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Pluto Integrated Camera-Spectrometer (PICS): A low mass, low power instrument for planetary exploration

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The concept we describe is an integrated instrument (a Pluto Integrated Camera-Spectrometer, PICS) that will perform the functions of all three optical instruments required by the Pluto Fast Flyby Mission: the near-IR spectrometer, the camera, and the UV spectrometer. This integrated approach minimizes mass and power use. It also forced us early in the conceptual design to consider integrated observational sequences and integrated power management, thus ensuring compatible duty cycles (i. e. exposure times, readout rates) to meet the composite requirements for data collection, compression, and storage. Based on flight mission experience we believe that this integrated approach will result in substantial cost savings, both in reworking instrument designs during accommodation, as well as in sequence planning and integration. Finally, this integrated payload automatically yields a cohesive mission data set, optimized for correlative analysis.

In our baseline concept, a single set of lightweight, multi-wavelength foreoptics is shared by an UV imaging spectrometer (160 spectral channels 70-150 rim), a two-CCD visible imaging system (simultaneously shuttered in two colors 300-500 nm and 500-1000 rim), and a near-IR imaging spectrometer (256 spectral channels 1300-2600 rim). The entire structure and optics is built from SiC, and includes an integrated radiator for thermal control. The design has no moving parts and each spectrometer covers a single octave in wavelength. For the Pluto mission, a separate port (aligned in a direction compatible with the radio occultation experiment) is provided for PICS measurement of a UV solar occultation and for spectral radiance calibration of the IR and visible subsystems. The integrated science this instrument will yield meets or exceeds all of the Priority-1A science objectives and captures many Priority- 1 B science objectives as well.

The presentation will provide details of the PICS instrument design and describe the fabrication and testing of the integrated SiC structure and optics at SSG Inc. Final integration and test plans for the prototype will also be described..