

**SMASS-NEXT: A NEXT GENERATION ASTEROID SPECTROSCOPIC SURVEY** F. E. DeMeo<sup>1</sup> and R. P. Binzel<sup>1</sup>, <sup>1</sup> Department of Earth, Atmospheric, and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, MA 02139, fdemeo @ mit.edu

**Introduction:** We present first results of an observing campaign using FIRE on the 6.5m Magellan Telescope at Las Campanas Observatory Chile to obtain near-infrared spectra of sub-kilometer near-Earth objects. We prioritize objects that are only accessible to large telescopes, for example objects that do not reach magnitudes lower than 18 for the next one hundred years. We also attempt to observe the smallest asteroids, especially objects with diameters less than 500 meters which can very rarely be observed on small to medium-sized telescopes, but are frequently available to telescopes like Magellan.

**Observations:** FIRE (Folded-port InfraRed Echellette) is a newly available instrument on the Magellan Baade Telescope. We operate the instrument in longslit (50 arcsec) mode with a 0.8 arcsec width and a spectral resolution of 300. The wavelength range 0.8 to 2.5 microns is covered, ideal for identifying minerals on asteroid surfaces. With each target we observe a G2V type star as a solar analogue at similar airmass and calibrate the data using neon argon lamps.

**Science Goals:** Since very few sub-kilometer objects have been observed, there are fundamental questions that to remain to be answered about the population. *How does the compositional distribution of NEOs vary with size?* The spectral properties of the sub-km population can be compared with the wealth of data on larger NEOs from visible and near-infrared spectral surveys (e.g., [1-3]) *Which NEOs provide the most scientifically important destinations for future exploration?* One goal of this program is to observe NEOs that are easily accessible by spacecraft, particularly very low delta-V objects for which ground based reconnaissance is only achievable with the largest aperture telescopes. Spectroscopic data will allow us to choose the most scientifically interesting targets among the most easily accessible. *What connections between asteroids and meteorites can be forged through understanding this intermediate-size population?* As we probe to smaller and smaller sizes, the NEOs we are observing should more closely match the meteorites sampled on Earth. Connecting meteorites with specific asteroid or asteroid types provides more detailed mineralogic information than we can obtain from remote observations. We hope to address these questions with these and future observations.

**References:** [1] Bus S. J. and Binzel R. P. (2002) *Icarus*, 158, 106–145. [2] Binzel R. P. et al. (2004) *Icarus*, 170, 259-294. [3] Binzel R. P. (2011) *this meeting*.