

Polarimetry as a tool for physical characterization of potentially hazardous NEOs

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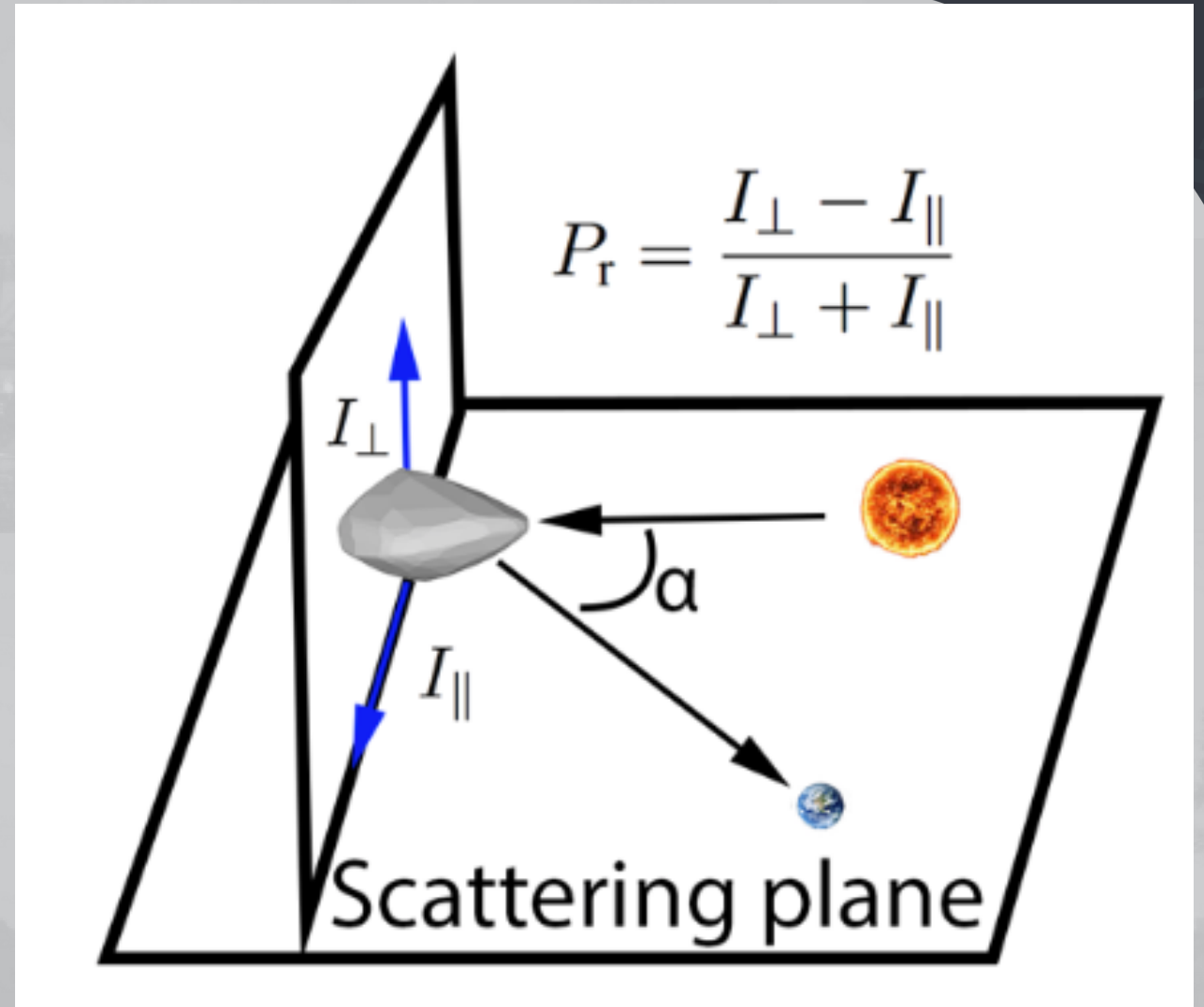
Image credit: Israel Cabrera Photography



What is polarimetry?



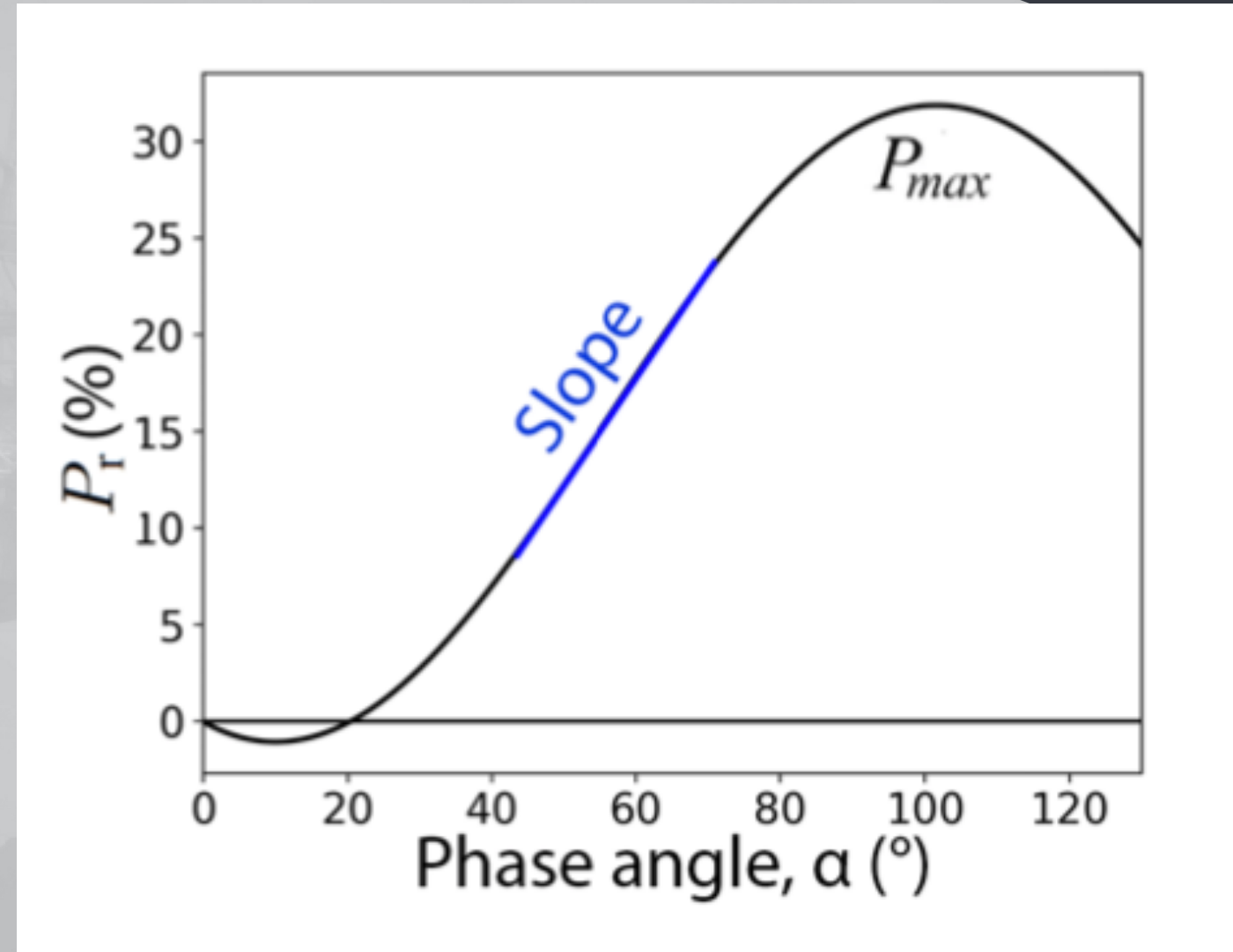
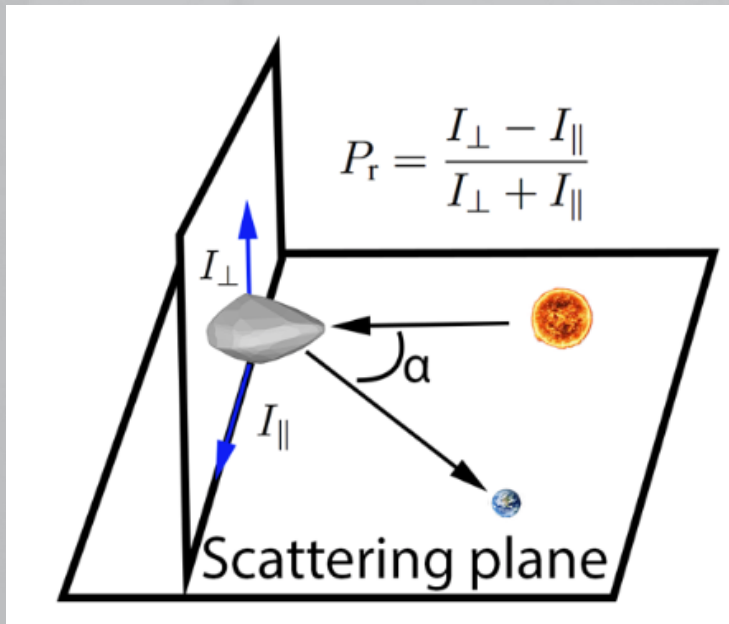
Measure of the linear polarization of the sunlight scattered by the surface of an asteroid



