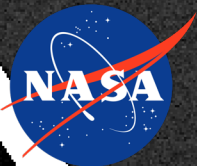


Chasing Near-Earth Asteroids at the Bottom of the Sky

Joseph Masiero

(NASA Jet Propulsion Laboratory/California Institute of Technology)

Co-Is: A.K. Mainzer, J.M. Bauer, R. Cutri, T. Grav,
E. Kramer, J. Pittichova, S. Sonnett, and the NEOWISE team



Jet Propulsion Laboratory
California Institute of Technology



NEOWISE

WISE PI: Ned Wright (UCLA)

NEOWISE PI: Amy Mainzer
(U Arizona)

Terminator-following polar
orbit

All-sky thermal infrared
survey in 2010, restarted for
two-band survey 13 Dec 2013

Mission funded by NASA
Planetary Science Division
through June 2020

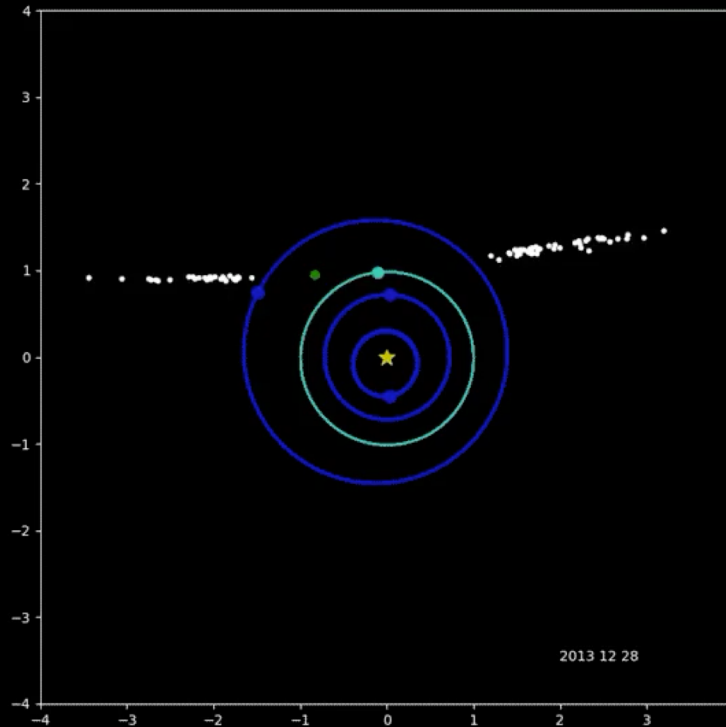


NASA/JPL-Caltech/WISE Team

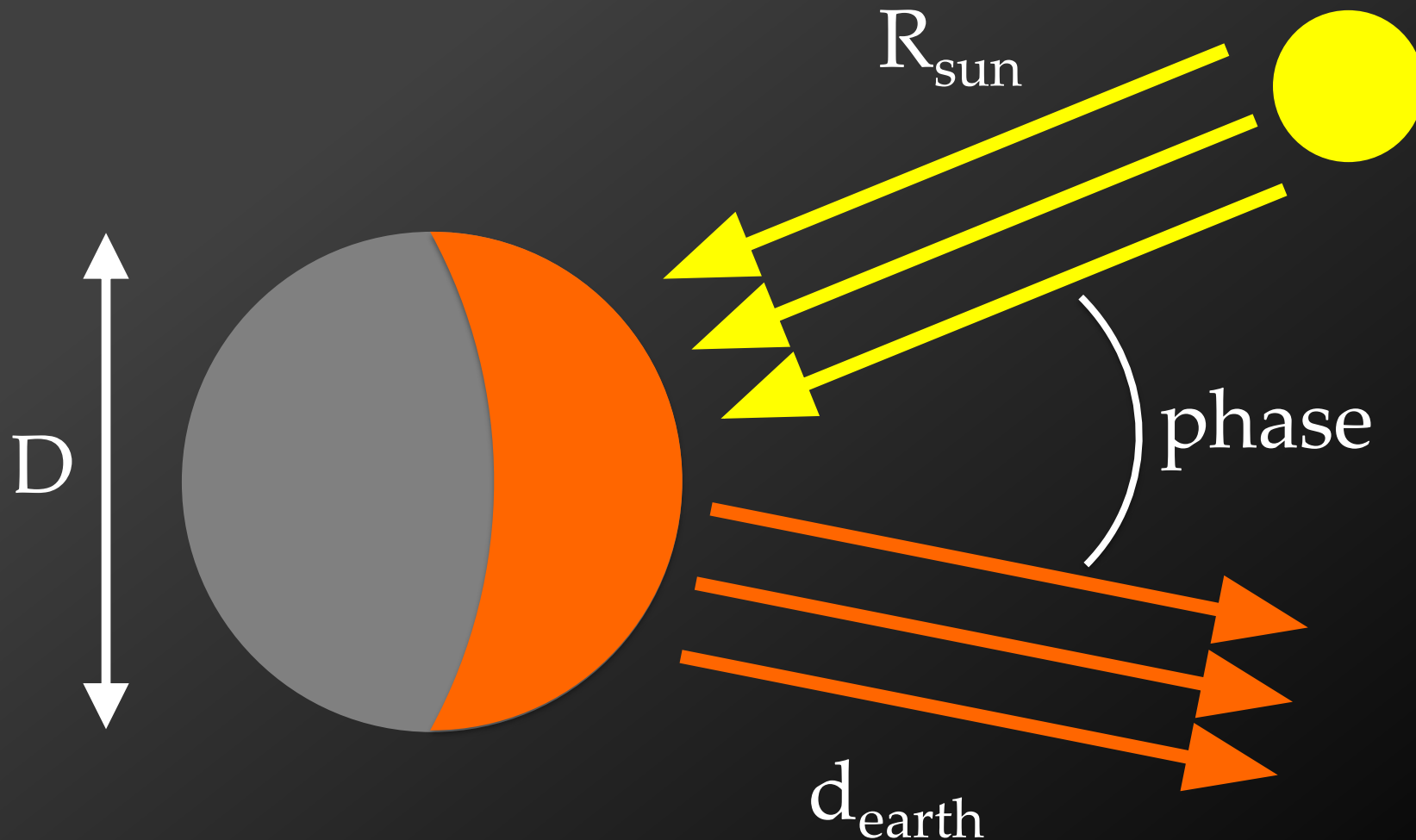
The NEOWISE survey, first 4 years

Color Key:

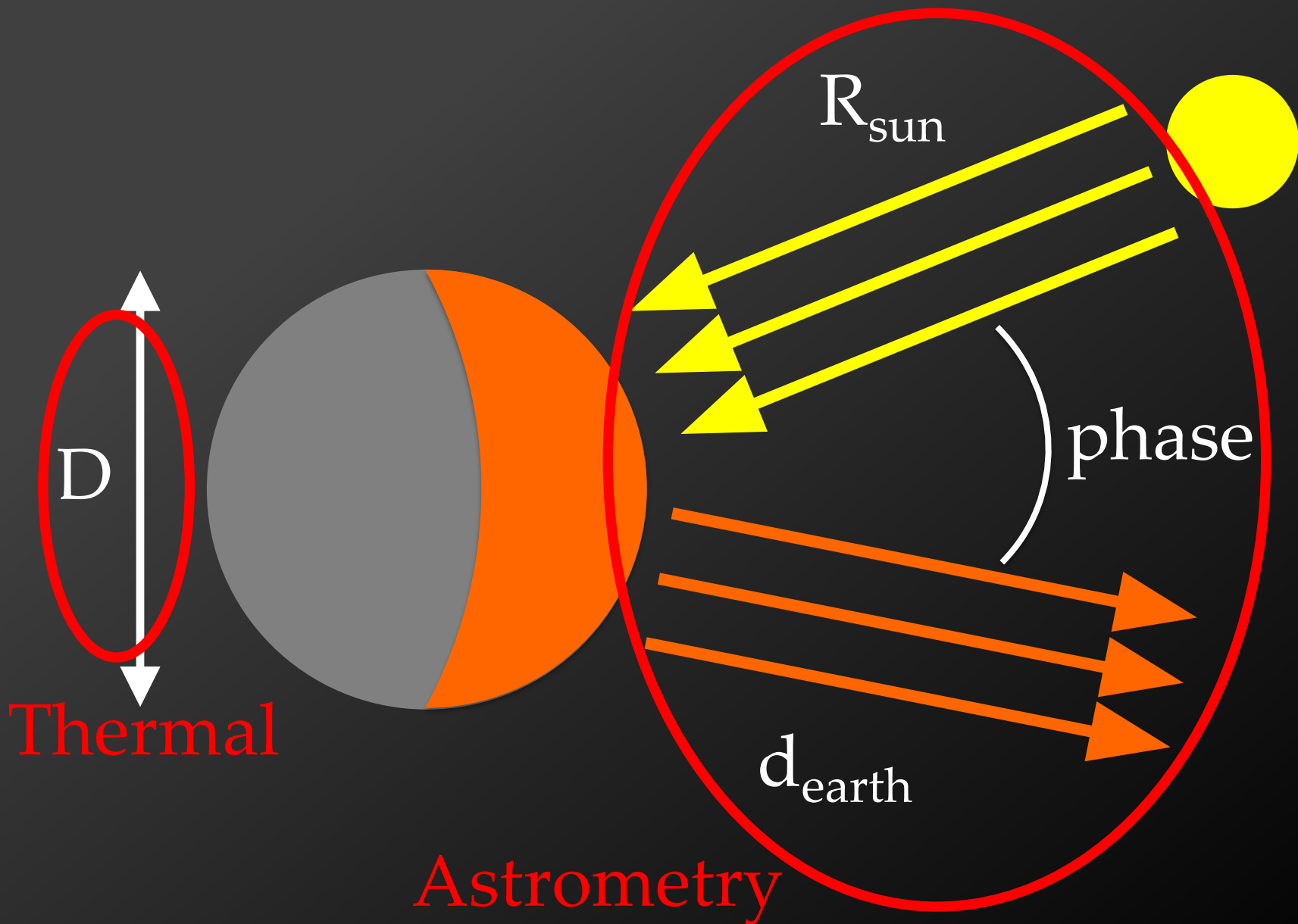
- Main Belt Asteroids
- Near Earth Asteroids
- Comets
- Initial Detection
- Earth/WISE
- Planets



