The Development of A Double Hemispherical Probe for The Advancement of Space Plasma Measurements

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Target: space and planetary plasma.

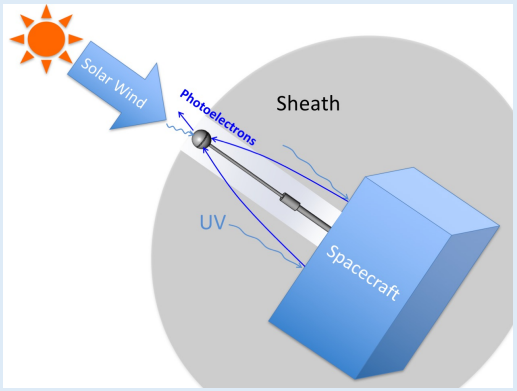
Science:

- To improve the understanding of space plasma in harsh environments, including low-density plasmas, high surface-emission environments, and dust-rich as well as oxygen-rich plasmas.

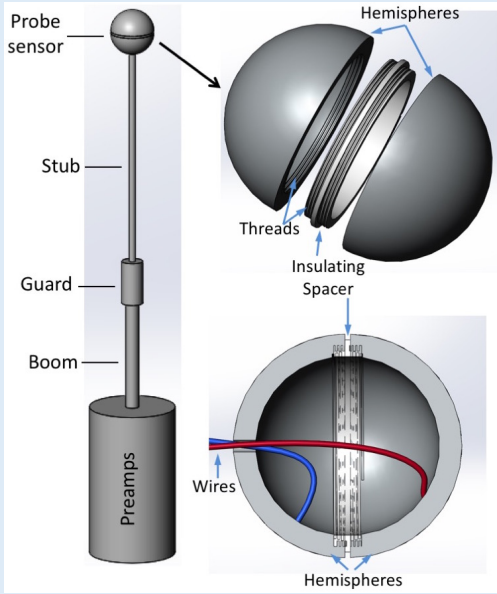
Objectives:

- To greatly enhance the capability and accuracy of the characterization of space plasmas by developing a novel Double Hemispherical Probe (DHP).
- To develop new coating materials for mitigating the probe surface oxidation problem.

CoIs: Hsiang-Wen Hsu, Mihály Horányi/University of Colorado-Boulder.



Left: A cartoon showing a Langmuir probe situated in an anisotropic plasma environment.



Right: Design of a novel DHP. Two hemispheres are electrically insulated from each other and swept with the same potential biases simultaneously.

Key Milestones:

- Year 1: Start with TRL 2-3; **validate new probe coating material (ongoing);** fabricate the prototype DHP; case I lab test.
- Year 2: Lab test for cases II, III and IV; meet TRL 4.
- Year 3: vibration, thermal and DHMR tests for the coated DHP; plasma tests with the coated DHP; meet TRL 5 in the end of the year.

TRL (2-3) to (5); Current TRL: 2-3