What is polarimetry?



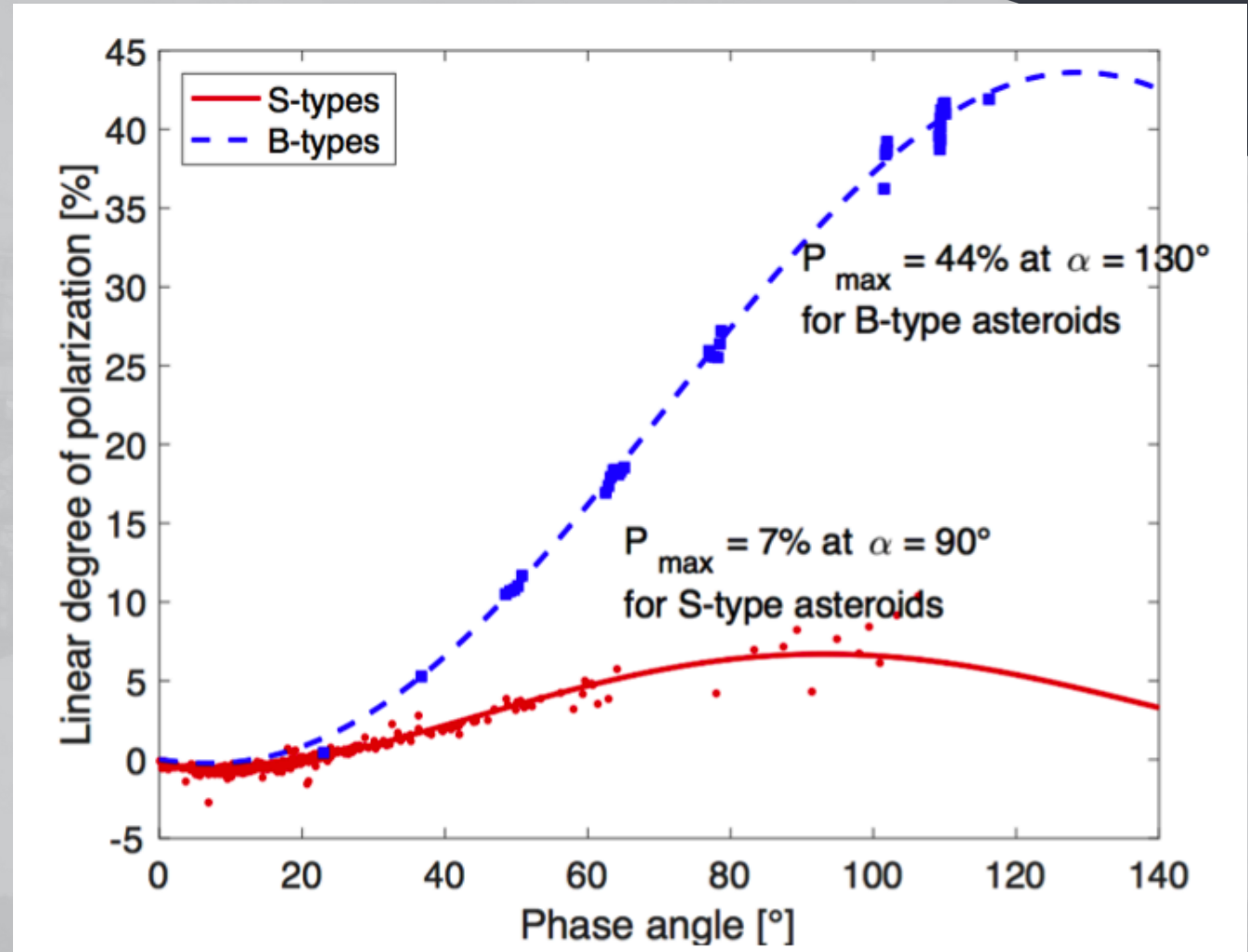
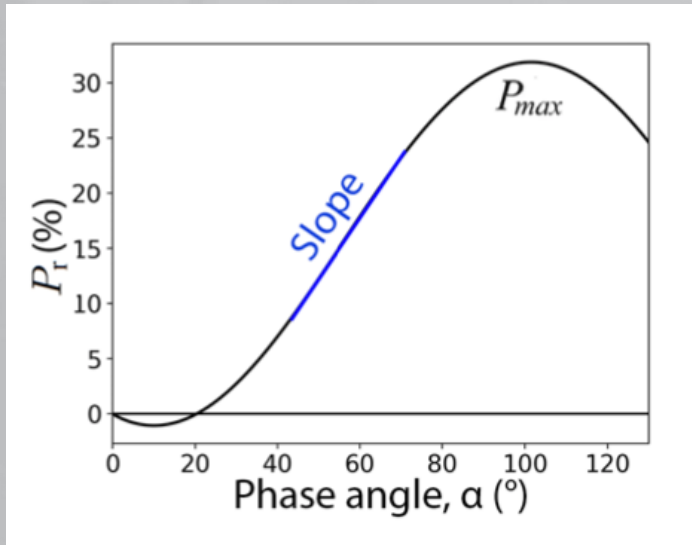
Polarimetry is mainly dependent on the phase angle