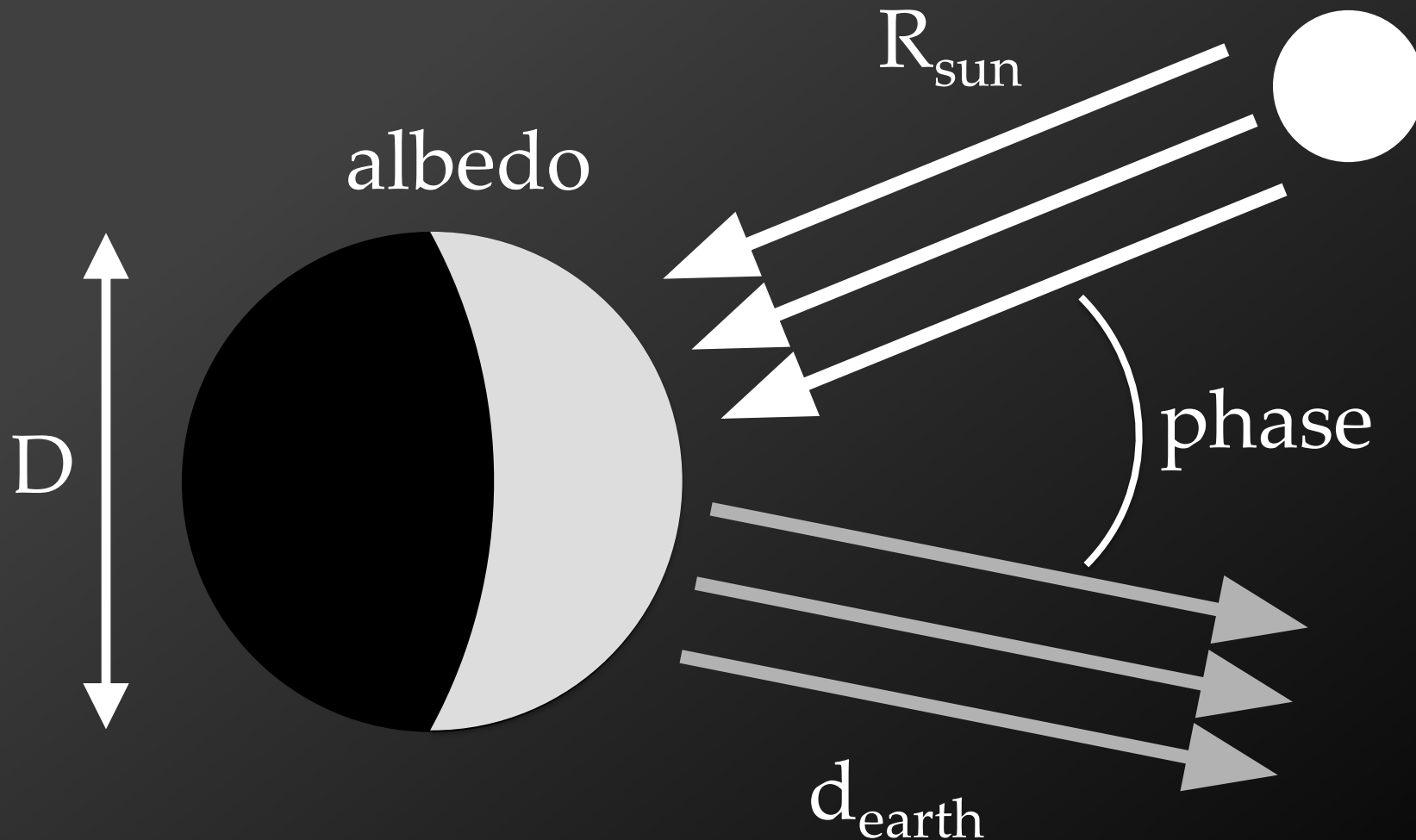
Thermal emission from asteroids



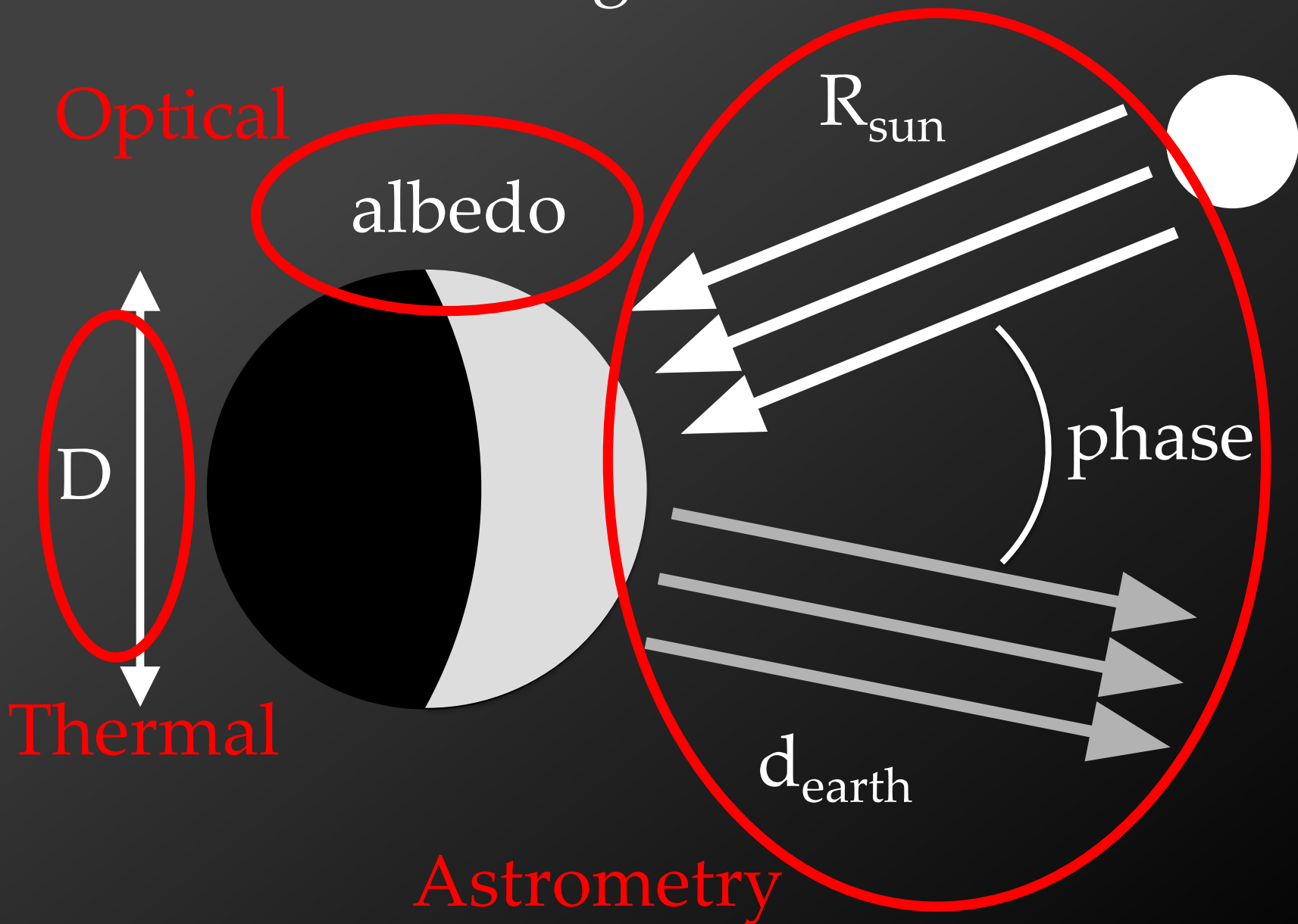
Thermal emission from asteroids



