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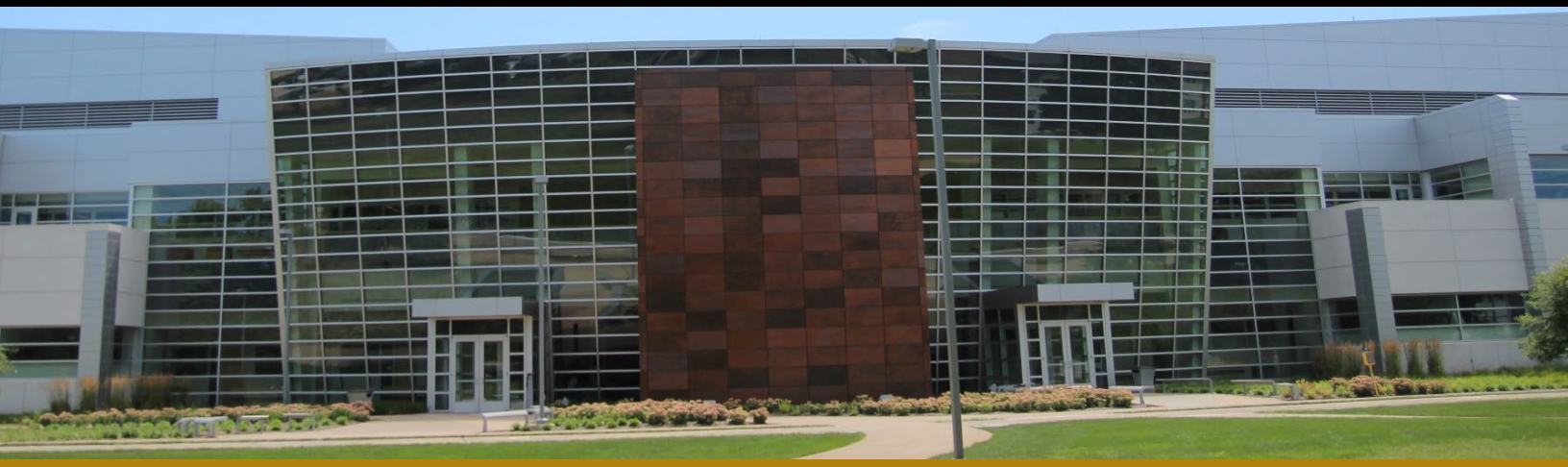

BNC Seminar

Going Below the Ice- The Next Steps to Enable Subsurface Science on Icy Worlds

Emily Klonicki

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Monday, August 26, 2019
1:30pm, BRK 1001

Bio: Emily Klonicki is a Planetary Protection Engineer at the NASA Jet Propulsion Laboratory (JPL) in Pasadena, CA. Her work focuses on managing the forward and backward risk of transferring microbial contaminants between earth and other planetary bodies for the Europa Clipper and Europa Lander missions. Prior to joining the Biotechnology and Planetary Protection Group, Emily developed a diverse research background that spans the fields of epigenetics, microbiology, and environmental engineering at the University of Pittsburgh. At JPL she has been actively involved in evaluating filtration methodologies for Mars 2020 instrumentation, investigating fungal growth in simulated microgravity, and fungal degradation of plastics for waste management on the International Space Station. Recent research activities include investigations into dry heat inactivation of microorganisms embedded in aerospace materials and short-duration, high-temperature heat sterilization as part of the Europa Lander Planetary Protection implementation team. Emily is also the instrument lead for a subsurface ocean access mission concept and is involved in several collaborative research projects focused on water chemistry monitoring systems and biosensors.

Abstract: NASA has posed “Big Questions” to motivate planetary exploration, including how life evolved, what characteristics lead to life, and whether we are alone. Ocean Worlds are bodies that may have past or extant interior global oceans, such as Europa, Enceladus, and Ceres, and are hypothesized to have habitable regions within their icy crusts. This has driven scientific communities to consider in situ exploration of these bodies. Autonomous ice penetrators build upon the capabilities of classical surface landers, enabling new opportunities for planetary science investigations. By design, penetrators are able to embed instrumentation into the ice crust, continuously ingest surrounding melt water to sample on descent, provide data with depth, and potentially deploy ocean-faring mobility platforms. Ice descent probes are highly integrated, imposing several challenges in regard to scientific instrumentation selection, configuration, and operation. Subsurface vehicle instruments would inherently be compact and robust to withstand both the physical constraints of the vehicle and surrounding environment, making it essential for NASA and the science community to identify risks and dependencies across instrument technology trades. Additionally, strong practices in Planetary Protection are critical to prevent biological contamination and maintain scientific integrity for life detection instruments. We will discuss the science goals, instrument concepts, and technological challenges in building and operating subsurface instrumentation on decent probes, as well as future work that would enable these endeavors.

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