Interstellar Objects

The solar system science community and the general public were very excited with the recent discovery of an entirely new class of small bodies: interstellar asteroids. Interstellar asteroids (or comets) are not bound to the Sun and are debris from some other planetary system that was ejected into its own galactic orbit in interstellar space. Several papers over the last few decades have hypothesized various properties of this population which provides unique constraints on planet formation. With the discovery of 1I/'Oumuamua (e.g., Meech et al. 2017), we have our first peak into this unique population, but the dozens of papers that followed created many more questions about these objects than answers.

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Such objects are incredibly sparse because of the vast distances between stars, even though typical stars may eject trillions of such objects. Such sparseness implies that these objects will be rare and faint (similar to small Near Earth Objects) and an efficient way to search for them is through a wide and fast survey like LSST. In fact, early estimates were cautious about whether LSST would even discover a single interstellar object (e.g., Cook et al. 2016, Engelhardt et al. 2017, and Trilling et al. 2017), though the ability of a shorter shallower survey to find the first such object creates significant optimism about LSST's potential.

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Above: Artist's interpretation of 'Oumuamua as it approaches our Solar System. Exact shape and surface features are extrapolations from research and based on bodies in our Solar System, except the extreme elongated shape is unique to this object. Credit: Gemini Observatory/ AURA/NSF

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