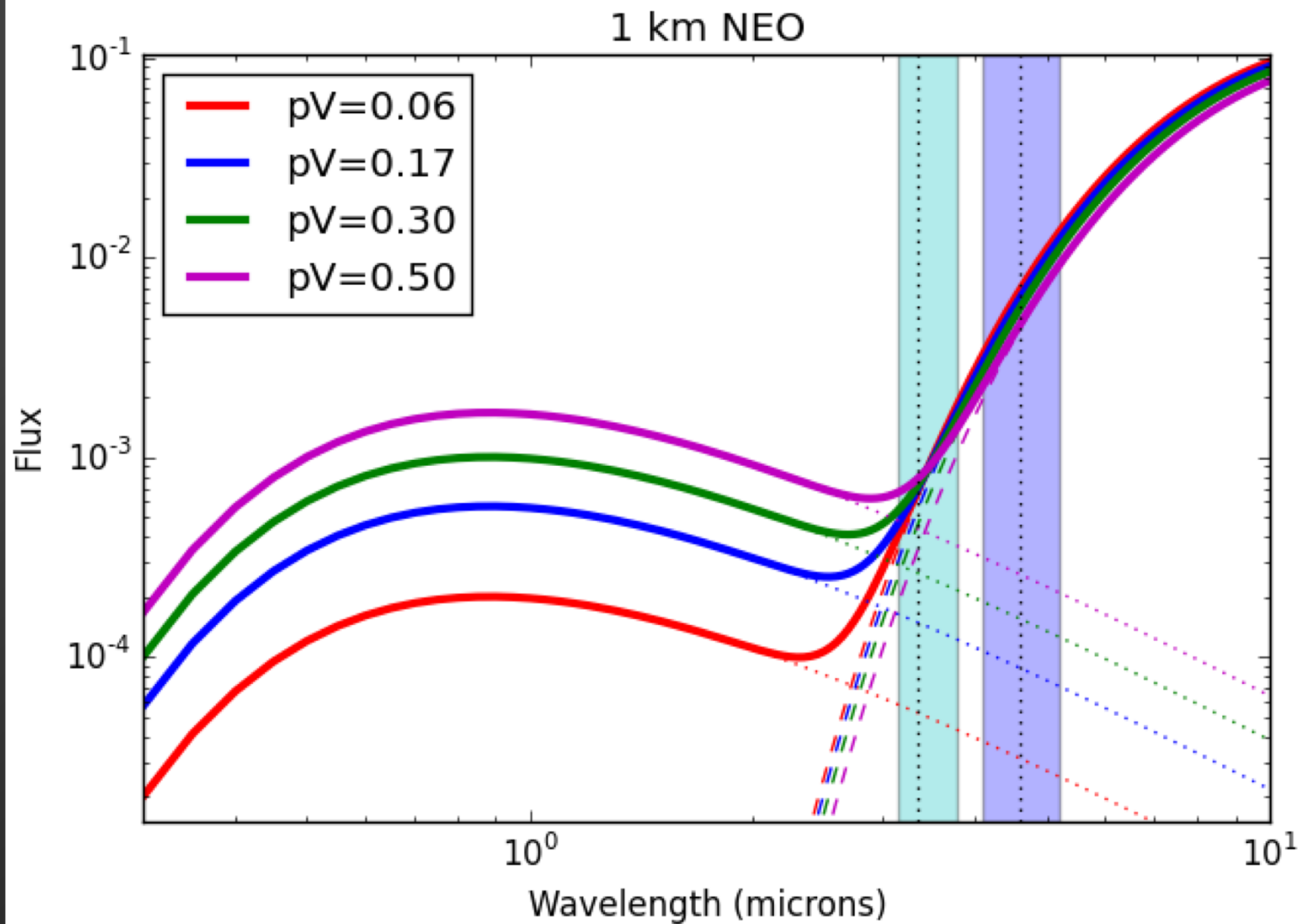
Reflected light from asteroids



Reflected light from asteroids

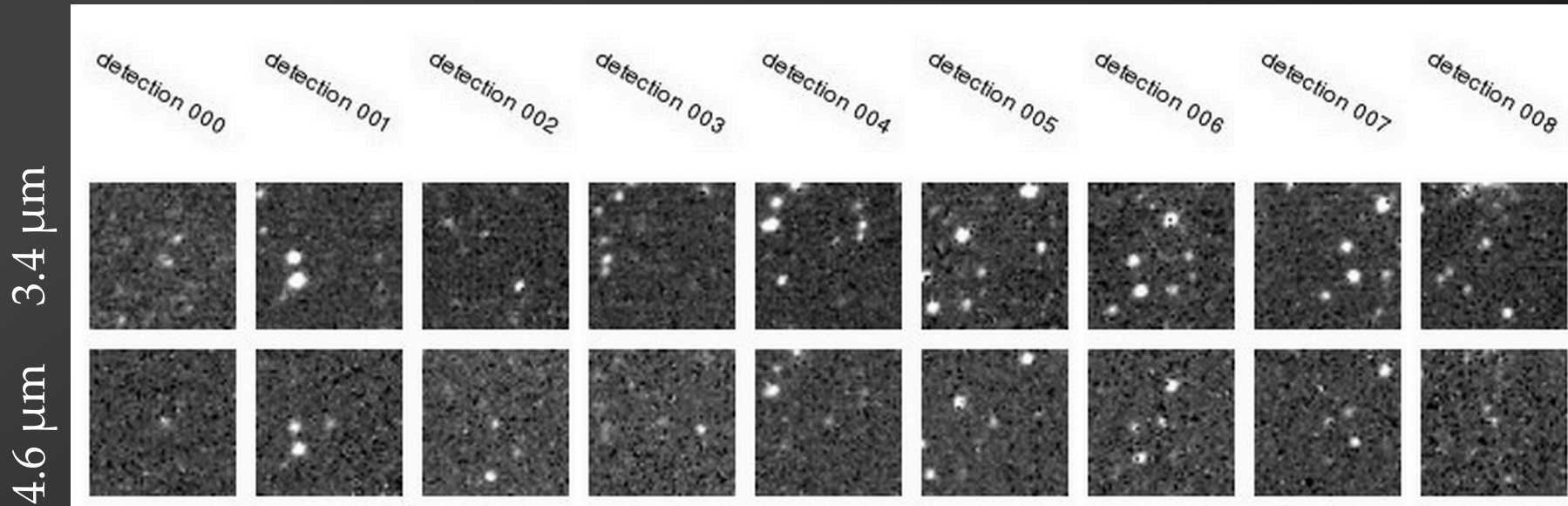


