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**Characterization of NEAs in the frame of NHATS program using the 10.4m  
Gran Telescopio Canarias**

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**ABSTRACT**

Asteroids and comets are the main building blocks of our Solar system and so their study contributes to the understanding of its nature and evolution. Of particular interest are near-Earth asteroids (NEAs): their proximity to Earth constitutes a potential impact hazard, but at the same time makes them accessible to spacecraft and to detailed observations from ground-based facilities. Close approaches to the Earth allow us to study asteroids about two to three orders of magnitude smaller (i.e., tens/hundreds of meters in diameter) than those observable in the main asteroid belt. Small-sized NEAs deserve special attention in terms of understanding the impact hazard, since they have the highest statistical likelihood of actually hitting the Earth, and are capable of producing catastrophic events at local/regional scales.

The NASA Near-Earth Object Human Space Flight Accessible Targets Study (NHATS) provides a complete list of viable NEAs for an actual human exploration

mission. Deciding whether a near-Earth asteroid is accessible to spacecraft or not relies mainly on dynamical trajectory performance constraints. Current spacecraft payload and launch constraints indicate that NEAs with  $\Delta V \leq 7$  km/s are the most accessible to spacecraft in terms of energy (i.e. cost) efficiency. NHATS is used to identify high priority targets and alerts are sent out to the observing community requesting additional observations.

Despite the fact that the number of these accessible NEAs has significantly increased in the last few years, there are less than a dozen of such asteroids with spectroscopic (i.e., compositional) information available. This is because these targets are relatively faint due to their small size (a few tens of meters) and are typically discovered during their closest approach. Therefore, in order to obtain their reflectance spectra before these objects recede and fade in brightness, a rapid response (within one or two weeks) is required by large aperture telescopes.

In this work we present the results of our on-going program to obtain visible spectra of NEAs discovered by NHATS using the 10.4m Gran Telescopio Canarias, located at the “El Roque de Los Muchachos” Observatory, in the island of La Palma (Spain) and managed by the Instituto de Astrofísica de Canarias (IAC).

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