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- ☐ **Key International and Political Developments**
- ☐ **Advancements and Progress in NEO Discovery**
- ☒ **NEO Characterization Results**
- ☐ **Deflection and Disruption Models & Testing**
- ☐ **Mission & Campaign Designs**
- ☐ **Impact Consequences**
- ☐ **Disaster Response**
- ☐ **Decision to Act**
- ☐ **Public Education & Communication**

Physical Characterization Of The Carbonaceous NEO Population

Simone Ieva[1], Elisabetta Dotto[1], Elena Mazzotta Epifani[1], Davide Perna[1,2], Marco Micheli[3], John Robert Brucato[4], Giovanni Poggiali[4,5] and Ettore Perozzi[6]

[1] *INAF – Osservatorio Astronomico di Roma, Via Frascati 33, 00078 Monte Porzio Catone, Rome, Italy. +390694286431, simone.ieva@inaf.it*
[2] *LESIA – Observatoire de Paris, PSL Research University, CNRS, Sorbonne Universités, UPMC Univ. Paris06, Univ, Paris Diderot, Sorbonne Paris Cité, 5 Place J. Janssen, 92125 Meudon, France*
[3] *ESA NEO Coordination Centre, Frascati, Rome, Italy,*
[4] *INAF – Osservatorio Astrofisico di Arcetri, Largo Enrico Fermi 5, 50125 Firenze, Italy,*
[5] *[6]University of Firenze, Department of Physics and Astronomy, Via Sansone 1, 50019 Sesto Fiorentino, Italy*
[6]*ASI – Agenzia Spaziale Italiana, Rome, Italy*

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ABSTRACT

Primitive small bodies, such as carbonaceous Near-Earth Objects (NEOs), formed in the water- and organic-rich outer regions of the proto-planetary disk, very likely containing primordial material from the proto-solar cloud, as well as elements issued from alteration processes. Their current physical and orbital properties provide information about the earliest processes that governed the formation and evolution of

the proto-nebula at different solar distances. Moreover, recent exobiological scenarios for the origin of life on Earth invoke the exogenous delivery of organic matter to the early Earth due to an intense influx of organic-rich material after its formation, for which the most likely source is the impact of many small bodies formed in the outer Solar System.

Furthermore, the proper assessment of the carbonaceous contribution to the NEO population is compelling for mitigation purposes, since the most mature mitigation technique at the moment (the kinetic impactor) seems more challenging to be executed on a porous NEO than on a monolithic asteroid. Carbonaceous small bodies usually have a higher internal porosity, hence the kinetic impactor may not be very effective in changing the orbit of these bodies.

We will present the latest results we have obtained during our observational campaign to investigate the surface composition of several primitive bodies through photometric and spectroscopic observations in the visible and near-infrared range. We found NEOs with dynamical and physical connection with outer Solar System bodies, and NEOs currently on extremely challenging mitigation orbits, making them them particularly interesting for a future sample-return or a mitigation mission.

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