NEO SEDs



2014 HQ124

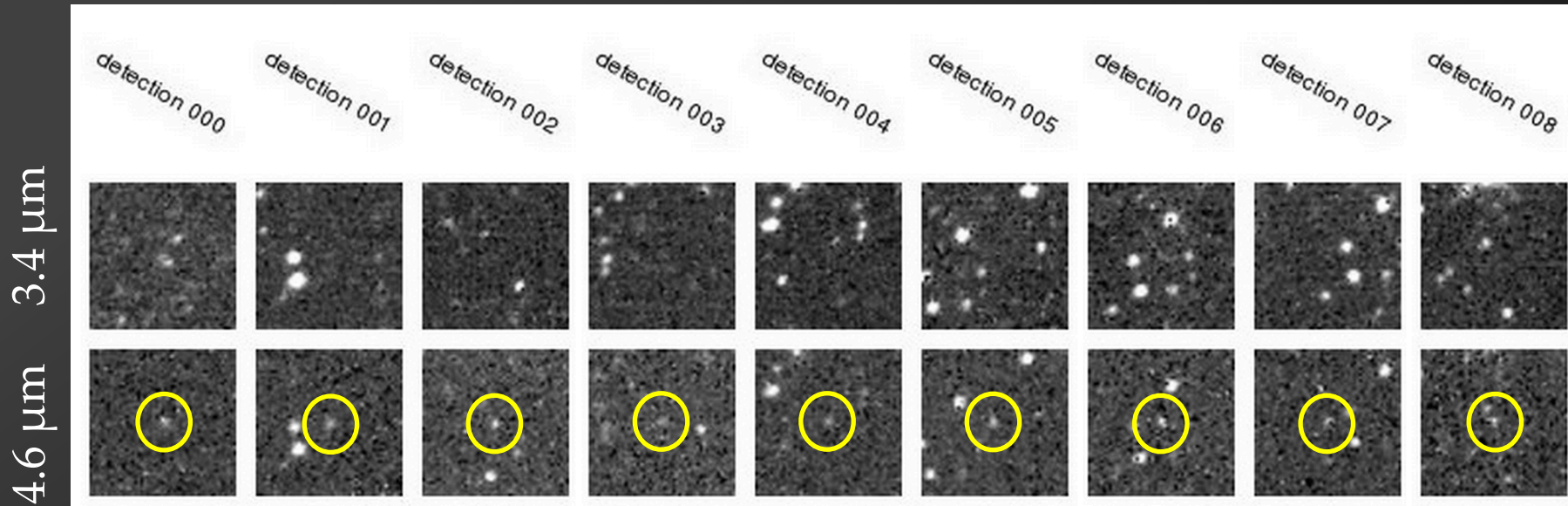
Increasing Time 



Discovered by NEOWISE 23 Apr 2014 at a Dec = -72!

