PDC2019
Washington, DC, USA

Please send your abstract to iaapdc (at) iaamail.org

You may visit www.pdc.iaaweb.org

(please choose one box to be checked)
(you may also add a general comment - see end of the page)

☐ **Key International and Political Developments**
☐ **Advancements and Progress in NEO Discovery**
X NEO Characterization Results
☐ **Deflection and Disruption Models & Testing**
☐ **Mission & Campaign Designs**
☐ **Impact Consequences**
☐ **Disaster Response**
☐ **Decision to Act**
☐ **Public Education & Communication**

BIG TELESCOPES CAN LARGELY SOLVE THE ALBEDO QUESTION FOR 2019PDC

Martin Elvis[(1)]
[(1)]Harvard-Smithsonian Center for Astrophysics, 60 Garden St., Cambridge MA02138 USA, +1-617-495-7442, melvis@cfa.harvard.edu

Keywords: *characterization, spectral types, albedo, colors, telescopes, astrometry*

ABSTRACT

The PDC 2019 Exercise for Day 0 states that the potentially hazardous object (PHO) 2019PDC was followed for 3 weeks but that no albedo information was obtained, only an H magnitude. Without any composition information the albedo is unknown to a factor ~10, so the size is uncertain by a factor ~3 (and volume by a factor ~30). A direct size measurement from radar was not available, which is likely to be the case for most PHOs. This is a serious problem for planetary defense. Fortunately Mainzer et al. (2011) have shown that spectral type predicts albedo for S-type and C-type Main Belt asteroids. Desira et al. (2019) have quantified this capability. They find that albedo can be predicted to within a factor 1.7 at 70% - 80% reliability. Hence size is known to a factor 1.3 (and volume to a factor 2.2). Hence a simple spectrum, or even accurate colors (Ivezic et al. 2002), are enough to yield usefully small uncertainties for hazard assessment. As 2019PDC was at V=21.1 when discovered it was too faint for infrared telescopes to get spectra that could lead to a spectral type. Most PHOs will be similarly faint.

We are defining a program of asteroid characterization using the 6.5 meter Magellan telescopes in Chile and the 4-color simultaneous imager PISCO (PI: Tony Stark), that will enable PHO characterization to faint magnitudes. The large mirror enables a

S/N = 100 detection at V = 22 - 23 in 1-2 minutes, minimizing errors due to asteroid motion. The simultanous imaging in the Sloan *griz* bands removes color errors from asteroid rotation. Field stars allow asteroid color determination to ~1%, and hence spectral types.

We also obtain accurate astrometery against *Gaia* stars. So far we have obtained ~40 milli-arcsecond (mas) astrometry for several NEOs. We find that 40 mas errors are sufficient to shrink the position uncertainty for the next apparition of an NEO to ~10 arcmin, so that it can be recovered easily (Taylor et al. 2019). We expect refinements to give ~20 mas.

****