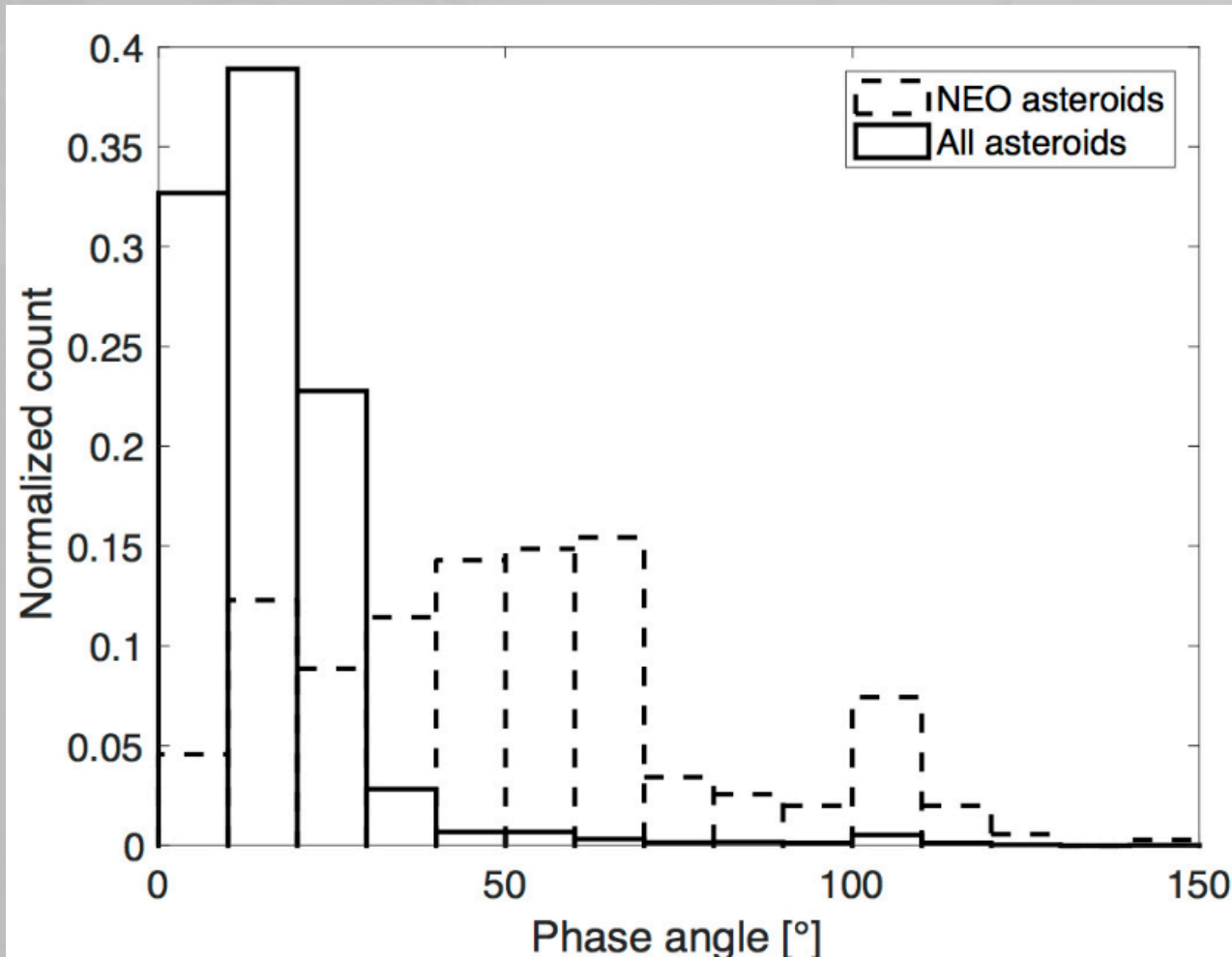
Why polarimetry is important?



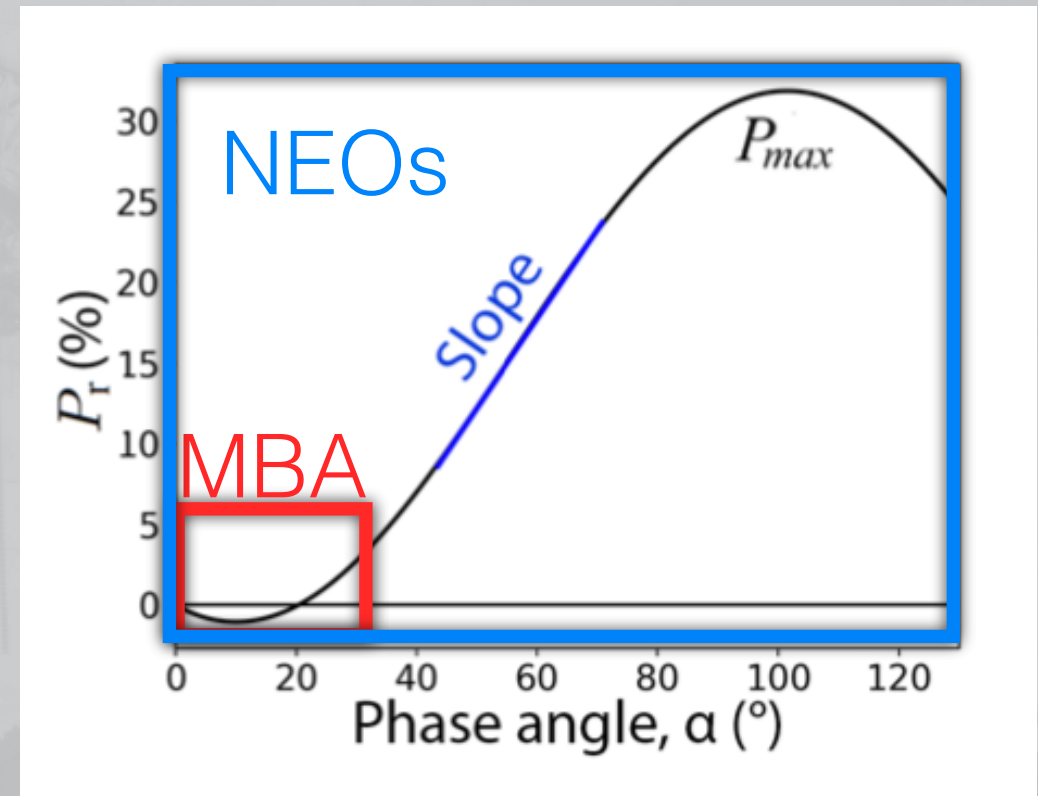
The phase-polarization curve is dependent on the albedo



