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Janus: A NASA SIMPLEx mission to explore two NEO Binary Asteroids.

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ABSTRACT

Janus is a NASA SIMPLEx mission currently in Phase C/D. The SIMPLEx program is designed around the idea of using secondary launch opportunities to explore interplanetary destinations. The Janus mission will be launched with the NASA Psyche mission in August/September of 2022 and will send two spacecraft to fly by Near Earth Objects of interest. Each of the Janus spacecraft will fly by a binary asteroid system in early 2026. The targeted systems are (175706) 1996 FG3 and (35107) 1991 VH, both of which have been observed repeatedly with photometry, spectrometry and radar.

The Janus mission is managed by the University of Colorado, where the PI is located and where the science operations center will be housed. The Janus spacecraft are low-cost and small, and are being designed and built by Lockheed Martin. Each

spacecraft carries two science instruments, a visible and an IR imager, built by Malin Space Science Systems. The spacecraft will perform a rigorous remote sensing campaign when the object is a point source and when resolved. The spacecraft will track the binary asteroid systems through closest approach, allowing for a combination of absolute surface resolution, relative resolution across the target asteroids and phase angle coverage unparalleled in previous asteroid flyby missions (see Figure). The science team members all have experience on asteroid missions or are experienced ground based observers of NEAs. The industry team has extensive experience in the design, fabrication and operation of interplanetary spacecraft and instrumentation.

Janus will provide the first detailed images of a diverse set of binary asteroids that have been well characterized previously using ground-based observations. As 15% of NEA are binary asteroids, it is crucial that they be studied and understood to better characterize their unique aspects to better prepare should one be a potential hazard in the future. The Janus science goals are to combine flyby observations of the target binary asteroids with ground-based observations, enabling the high resolution imaging and thermal data to be placed into a global context and leveraging all available data to construct an accurate topographical and morphological model of these bodies. Based on these measurements, the formation and evolutionary implications for small rubble pile asteroids will be studied.

In summary, Janus is a NASA SIMPLEX mission that will launch with the NASA Discovery mission Psyche in August 2022. It's two spacecraft will flyby the target binary asteroids in the first half of 2026. Scientific results from Janus will provide key insights into the mechanics of rubble pile asteroids in general, and binary asteroids in particular.

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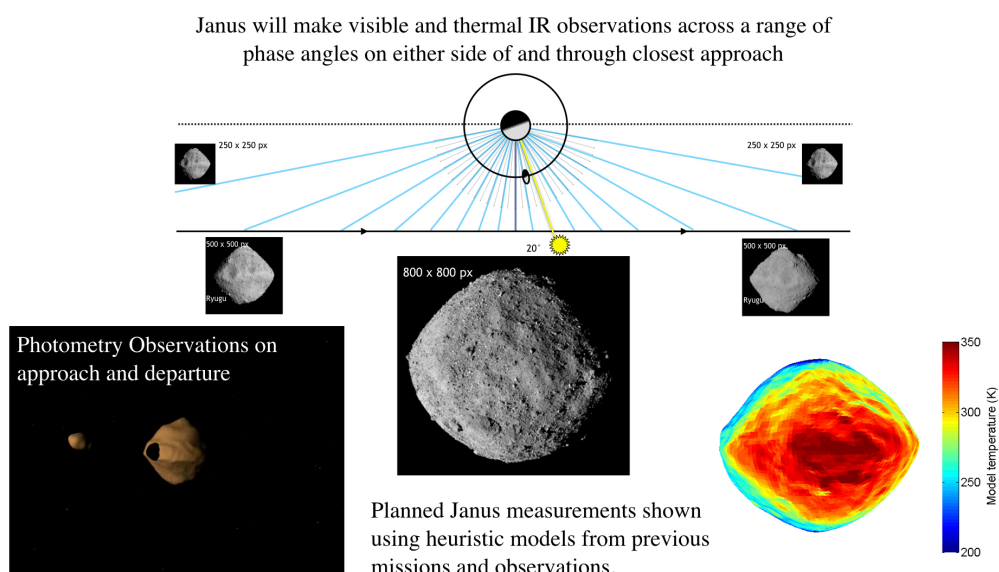


Figure 4: Planned Janus observations during each binary asteroid flyby.

Comments:

Oral talk preferred.