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Asteroid Size Estimation with Data from the Rubin Observatory Legacy Survey of Space and Time

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The observed strong correlation between optical colors and optical albedo of asteroids can be used to estimate asteroid sizes from optical data alone. This finding is important for future asteroid studies because the Rubin Observatory Legacy Survey of Space and Time (LSST) will obtain time-resolved astrometric and photometric data for about 6 million asteroids. We will present recent results from [1], where we revisited a correlation between SDSS colors and albedo derived using WISE-based size estimates. Using several sophisticated data-driven models for the variation of optical albedo with colors, we estimated the contribution of SDSS photometric errors to the albedo and size estimate uncertainties, and predicted that LSST data will enable asteroid size precision of about 15% relative to WISE-based size estimates. Compared to the accuracy of WISE-based size estimates of 15-20%, the implied accuracy of optical size estimates, in the range 21-25%, is thus only a factor of 1.3 to 1.4 worse. This size estimation accuracy is significantly better than commonly assumed for optical data and is due to accurate and homogeneous multi-band photometry delivered by modern digital sky surveys.

References

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