NEOs observations in polarimetry



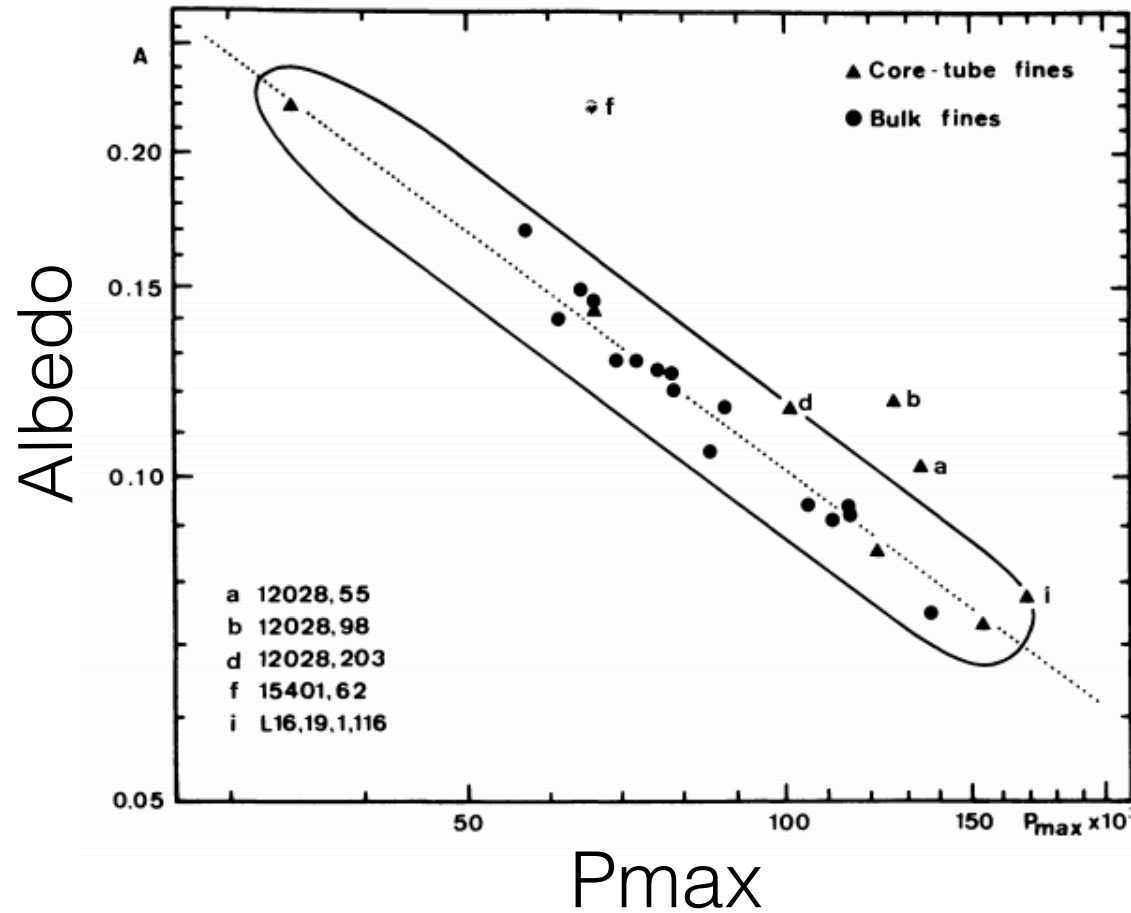
NEOs can be observed at higher phase angles



