRISTOPHER KLEIN, MIHAILO MARTINOVIC, University of Arizona — The relative lack of collisions in low-density, high-temperature plasmas, such as the solar wind, allow systems to depart from local thermodynamic equilibrium (LTE); these departures act as sources of free energy driving unstable growth. Understanding the behavior of these instabilities is necessary for fully characterizing the transport and dissipation of energy in these systems. In the solar wind, the presence of unstable wavemodes are frequently inferred. To understand the role instabilities play in the evolution of this system, we must investigate how their frequency of occurrence changes with distance from the Sun. Given the large number of free energy sources that can drive these instabilities, e.g. temperature anisotropies, temperature disequilibrium between species, and relative drifts, we use an automated implementation of the Nyquist criterion instead of more traditional parametric models to determine stability. We apply this method to tens of thousands of ion spectra measured by the Helios spacecraft at distances ranging from 0.3 to 0.9 au. These results will be expanded upon using forthcoming measurements from Parker Solar Probe to refine our understanding of the role instabilities play in shaping the evolution of the expanding solar wind.

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