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Near-Earth Object (NEO) Discovery, NEO Characterization

CHARACTERIZATION OF NEAR-EARTH OBJECT 2020 PN1: PROPOSED TARGET OF CHINESE PLANETARY DEFENSE TEST

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ABSTRACT

Near-Earth Object (NEO) 2020 PN1 is a ~40 m diameter object that is the target of the Chinese space agency's planetary defense test mission that is scheduled to be launched in 2025. The mission will consist of two spacecraft launched to the same destination; one to study and characterize the asteroid and the other to perform the deflection experiment. Being such a small object, it is likely that 2020 PN1 will be monolithic and therefore can have virtually any rotation rate, which will impact plans for the agency's deflection test. Although the mission includes a spacecraft characterization component, ground-based observations and characterization can help better inform the mission design.
We characterized 2020 PN1 using the SpeX and MORIS instruments on the NASA Infrared Telescope Facility on Mauna Kea, Hawai'i, in August 2022. This observing window was the last opportunity to characterize this object before the planned planetary defense test. Our goal is to constrain its surface mineralogy, mineral abundance, mineral chemistry, and to identify potential meteorite analogs using near-infrared spectra. Additionally, we plan to constrain 2020 PN1's rotational period using relative photometry extracted from visible wavelength images. Understanding physical properties of NEOs is critical for any deflection test as they directly relate to the object's mass and density. These data and the planned planetary defense test also provide a unique opportunity to better characterize a NEO with both ground and in-situ observations. Each time ground-based observations can be linked to an in-situ measured truth, the community improves its ability to accurately characterize a future NEO's physical properties when only remote observations are available.

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Comments:

Oral presentation