

**Abstract Submission for  
the 1<sup>st</sup> RPI Workshop on Image-Based Modeling and Navigation for Space Applications**

**Rendering an image from stars to asteroids**

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The Applied Physics Laboratory (APL) at the John Hopkins University has been developing a renderer and camera emulator (RCE) that models input sources from point sources to small bodies through the telescope to the detector electronics. The RCE is being used to test the small-body maneuvering autonomous real-time navigation (SMART Nav) on the NASA Double Asteroid Redirection Test (DART) mission. It has also been utilized for terrain relative navigation mission concept design analysis. This poster describes the details of the telescope modeling that includes detector noise from multiple sources, the use of a GPU to parallelize the ray tracing, details of our physics based ray tracing implementation, and the use of shape models for rendering small bodies.