Rotational Study of Ambiguous Taxonomic Classified Asteroids 16177, 55043, and Near Earth Asteroid 2016 LX48

Tyler Linder[1, 2], Rick Sanchez[3], Wolfgang Wuerker[3], Timothy Clason[3], Tucker Giles[3]

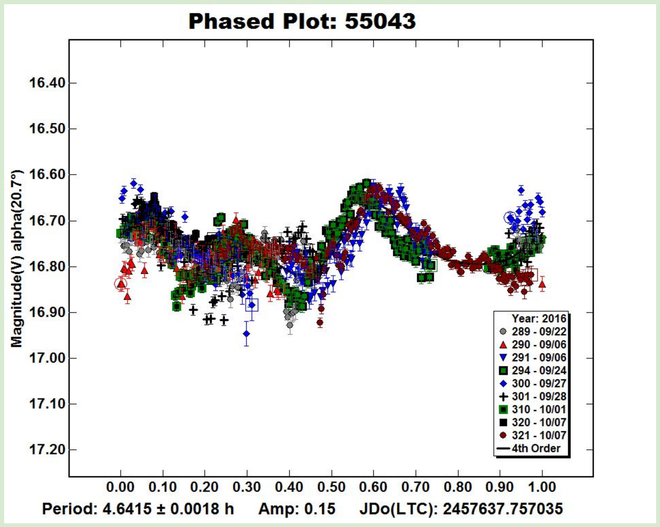
1. Astronomical Research Institute, Ashmore, IL. (USA) 2. University of North Dakota, Grand Forks, ND. (USA)
3. Johnson County School District, Buffalo, WY. (USA)

The Sloan Digital Sky Survey (SDSS) conducted a survey of the Northern Galactic Cap in 5 filters u',g',r',i' and z'. Almost immediately after Moving Object Catalog 1 (MOC1) was released it was discovered that there were significant variations in color of the same asteroid between observations. This taxonomic variation was studied for almost ten years before concluding that the majority of the variations are due to changes in phase angles. Carvano et al. (2010) developed a photometric based taxonomic classification systems and discovered that ~70% of asteroids observed multiple times had significant variations. However, more importantly there were a group of asteroids that exhibited a taxonomic variation of the 1um silicate absorption feature. These are identified by the variable reflectance of the z' filter. This has prompted an in depth study of these asteroid in an attempt to identify any unique features in their rotation. Primary questions are 1) Is there any unexplained amplitude variation and 2) Are these slow or fast rotating asteroids.

Right: Main Belt Asteroid 55043 has an absolute magnitude of H=14.3 (~4.2km) with perigee at 1.65AU this is a Mars-Crossing asteroid. This inner asteroid belt rock was listed by Carvano et al. (2010) has having Cp, Sp, and Qp. The main difference in visible wavelengths between Cp and Sp is an increase in reflectance at 0.7um followed by a 1um absorption on Sp type asteroids. This is a complete opposite from an Cp which has a relatively flat spectra across the visible wavelengths.

55043 was discovered to have a period of 4.64h with an amplitude of 0.15mag. There is no evidence for an abnormal asteroid.

Below: Main Belt Asteroid 16177 is 3.8km wide rotating once every 13.32 hours with an amplitude to 0.50 magnitudes. There is no evidence for any abnormalities on this Xp, Sp taxonomic type asteroid.



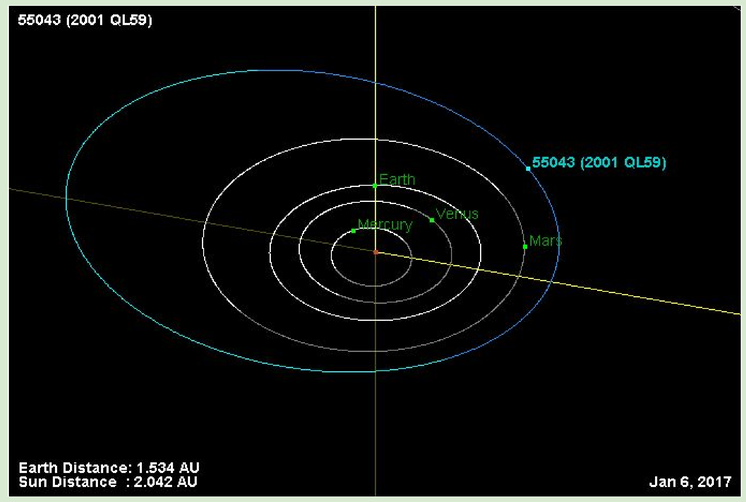
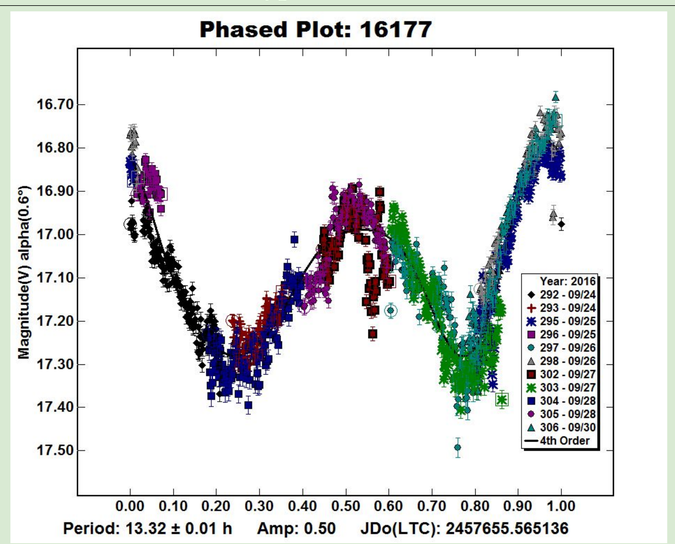