Polarimetry-Albedo relation



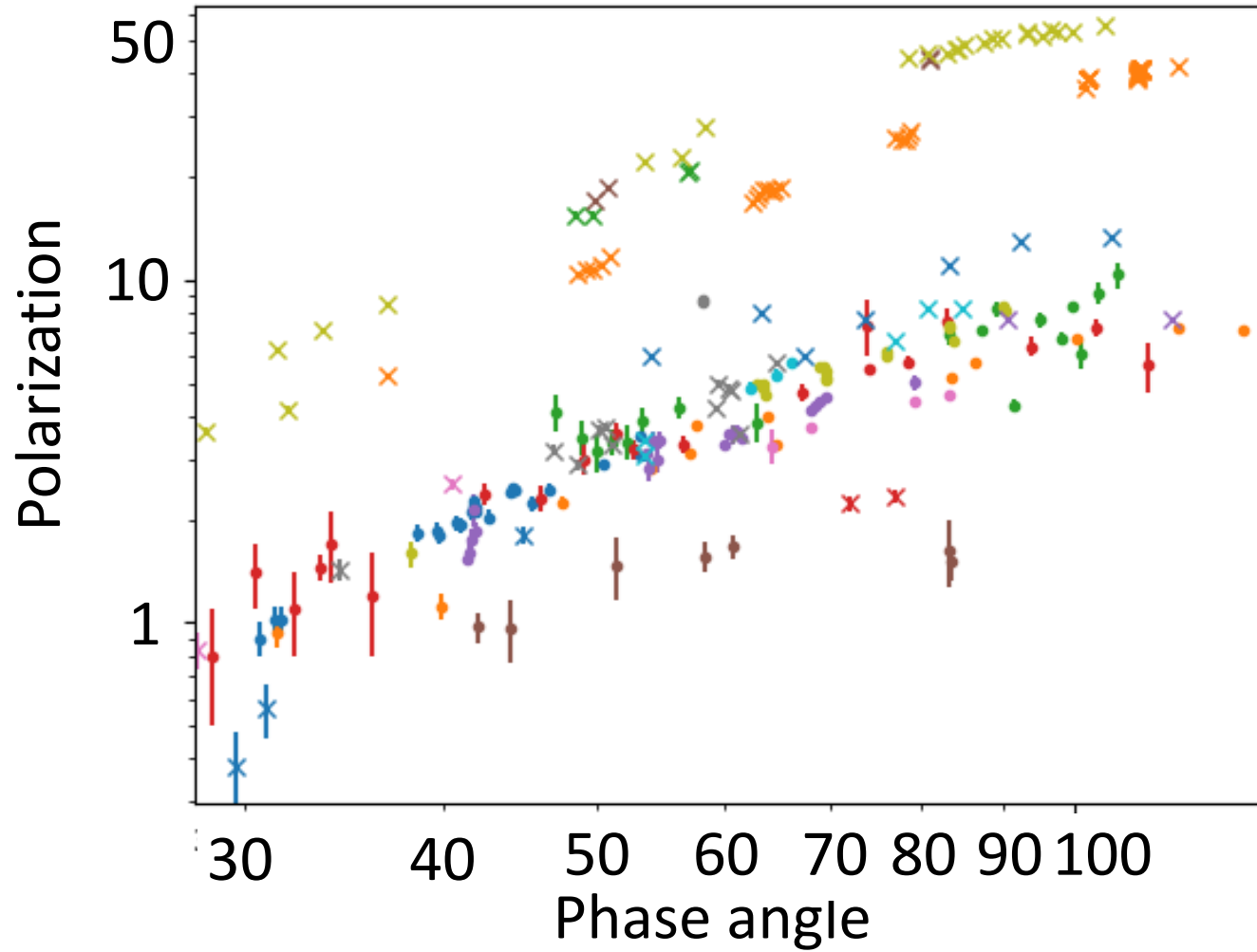
Bowell et al. 1973



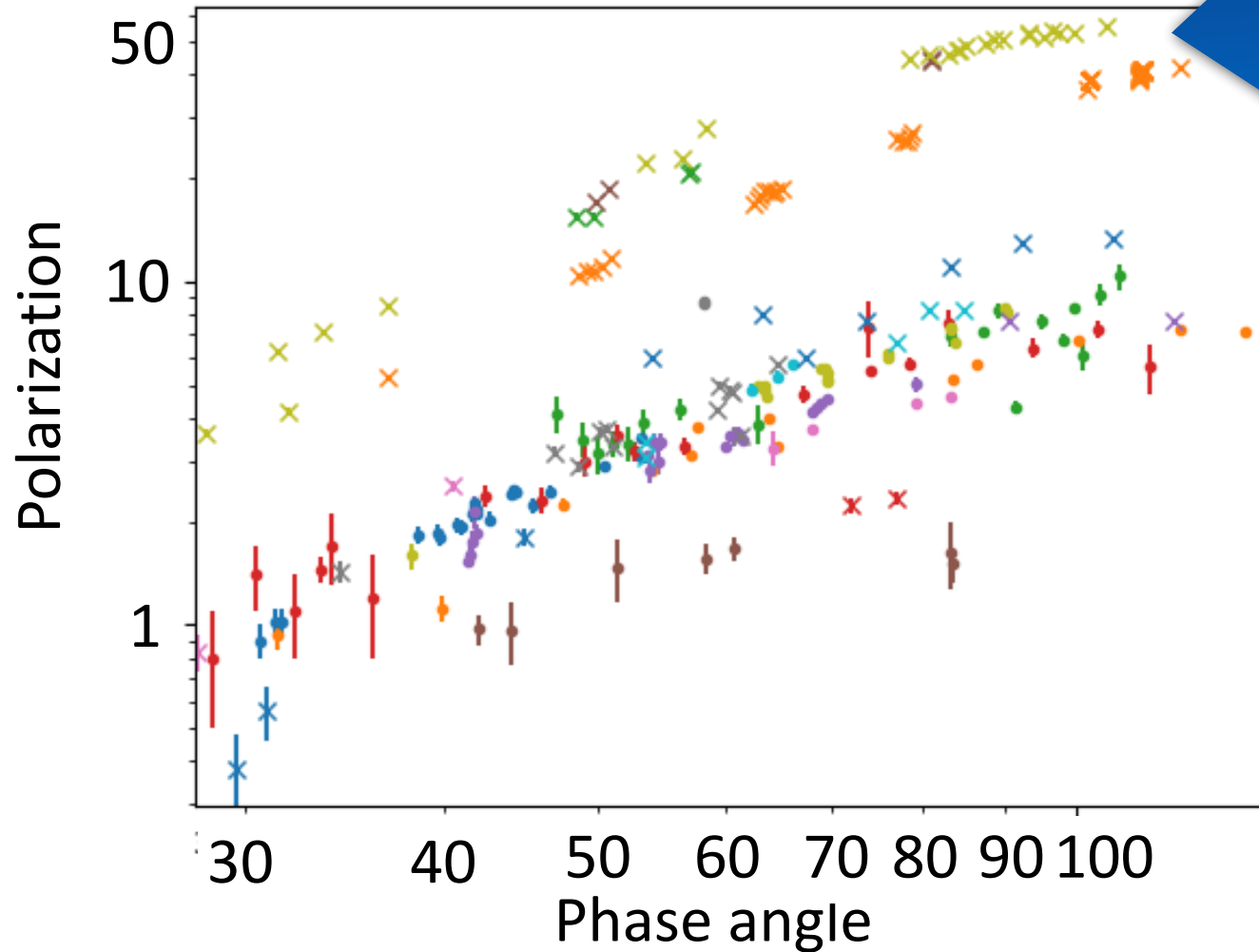
The Umov law is linking the albedo to the maximum of polarization



