The Search for Satellites of KBO 55636 from the 2009 October 9 Stellar Occultation

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Plif

Worldwide Observing Campaign





Multichord Occultation Observations EAPS









- Radius = 143±5 km
- Geometric Albedo = $0.88^{+0.15}_{-0.06}$ in V band
- Active resurfacing or fresh water ice on Gyr timescales







Definition: The Hill sphere is the volume of space in which the gravitational influence of 55636 exceeds that of the sun.

 $\mathbf{R}_{Hill} = \mathbf{a}(\mathbf{1} - \mathbf{e}) \left(\frac{\mathbf{m}}{\mathbf{3M}}\right)^{\frac{1}{3}}$

- Probed 0.0001V_{Hill} for 40km radius body
- Increase observation time to increase volume probed



The Search for Satellites: Cross Correlation



$$f(t) \star g(t) = \int_{-\infty}^{\infty} f^*(\tau)g(t+\tau)d\tau$$

- Each time series data set f(t) is compared to a surrogate occultation data set g(t)
- No cross correlation values > 2σ above the mean were observed





Limiting Radius Calculations



Station	Photometric	Cycle	Limiting
	Precision	Time (s)	Radius (km)
Brownsville	0.13	0.50	5.6 ± 0.2
Lick Obs. Crossley	0.03	0.10	1.46^{*}
Lick Obs. Nickel	0.04	0.10	1.46^{*}
McDonald Obs.	0.10	3.50	42 ± 2
USNO	0.05	6.00	18 ± 2
VATT	0.06	0.05	1.46^{*}
Grove Creek, AU	0.14	3.70	29 ± 2
San Pedro Martir, MX	0.02	0.57	1.46^{*}
MK Mid Level	0.10	12.00	120 ± 14
Haleakala	0.09	0.07	0.86 ± 0.08
Leeward CC	0.04	0.50	1.5 ± 0.3

* Limiting radii smaller than the fresnel scale $f_s = 1.45816$, will be calculated using a diffraction model rather than the analysis described in this section.





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- Funding for this work was provided by NASA Grants NNX10AB27G (MIT), NNX08AO50G (Williams College), and NNH08AI17I (USNO-FS) and NSF Grant AST-0406493 (MIT). Student participation was supported in part by NSF's REU program and NASA's Massachusetts Space Grant.