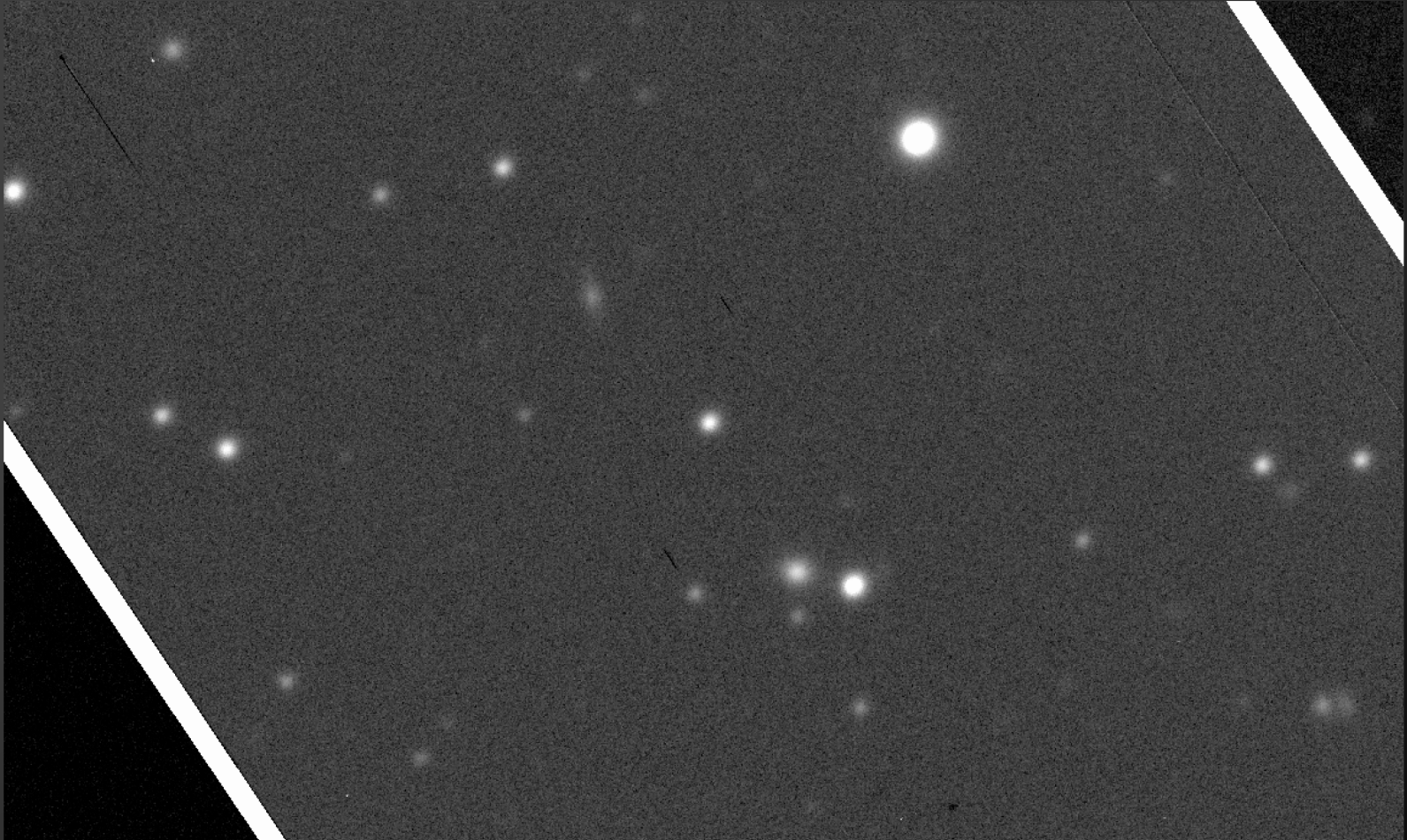
2014 HQ124

Increasing Time 



Discovered by NEOWISE 23 Apr 2014 at a Dec = -72!

