Barbarians in the Watsonia family: Interpretation and open problems

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The so-called Barbarian asteroids, which take their name from the prototype of their class, asteroid (234) Barbara, are characterized by anomalous polarimetric properties. They exhibit a so-called "negative polarization branch" which is much wider than usual. This behavior is strikingly different with respect to that exhibited by the vast majority of asteroids. Barbarians are relatively rare. Before the results of the investigation described in this work, only 6 Barbarians were known to exist. A couple of them (980 Anacostia and 387 Aquitania) were known to be within or very close to the Watsonia dynamical family, thought to consist of fragments coming from the collisional disruption of a high-inclination parent body (Novakovic et al., 2011). We have therefore carried out a campaign of spectroscopic observations of members of the Watsonia family using the ESO VLT. The results are striking: 7 out of 9 targets have been found to be Barbarians. This result not only more than doubles the inventory of known Barbarians, but it shows that the Barbarian behavior is due to properties which are not simply due to mere surface properties, but characterize also the overall composition of the interior of the bodies. In this respect, the fact that a number of Barbarians have been found to have also anomalous abundances of the spinel mineral on their surfaces opens exciting lines of investigation, since it is possible that these asteroids could be extremely primitive. Their rarity remains also to be explained.

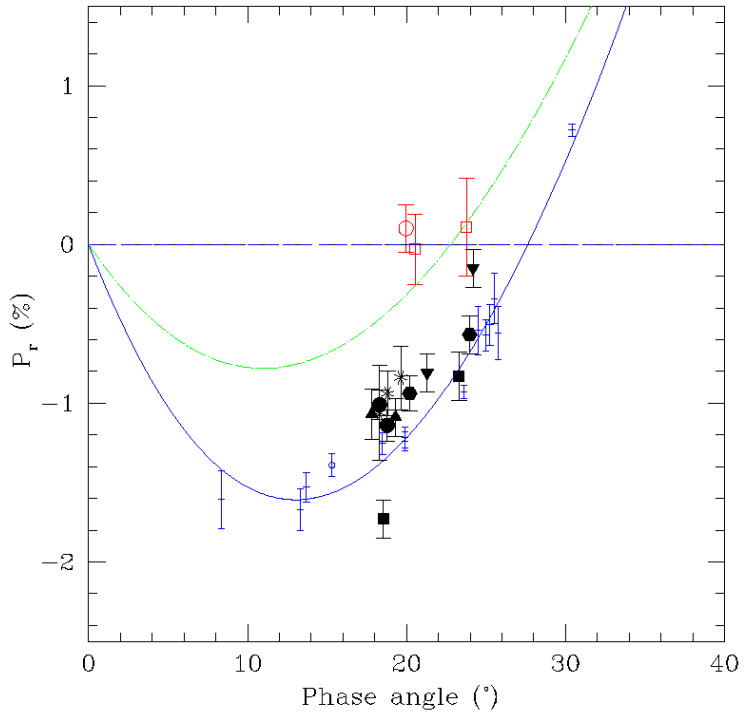

Figure: Phase–polarization data (in R light) for the seven targets of our investigation of the Watsonia family found to be Barbarians (black symbols) and the two targets displaying normal polarimetric properties (red symbols), compared with the polarization data and best-fit curve (in V light) of the Barbarian prototype, (234) Barbara (in blue) and (12) Victoria (in green), a large, non-Barbarian, L-class asteroid.

References: Novakovic B., Cellino A., Knezevic Z., 2011, Icarus, 216, 69.