Abstract Submitted
for the 4CF17 Meeting of
The American Physical Society

Effects of Sparse Data on the Inversion of Lightcurves for the 3D Modeling of Asteroids[1] SEBASTIAN HENDRICKX-RODRIGUEZ, DANIEL KLINGLESMITH III, New Mexico Institute of Mining and Technology, BRIAN WARNER COLLABORATION[2], RAOUL BEHREND OBSERVING GROUP TEAM[3] — The asteroid belt is estimated to contain over one million asteroids, but only a few hundred have a 3D model. Prior research has shown that the inversion of lightcurves is an effective method to obtain these models. However, it is time consuming to collect 'dense' lightcurve observations where the time between data points is much less than the rotation period of the asteroid; especially because reliable shape models are only produced by observing an asteroid at several different solar bisector angles, a process that could take years and span several different geographical locations. Therefore, the use of 'sparse' in time data, where data points are collected at a rate much slower than the rotation period of the asteroid, is becoming increasingly popular for the modeling of asteroids. Asteroid 1293 Sonja was modeled with purely dense data, and then with a mix of dense and sparse data. The latter approach appears to create a model whose lightcurves resemble the original data more accurately, lending credence to the idea that sparse data can be used to fill in the gaps left by a purely dense lightcurve model. This study shows how the powerful inversion process can be even further refined, creating accurate models that could be used for asteroid mining and collision prevention.

[1]New Mexico Space Grant Consortium
[2]Developed the program LCInvert used to create the 3D models.
[3]Provided lightcurves used in the inversion program.

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Date submitted: 20 Sep 2017 Electronic form version 1.4