2014 HQ124

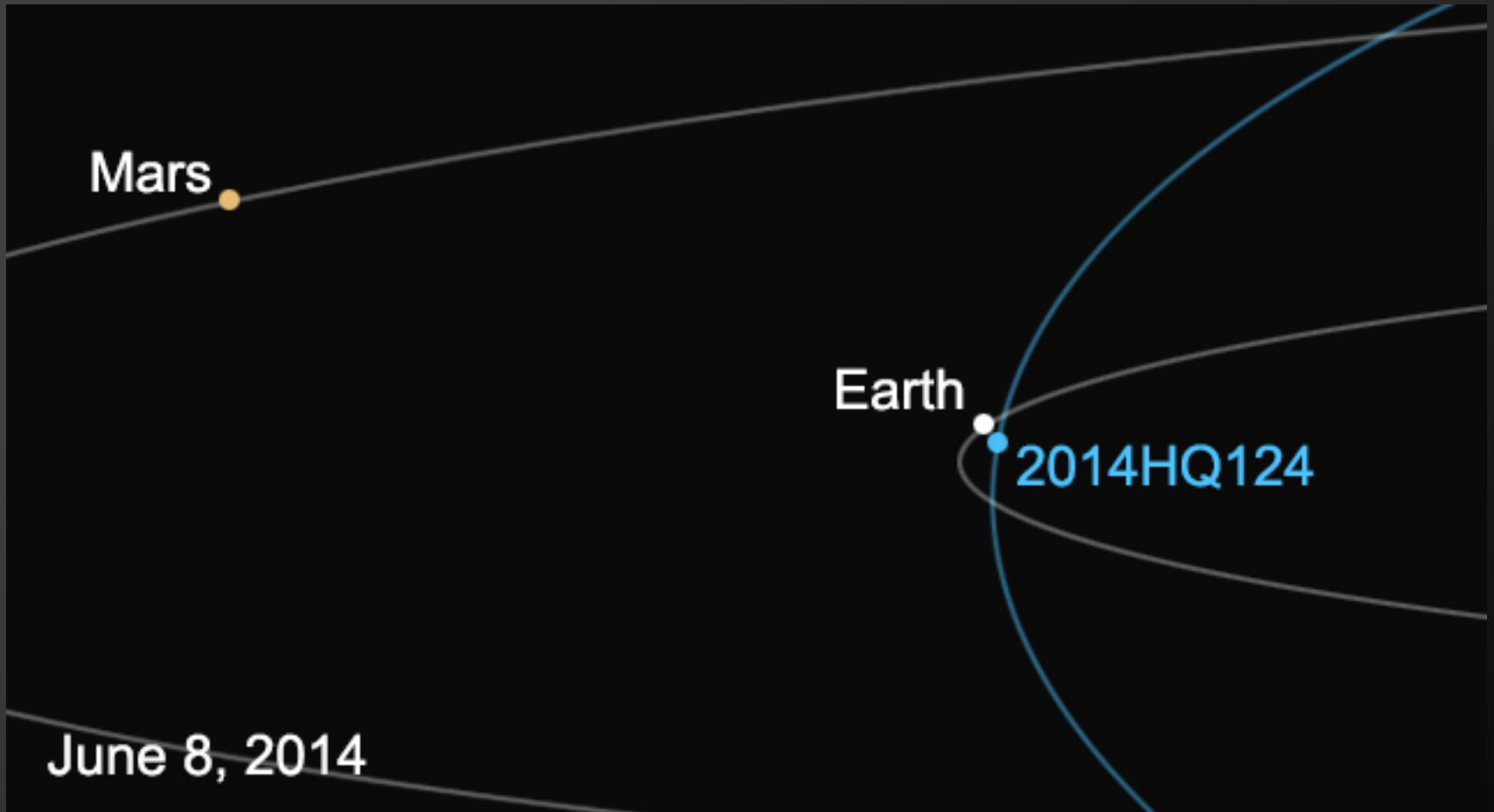


Gemini Followup 28 Apr 2014, in twilight, elevation 40°

Diameter=400 m, albedo =30%

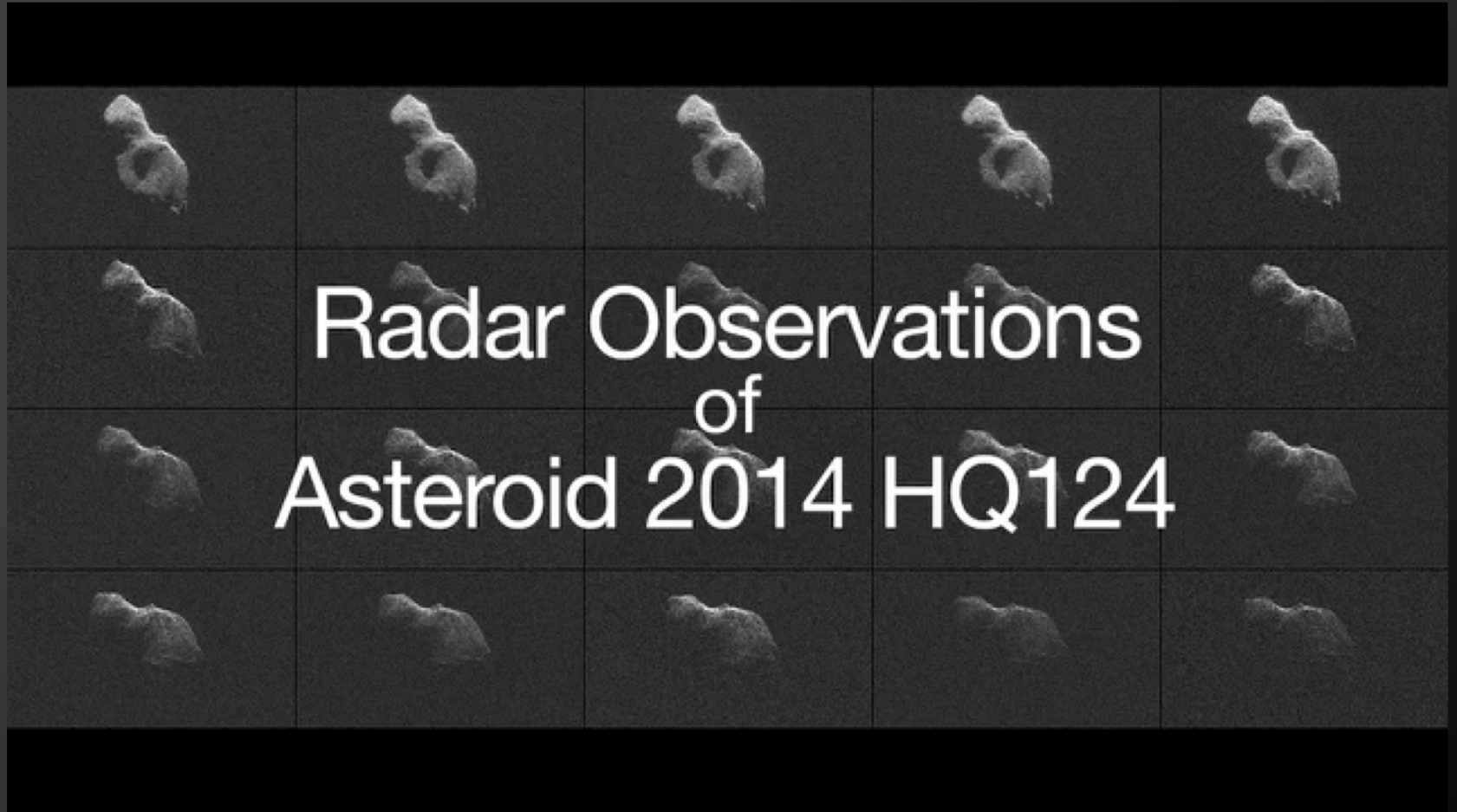
Published in MPEC 2014-H67

2014 HQ124



Combined with RAS Moorook observations, Gemini observations enabled designation by MPC on 28 Apr 2014 and identification of Earth flyby 8 Jun 2014 at 3.2 Lunar distances

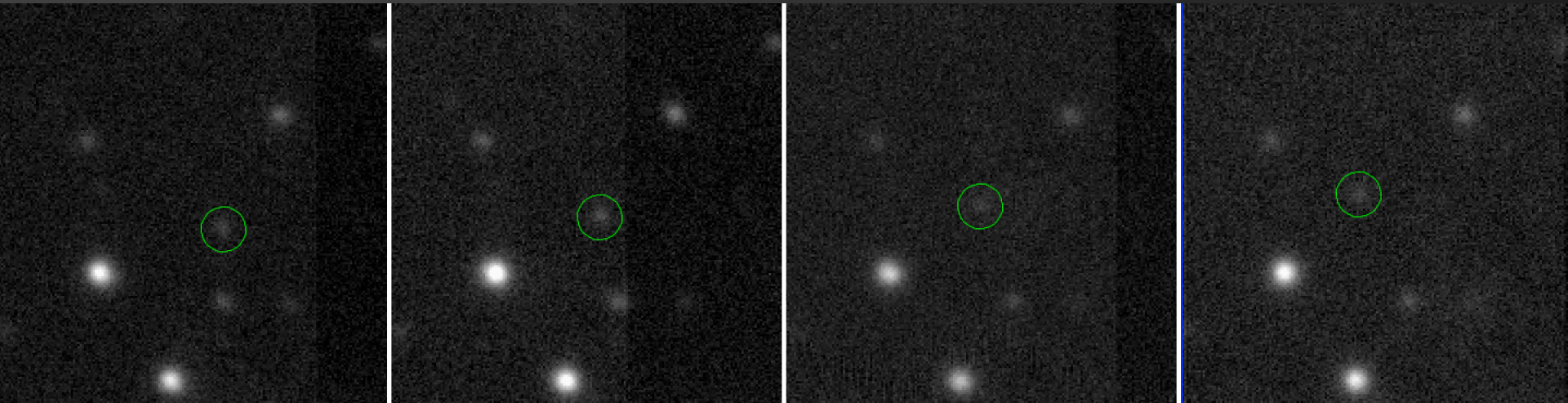
2014 HQ124



Further followup from Mount John Obs (NZ), et al., enabled accurate predictions for Arecibo and Goldstone Radar imaging

2015 KL157

Discovered by NEOWISE 21 May 2015 at a Dec = -47



- Gemini/GMOS-S the *ONLY* telescope capable of followup
- Observations on 24 May and 30 May
- Diameter: 1.3 km, Albedo: 2%
- Published in MPEC 2015-L10

Large NEOs found with Gemini's help

2014 BG60	D=0.7 km	4% albedo
2014 JH57	D=4.6 km	2% albedo
2014 SR339	D=1.0 km	7% albedo
2014 TJ64	D=0.5 km	2% albedo
2015 FT344	D=0.7 km	3% albedo
2015 KL157	D=1.3 km	2% albedo
2015 OA22	D=1.2 km	1% albedo
2016 GB241	D=1.2 km	2% albedo
2016 JU38	D=0.9 km	2% albedo
2016 OY2	D=0.5 km	7% albedo
2017 MD9	D=1.1 km	1% albedo
2018 LK2	D=0.5 km	8% albedo

Summary

- 85 triggers executed from 2014-2018 as part of the LLP program, pilot DDT proposal, and follow-on NOAO proposal (50 successfully observed), resulting astrometry reports for 46 NEOWISE-discovered objects to the MPC (and one MBA in the field, too)
- ToO Gemini followup observations provided critical orbital information for NEOWISE-discovered NEOs that would otherwise be lost
- Particularly important for low albedo objects at low Solar elongations, that were not bright enough for other followup telescopes
- Special thanks to Gemini for enabling Large and Long Programs to be conducted