

Spectroscopy and photometry of L-type asteroids

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Abstract

Among L-type asteroids, a peculiar category of objects exists: it includes the so-called “Barbarians”, known to have very specific features in the phase-polarization curve. Such objects are thought to contain a high percentage of Calcium-Aluminum-rich-Inclusions, responsible of a spinel absorption feature in the near infrared (around 2.1-2.2 μm). However, Barbarians are also peculiar in some other physical properties: in particular they seem to have unusually high rotation periods, and large amplitude light curves. We started a campaign of NIR spectroscopy and photometry to shed a light on such properties and to compare the Barbarians to the other objects belonging to the same taxonomic type.

1. Properties of the Barbarians

The Barbarians were discovered by A. Cellino with the detection of the first objet giving the name to this category: 234 Barbara. They have a strong polarization parallel to the scattering plane at small phase angles, and a transition to perpendicular polarization at unusually high phase angles. Futher details about their nature are provided in the abstract by [1].

Sunshine et al. (2007) [2] suggested that Barbarians could contain a very high percentage of CAIs (up to 30%), not found in the current meteorite sample. If this was true, they could be very ancient objects, formed in a refractory-rich environment.

Also, it appears that Barbarians have irregular shapes and long rotation periods [3], but such properties are verified on a small sample of objects for which they are available.

We thus decided to run a systematic campaign for the acquisition of NIR spectra at IRTF and of light curves of Barbarians – or candidate Barbarians.

2. Our campaign, preliminary results

We were awarded two nights at IRTF that were fully exploited. During our presentation, we will illustrate the results obtained on the NIR spectra of several L-type asteroids, some of them known to be Barbarians. We will discuss the presence of the spinel absorption and its possible relation to photometric properties and albedo. With our observations we have strongly expanded our knowledge on this category of objects.

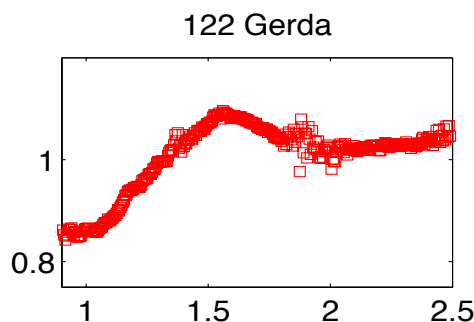


Fig. 1 – Example of spectrum of 122 Gerda, obtained at IRTF by our team. The spinel absorption shows up above 2 μm , over a globally red-sloped spectrum.

References

- [1] Cellino, A. et al. 2015, Recent advances in asteroid polarimetry, EPSC 2015
- [2] Sunshine, J. et al., 2008, Ancient Asteroids Enriched in Refractory Inclusions, *Science*, 320, 514
- [3] Tanga et al. 2015, The non-convex shape of (234) Barbara, the first Barbarian, *MNRAS* 448-4, 3382