Polarimetry-Albedo relation

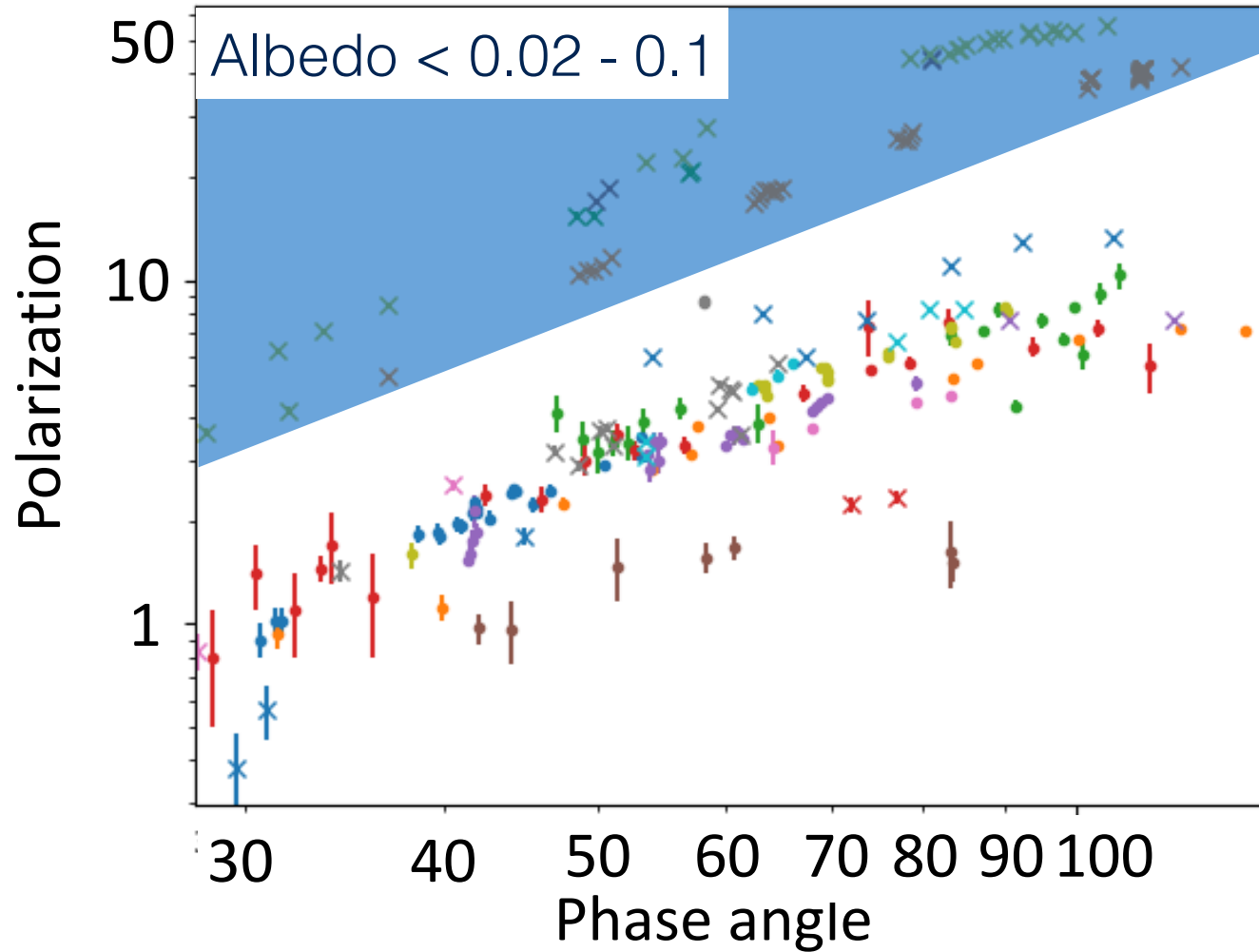


Polarimetry-Albedo relation



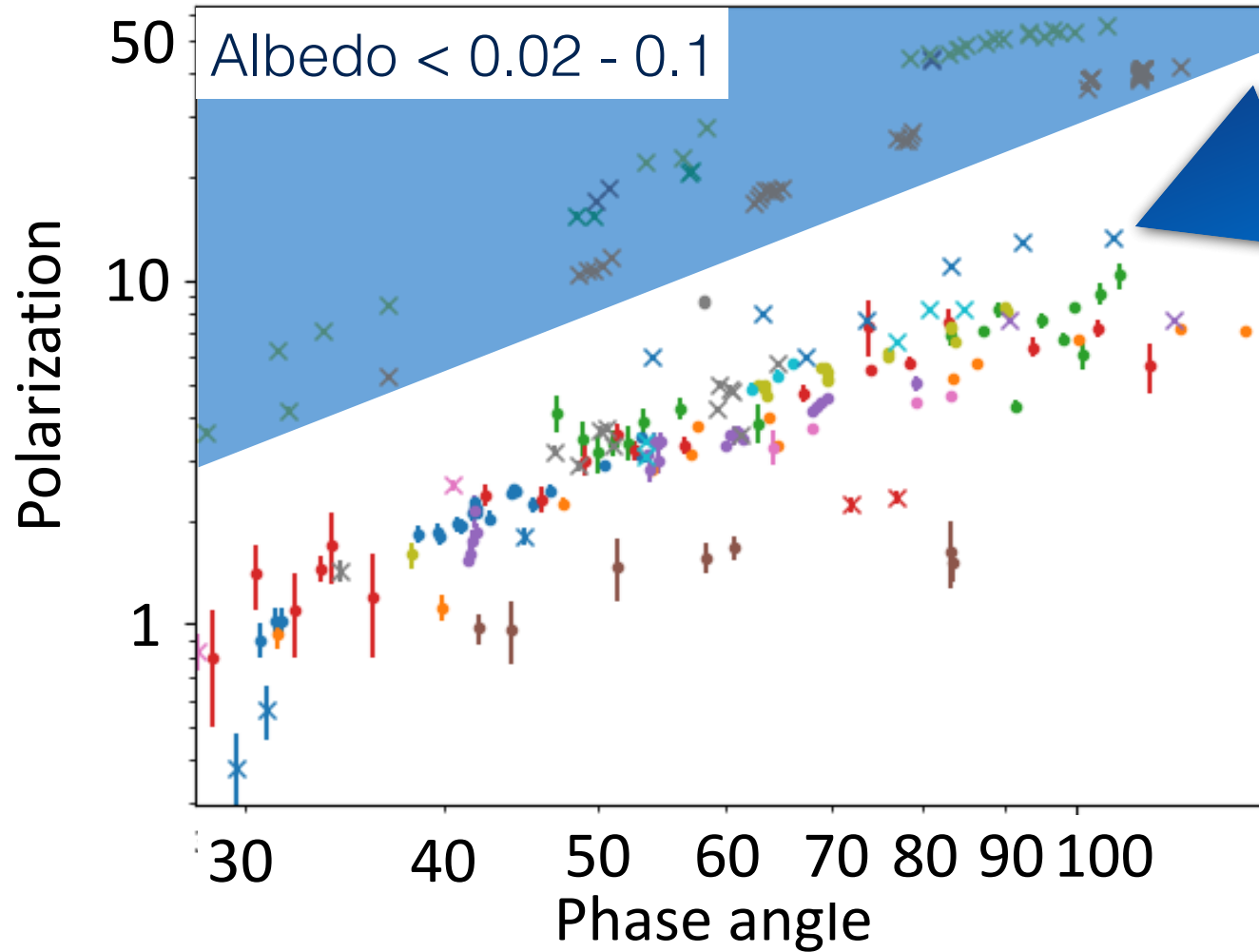
Ryugu
Bennu
1998 KU2
Phaethon
Albedo $\sim 0.02 - 0.1$

