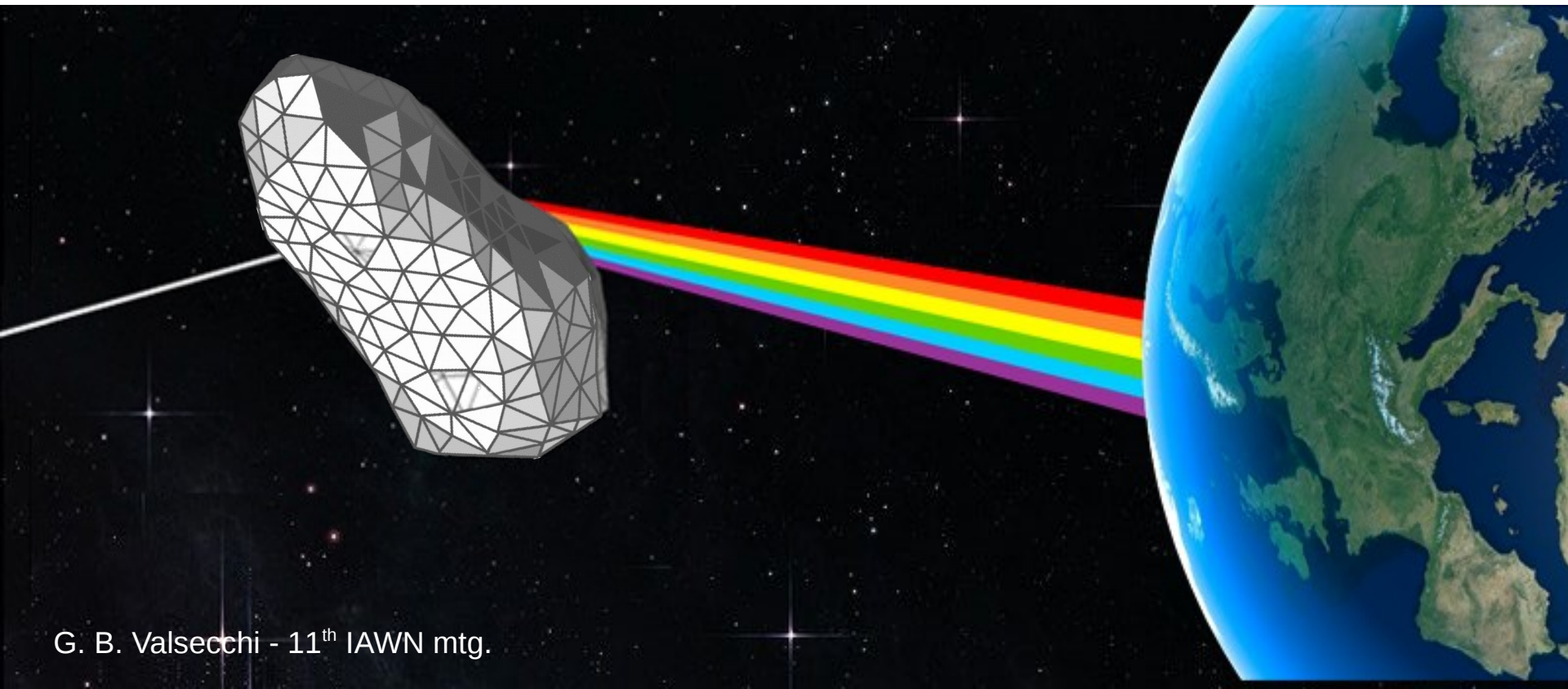




# NEOROCKS: The new Priority List



NEOROCKS stands for:

