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Oral
(Invited Talk)
Mesoscale structure in the solar wind (~tens to several thousands Mm at 1 AU) are created in two general ways: first, those that are formed in the solar atmosphere and come directly from the Sun, and second, those formed through processing en route as the solar wind advects outward. For solar-generated structures, spatial mesoscale structure in the solar atmosphere imposes mesoscale structure in the solar wind, while mesoscale time dynamic phenomena such as blobs and periodic density structures injects mesoscale structures into the solar wind. Complexity arises from the competition and interaction between the imposed/injected structures that survive from the Sun with turbulence and other dynamical evolution. Understanding the source and evolution of solar wind mesoscale structures is important because it constrains the physics of turbulent processes, and it contains information on how the Sun forms the solar wind.
We describe how the Polarimeter to UNify the Corona and Heliosphere (PUNCH) mission, with its high temporal and spatial resolution and unprecedented coverage of the inner heliosphere, will unravel this complexity. Specifically, we describe Working Group 1B, which will address the question of which mesoscale structures come from the Sun, which formed en route, how they interact with each other, and how they evolve through the inner heliosphere. While coronal streamers and associated blobs and periodic density structures has been previously studied, PUNCH's FOV extends over the solar polar regions, providing a new connection of the mesoscale solar wind structures and injections by jets and jetlets. We conclude with a description of the ways in which mesoscale solar wind structures comprise the ground state of space weather, as they are continually buffeting planetary magnetospheres.
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