Polarimetry-Albedo relation



2021 PDC: 150m < D < 330m

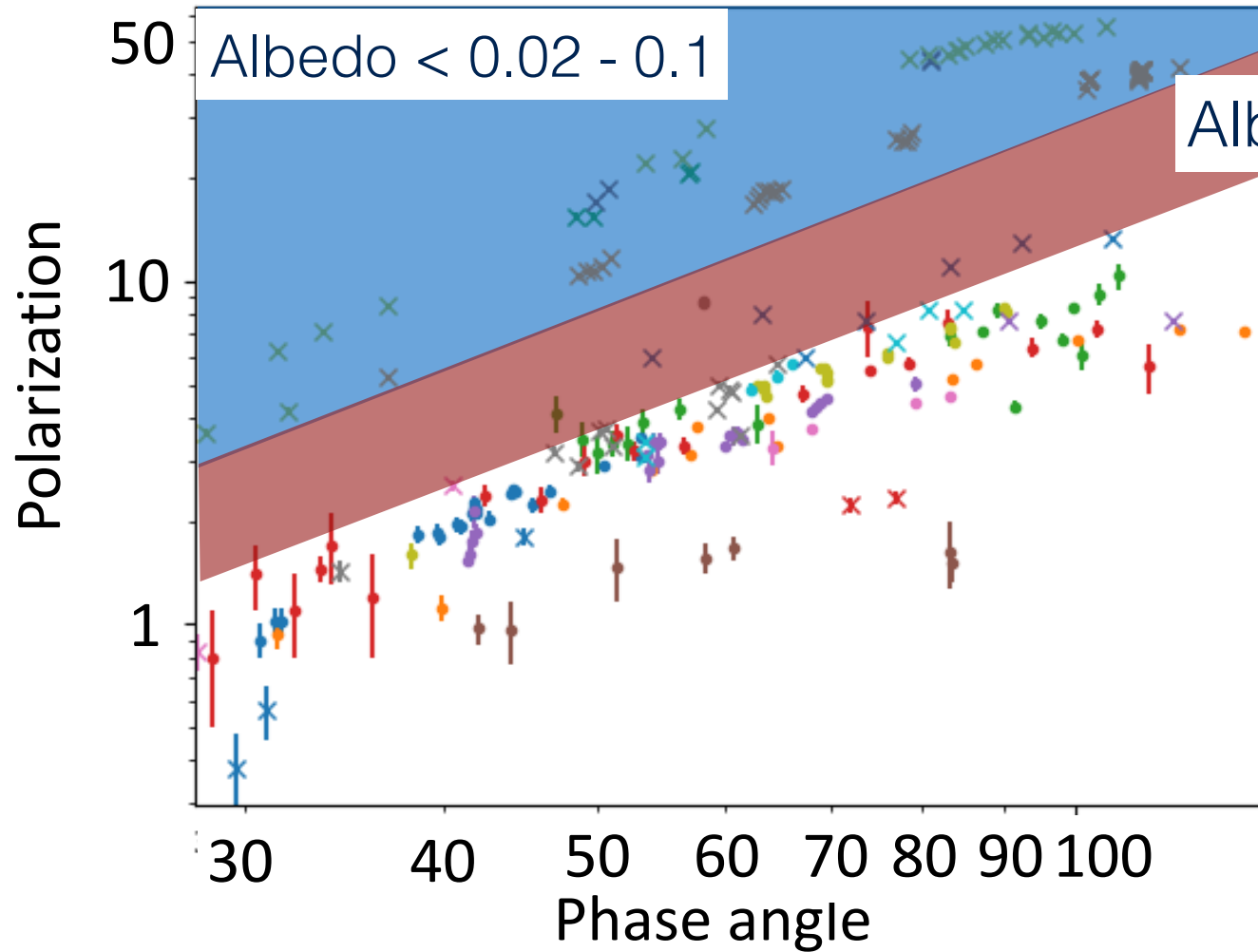
Polarimetry-Albedo relation



1999 JD6
Albedo ~ 0.14



Polarimetry-Albedo relation

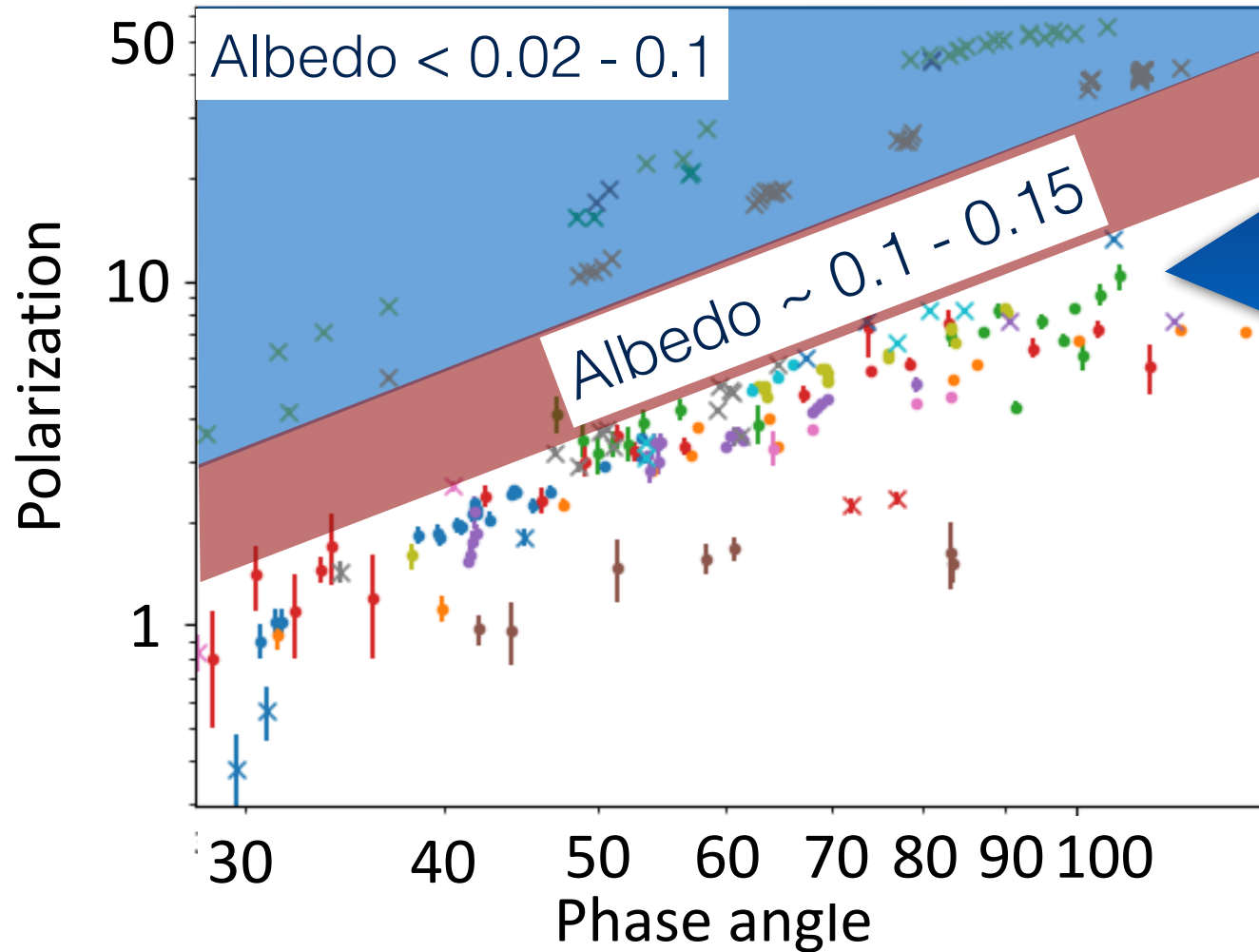


Albedo $\sim 0.1 - 0.15$

2021 PDC: $120\text{m} < D < 150\text{m}$



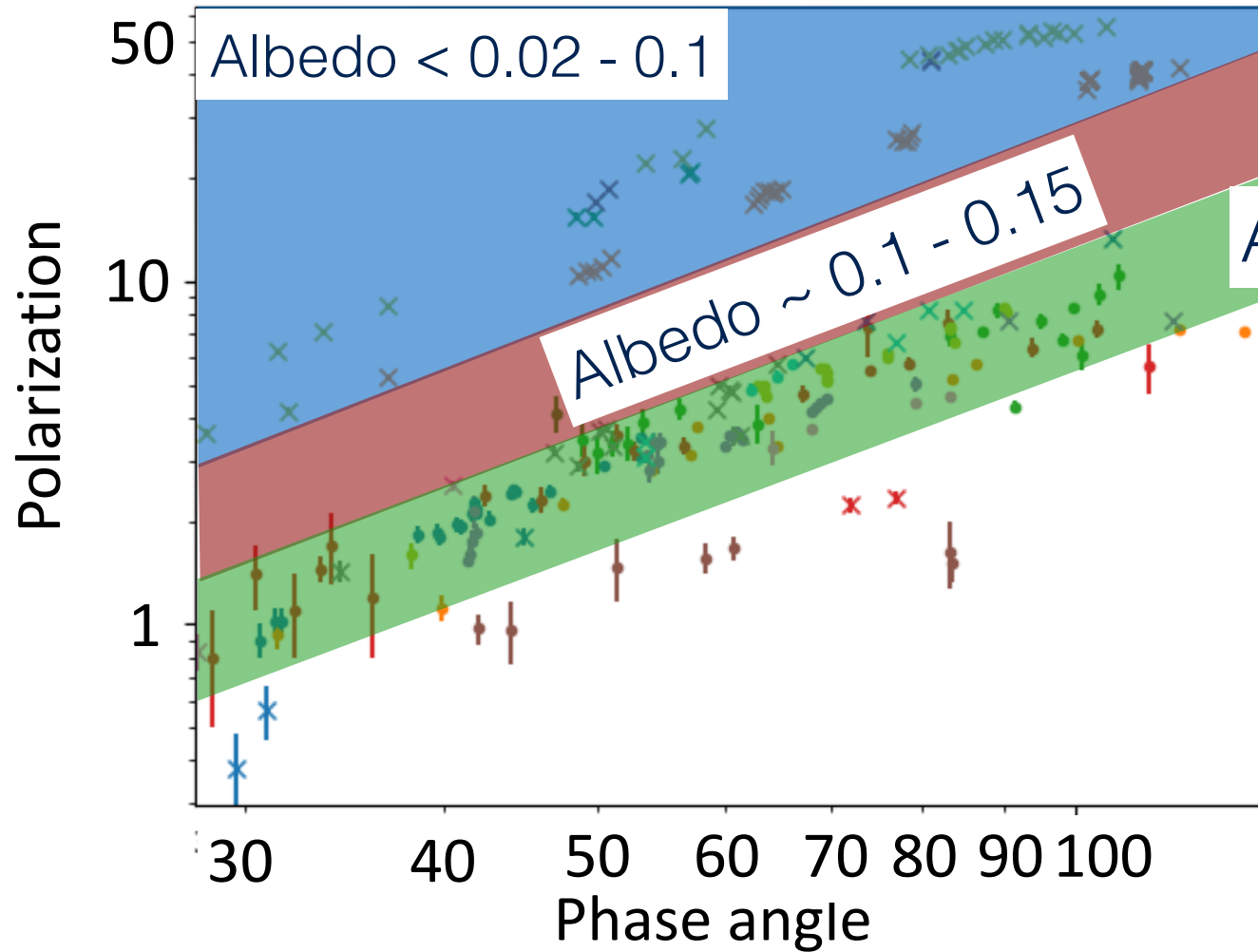
Polarimetry-Albedo relation



Mostly S-type
Apophis
Itokawa
Eros
Toro
Ivar
...