THE **NEO** **R**APID **O**BSERVATION,  
**C**HARACTERIZATION AND **K**EY  
**S**IMULATIONS

EU funded project

Started on 1/1/2020, lasts 30 months

# Project consortium

<b>Participant No</b>	<b>Participant organisation name</b>	<b>Country</b>
1 (Coordinator)	Istituto Nazionale di Astrofisica (INAF)	Italy
2	Agenzia Spaziale Italiana (ASI)	Italy
3	University of Padova (UniPD)	Italy
4	LESIA-Observatoire de Paris (ObsPM)	France
5	Observatoire de la Cote d'Azur (OCA)	France
6	University of Edinburgh (UoE)	UK
7	Astronomical Institute of the Czech Academy of Sciences (CAS)	Czech Republic
8	Instituto de Astrofisica de Canarias (IAC)	Spain
9	SpaceDyS s.r.l. (SpaceDyS)	Italy
10	DEIMOS Space s.l.u. (DMS)	Spain
11	DEIMOS Space s.r.l. (DMR)	Romania
12	DEIMOS Castilla La Mancha (DCM)	Spain
13	NeoSpace sp z.o.o (NeoSpace)	Poland
14	Resolvo Srl (Resolvo)	Italy

# NEOROCKS Goals

- To **improve our understanding of NEOs** through scientific modelling and data exploitation
- To contribute to the selection of NEO targets for **space missions**, either for science or mitigation through **ground based observations**
- To **network ground- based facilities** to perform a physical characterization of the imminent impactors

# Major challenges

- Often, the only opportunity to **dynamically and physically characterize** an NEO is only during the **days just after the discovery**
- Since some years, smaller and smaller objects are discovered (the km-size population is almost complete), therefore, the opportunity window is getting more and more shrunk
- In some cases, it is a matter of few hours (see 2008 TC3)
- To try to get physical observations, the target orbit must be well constrained to allow enough precise ephemerides computation:
  - Light-curves (photometry);
  - Colors (photometry);
  - Spectroscopy (visible and IR);
  - Radar observations (spin, shape, distance);
  - Polarimetry.

# New Priority List

- The **(Old) Priority List** is a protocol to provide a list of observable NEO targets to observers according to a priority defined by the observability conditions and dynamical constraints
- The protocol and algorithm were defined in the paper: «A New Protocol for the Astrometric Follow-up of Near Earth Asteroids»; Boattini, D'Abramo, Valsecchi & Carusi; Earth, Moon and Planets 100, 31-41 (2007)
- The priority List has been published since 2000 by the Spaceguard Central Node and since a few years it has been integrated into the ESA portal of the NEO Coordination Centre:
  - [http://neo.ssa.esa.int/PSDB-portlet/download?file=esa\\_priority\\_neo\\_list](http://neo.ssa.esa.int/PSDB-portlet/download?file=esa_priority_neo_list)
- After a couple of decades, the algorithm needs necessary a review:
  - Now we observe much smaller objects
  - The algorithm didn't take into account the Moon. Several NEOs have been lost when the Moon is getting full or the lunar elongation is too small
  - The algorithm didn't take into account the galactic latitude. If an asteroid is going to a densely star populated field, the observers usually avoid to observe it.
  - Objects going to negative declinations are more likely to get lost

# New Priority List

- Data fields in the new PL:
  - Name of target
  - Urgency: Urgent, Necessary, Useful, Low Priority
  - PL Value
  - Presence in Risk list and, in case, PS value
  - Absolute magnitude H
  - Whether it is a PHA
  - Number of observed oppositions/apparitions (source MPC)
  - End of Visibility at present apparition
  - Remaining days to EoV
  - RA, DEC and Vmag at next midnight UTC
  - Present Sky uncertainty
  - Sun elongation
  - Moon elongation
  - Galactic Latitude
  - Next Apparitions (number of visibility windows in the next 10000 days - 27.4 ys)
  - Reason for EoV
- All fields are sortable
- RA is sortable starting from present Sun RA (list objects from sunset to sunrise going East)

# New Priority List

- The **New Priority List** will list and sort the objects according to a Priority List Value determined according to observational and dynamical considerations
- There will be a new service:
  - Automatic daily (or configurable) e-mail to subscribers with some personalizations:
    - Obscode ephemerides, limiting magnitude, declination range...
  - We have some beta-testers of this service among the Italian amateurs community
- If you are interested, please contact:  
[bernardi@spacedys.com](mailto:bernardi@spacedys.com)