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Where no dust instrument has gone before: Dust science with Solar Probe Plus

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Solar Probe Plus will be a ground-breaking mission to explore the innermost regions of the solar system. By flying down to less than 10 solar radii ($\sim$0.05 AU), the mission will greatly enhance our knowledge of the Near-Sun dust environment. This region is governed by a poorly understood interplay of dust delivery by sungrazing comets and radiation forces, the destruction of dust by sublimation, and interactions of dust particles with the ambient coronal plasma.

We will focus on two Solar Probe Plus instruments relevant for dust: (1) the Wide-field Imager for SolarPRobe (WISPR), a white-light heliospheric imager dedicated to study the solar wind, coronal mass ejections, and dust-plasma interactions; (2) the FIELDS Experiment aimed at electric and magnetic field measurements in the solar wind, that can also detect telltale voltage signatures of dust-particle impacts on the spacecraft.

We will highlight recent simulations of the scattered-light emission from dust particles (F-corona) in order to assess the capabilities of the WISPR instrument to image the dust-free zone around the Sun. We will test whether dust density enhancements as predicted by dynamical simulations can be identified and resolved. Furthermore, we will discuss whether WISPR imagery will allow us to separate composition-dependent sublimation fronts, e.g. for silicates or carbonaceous dust. For FIELDS, we will present predictions for count rates and impact velocities of micron-sized dust particle hits expected over the 7-year mission.