Albedo ~
0.15-0.35

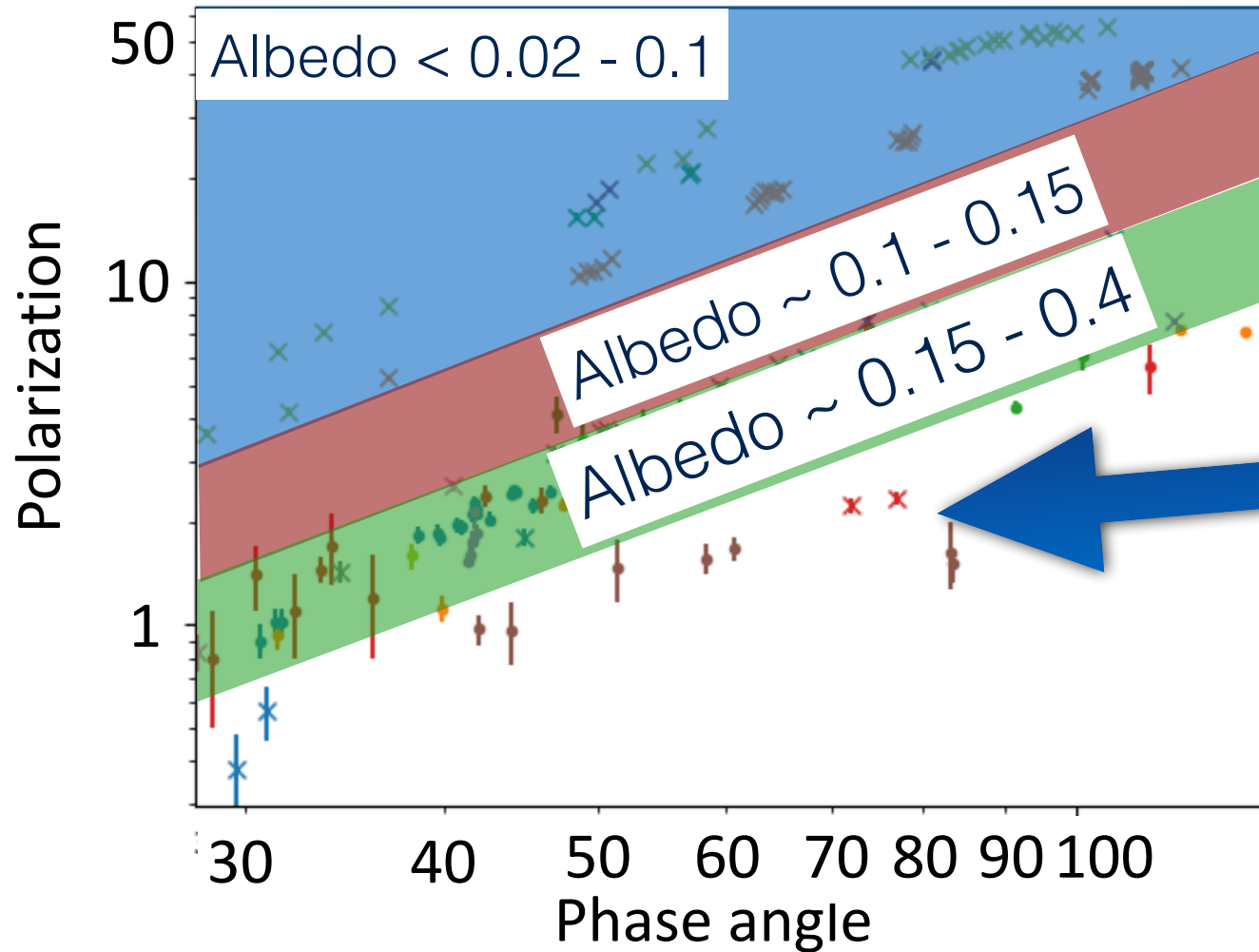
Polarimetry-Albedo relation



2021 PDC: $80\text{m} < D < 120\text{m}$



Polarimetry-Albedo relation



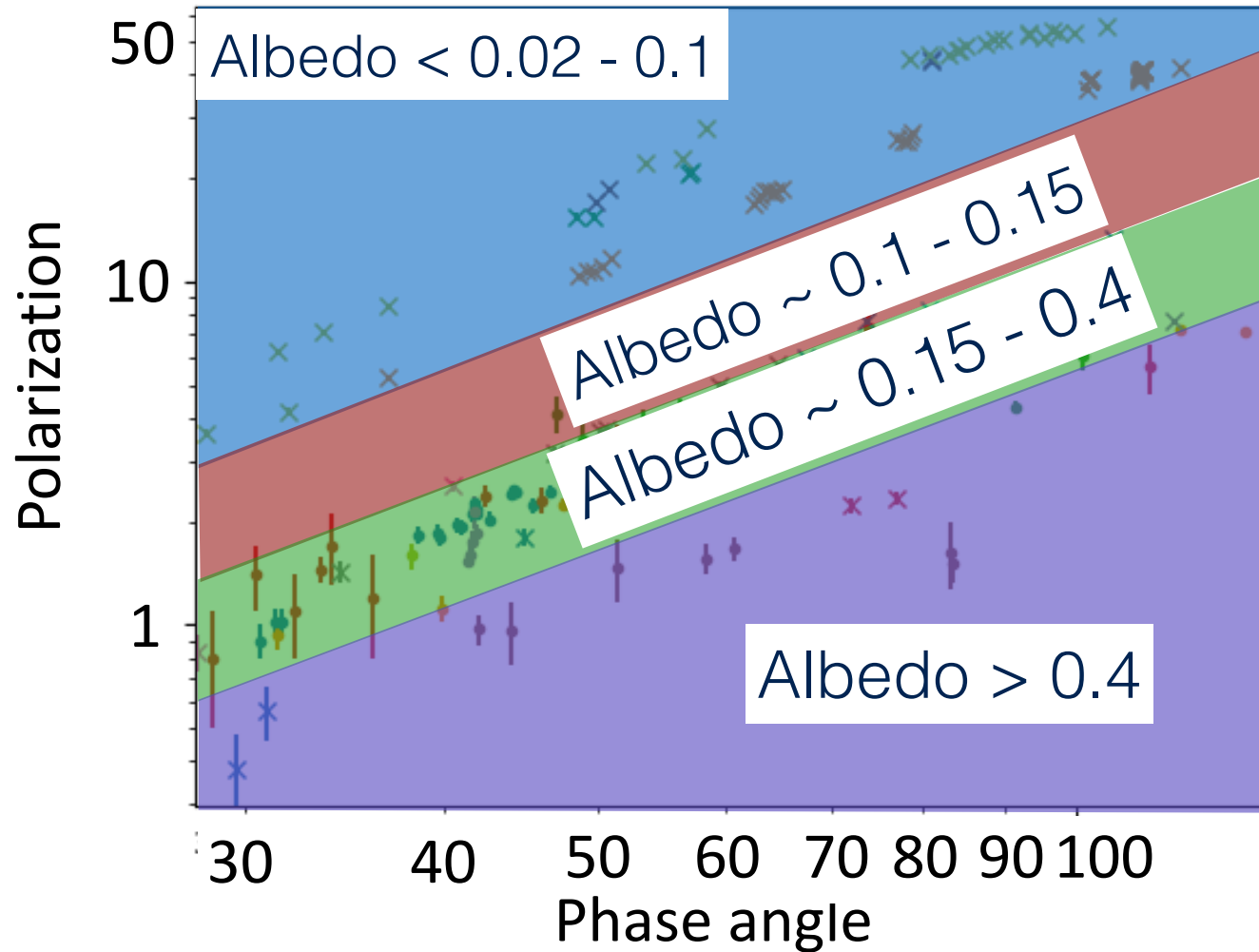
1999 WT24
2004 VD17

...

Albedo ~
0.45-0.75



Polarimetry-Albedo relation



2021 PDC: 50m < D < 80m



- Polarimetry is very effective to obtain albedo information
- One measurement can reduce the size uncertainty by a factor of 2 to 10
- We need new observations to better calibrate the polarimetry-albedo relation
- We need more polarimeters on large aperture telescopes