Image from
NASA/JPL http://ssd.jpl.nasa.gov/sbdb.cgi?sstr=55043;old=0;orb=1;cov=0;log=0;cad=0#orb

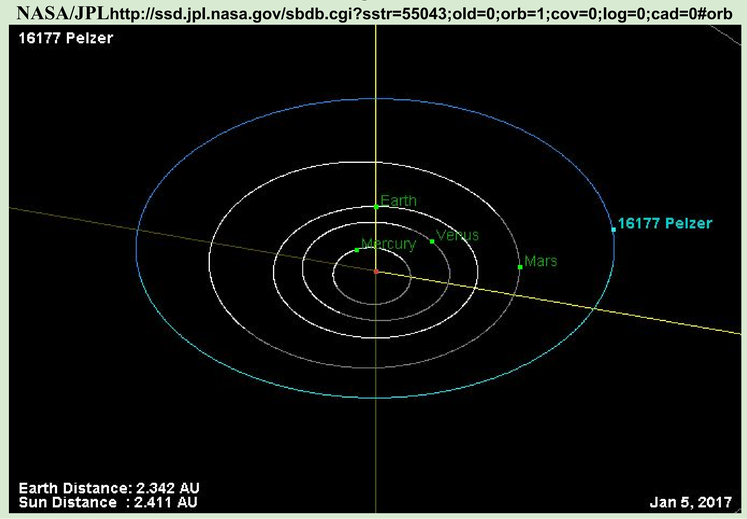


Observations were taken at Cerro Tololo Inter-American Observatory using a 0.41-m PROMPT telescope controlled by the SKYNET telescope network. SKYNET is managed and controlled by the University of North Carolina at Chapel Hill.

The observations were taken with no filter to increase signal to noise, calibrated using MAXIM DL, and analysis by the CANOPUS software.

All data analysis was conducted by 3 amazing students from Johnson County School District in Buffalo Wyoming. These students are future leaders in whatever field they choose: Hopefully it will be astronomy.

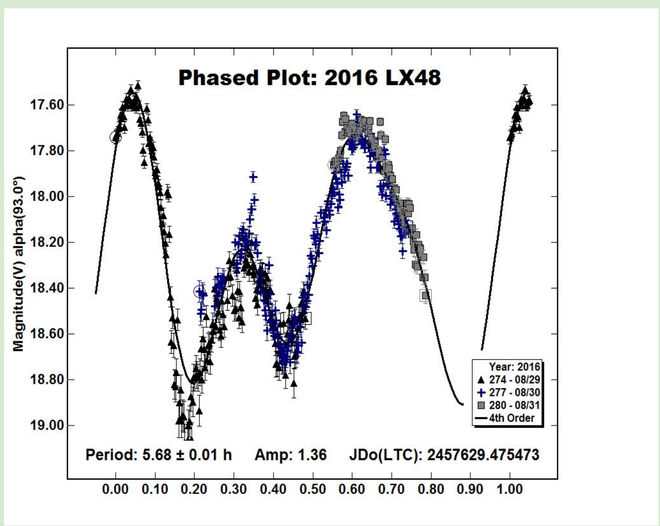
Image from
NASA/JPLhttp://ssd.jpl.nasa.gov/sbdb.cgi?sstr=55043;old=0;orb=1;cov=0;log=0;cad=0#orb



A Picture of the PROMPT telescopes in Chile

Potential Hazards Asteroid (PHA) 2016 LX48 (Right) is a Near Earth Asteroid (NEA) with perigee q=0.998AU was a target of opportunity during this research as at closest approach was V17.5mag.

This H=19.3 (500m) wide asteroid has a large amplitude of 1.36 magnitudes with a period of 5.68h. 2016 LX48 was discovered by Pan-STARRS on June 11th 2016.



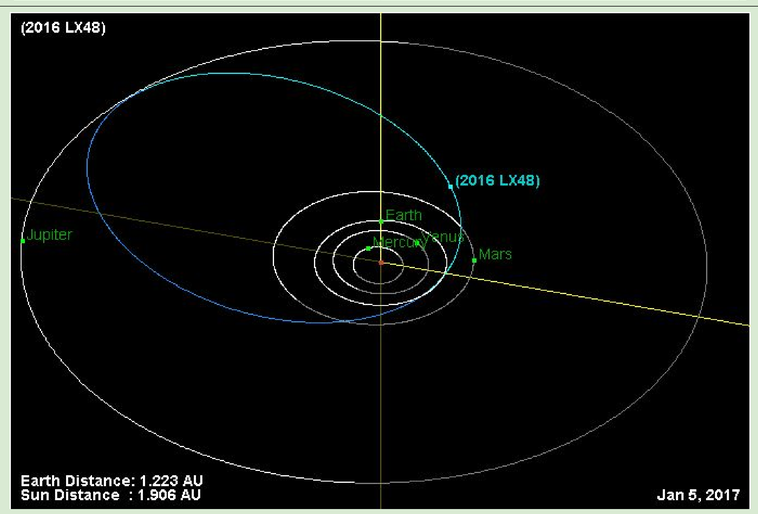


Image from
NASA/JPL http://ssd.jpl.nasa.gov/sbdb.cgi?sstr=550 43;old=0;orb=1;cov=0;log=0;cad=0#orb