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A New Model for Self-Consistent Simulations of Kinetic Dynamics in the Expanding Solar Wind MARIA ELENA INNOCENTI, University of Leuven, ELISABETTA BOELLA, University of Lancaster, ANNA TENERANI, University of Texas at Austin, MARCO VELLI, University of California Los Angeles — With the launch of Solar Orbiter, it is now possible to probe magnetically connected solar wind plasma across significantly separated heliocentric distances (at Parker Solar Probe, Solar Orbiter, Earth), and have a direct insight into the evolution of solar wind kinetic process with heliocentric distance. Kinetic features are ubiquitous in the young solar wind and rarer (but still non negligible) at 1 AU [Bale et al, 2019]. During propagation, kinetic processes constrain solar wind parameters [Stverak et al, 2008; Matteini et al, 2013] and regulate heat flux [Scime et al, 1994]. We simulate this evolution with the fully kinetic semi-implicit Expanding Box Model code EB-iPic3D [Innocenti et al, 2019a, b], which models kinetically a solar wind plasma parcel moving away from the Sun while expanding in the transverse direction. We investigate how plasma expansion triggers the onset and modifies the evolution of kinetic instabilities (eg, electron firehose and whistler instability) that constrain solar wind parameters and impact heat flux evolution with heliocentric distance. We then study the competition of expansion and turbulence in determining the solar wind temperature radial dependence.

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