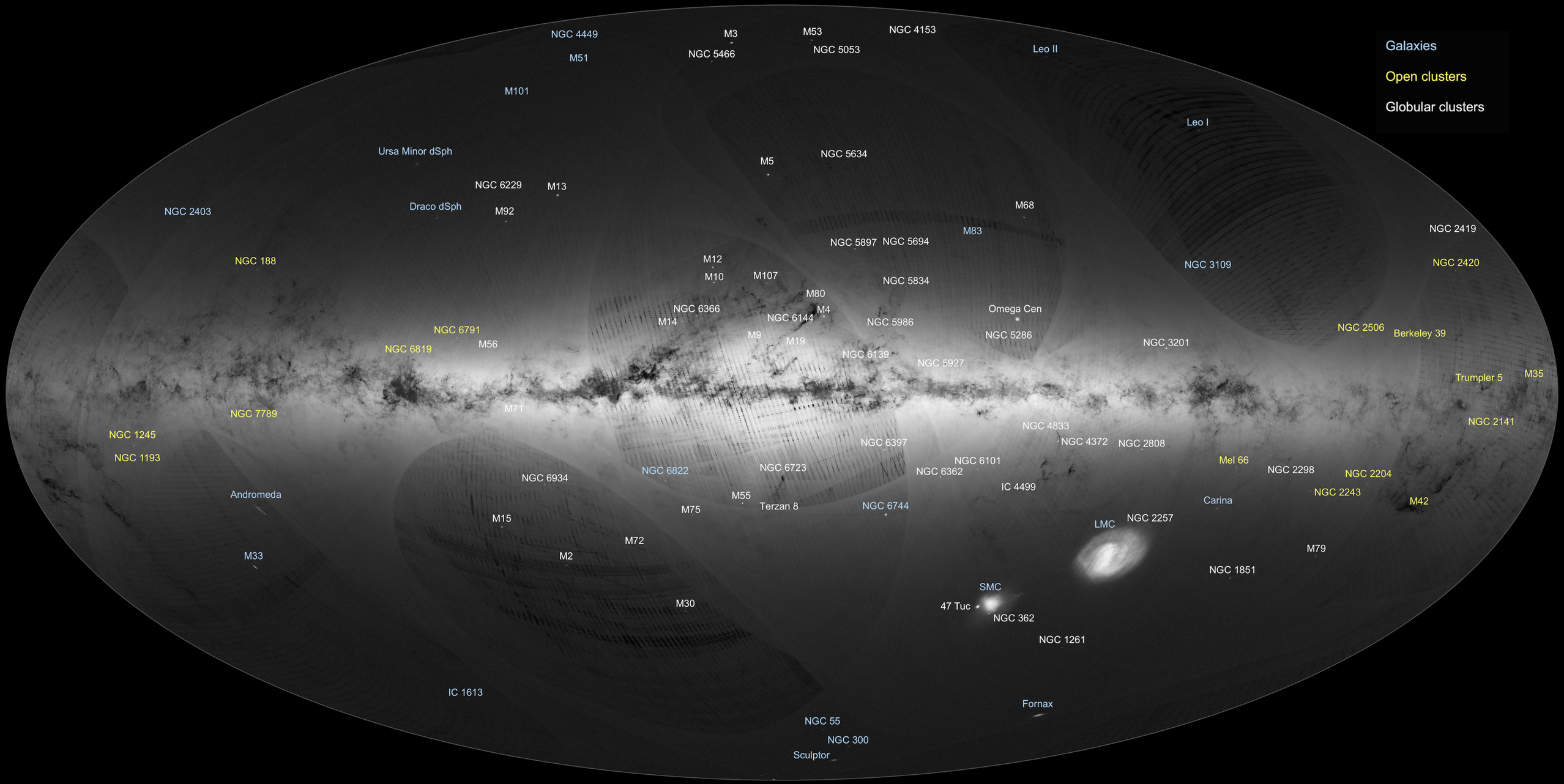
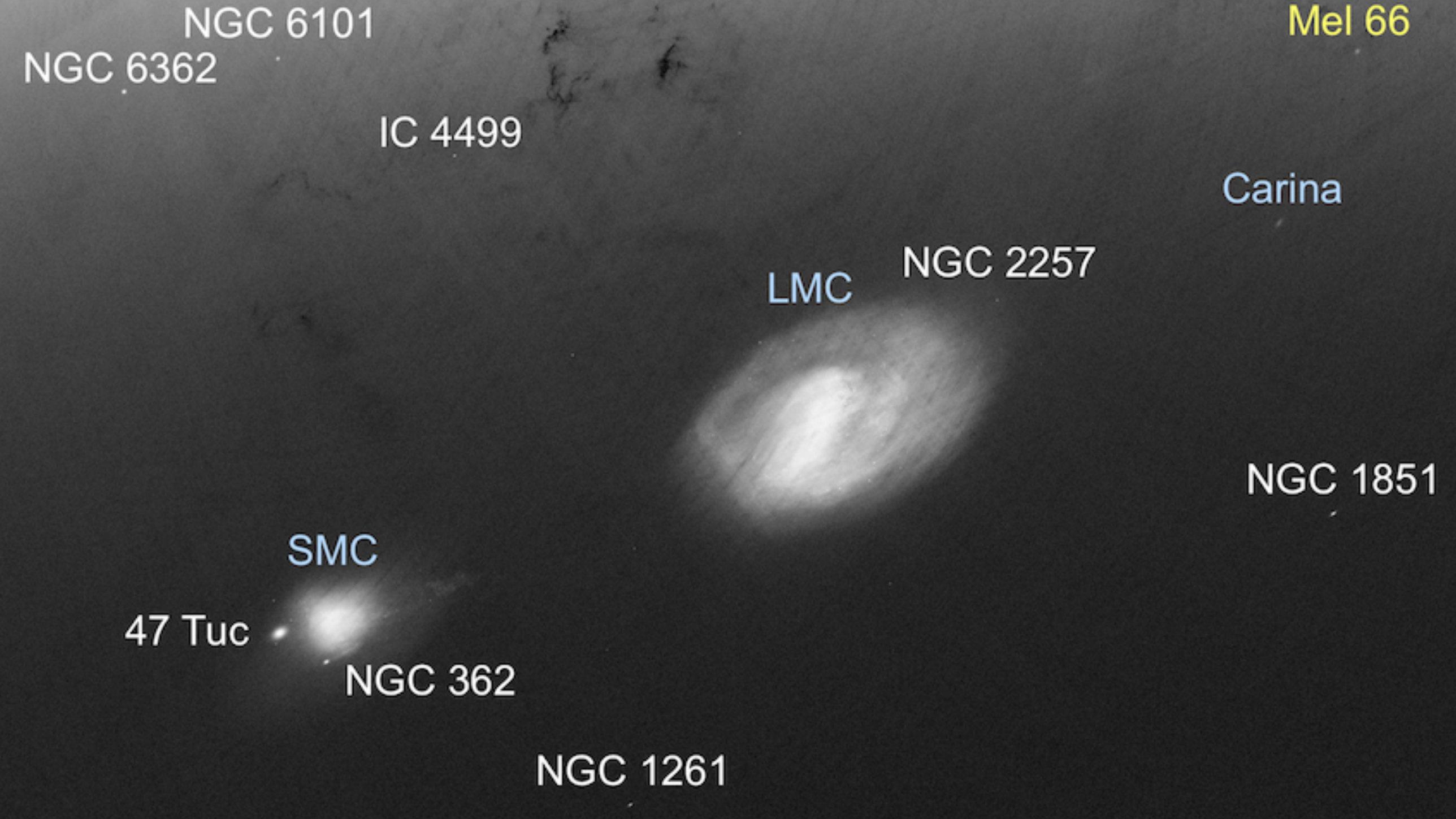
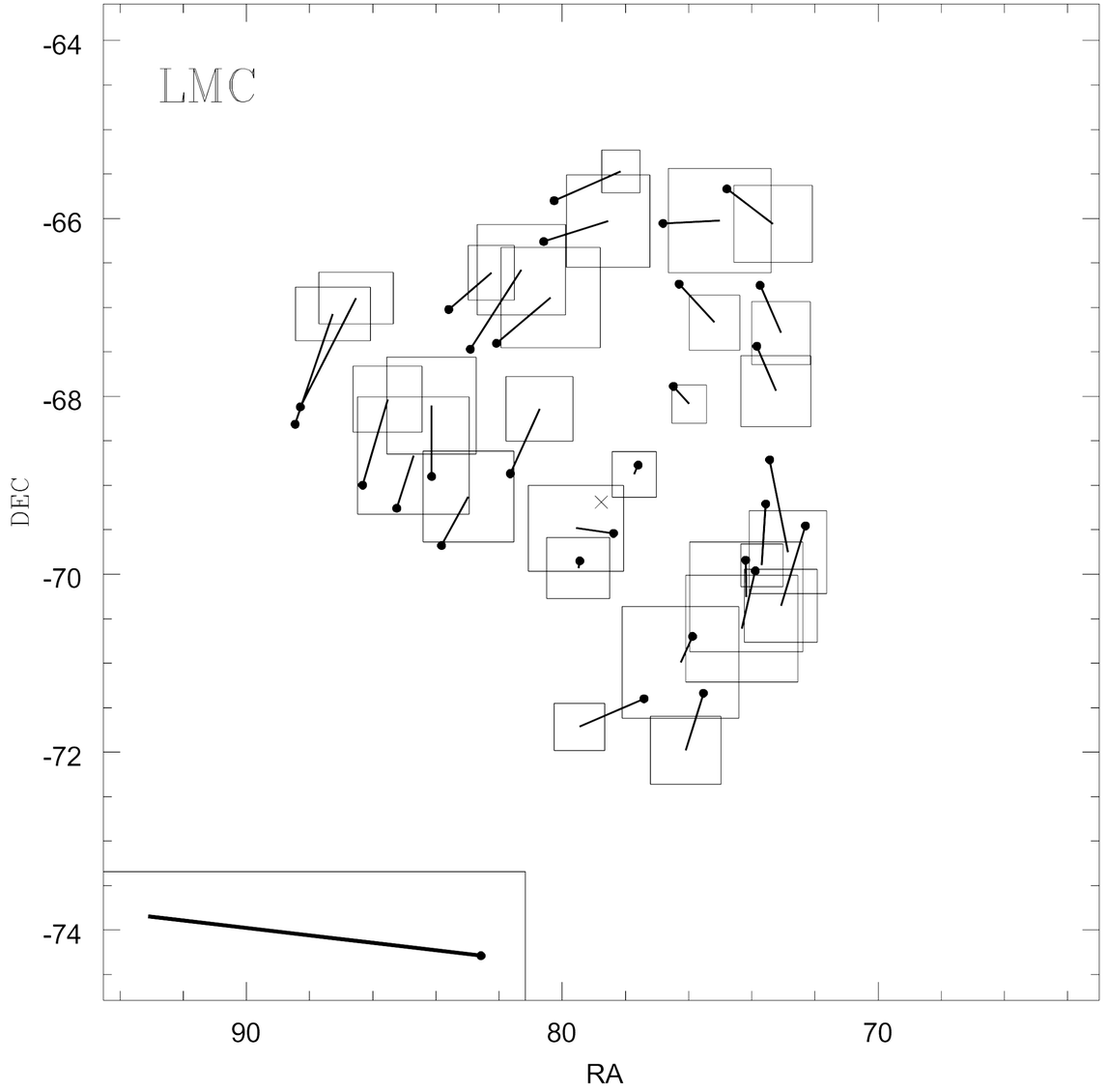
Gaia

Timo Prusti


Galaxies
Open clusters
Globular clusters
NGC 4449
M3
M53
NGC 4153
M51
NGC 5466
NGC 5053
Leo II
M101
Leo I
Ursa Minor dSph
NGC 5634
M5
NGC 6229
M13
Draco dSph
M92
NGC 2403
M68
M83
NGC 2419
NGC 5897
NGC 5694
NGC 188
M12
NGC 3109
NGC 2420
M10
M107
NGC 5834
M80
NGC 6366
M4
Omega Cen
M14
NGC 6144
NGC 5986
NGC 6791
NGC 2506
Berkeley 39
M9
M19
NGC 5286
M56
NGC 3201
NGC 6819
NGC 6139
NGC 5927
Trumpler 5
M35
NGC 7789
M71
NGC 2141
NGC 4833
NGC 1245
NGC 6397
NGC 4372
NGC 2808
NGC 1193
NGC 6101
Mel 66
NGC 6822
NGC 6723
NGC 6362
NGC 2298
NGC 6934
NGC 2204
IC 4499
Andromeda
M55
NGC 2243
Carina
M42
M75
Terzan 8
NGC 6744
M15
LMC
NGC 2257
M72
M79
M33
M2
NGC 1851
SMC
M30
47 Tuc
NGC 362
NGC 1261
IC 1613
Fornax
NGC 55
NGC 300
Sculptor

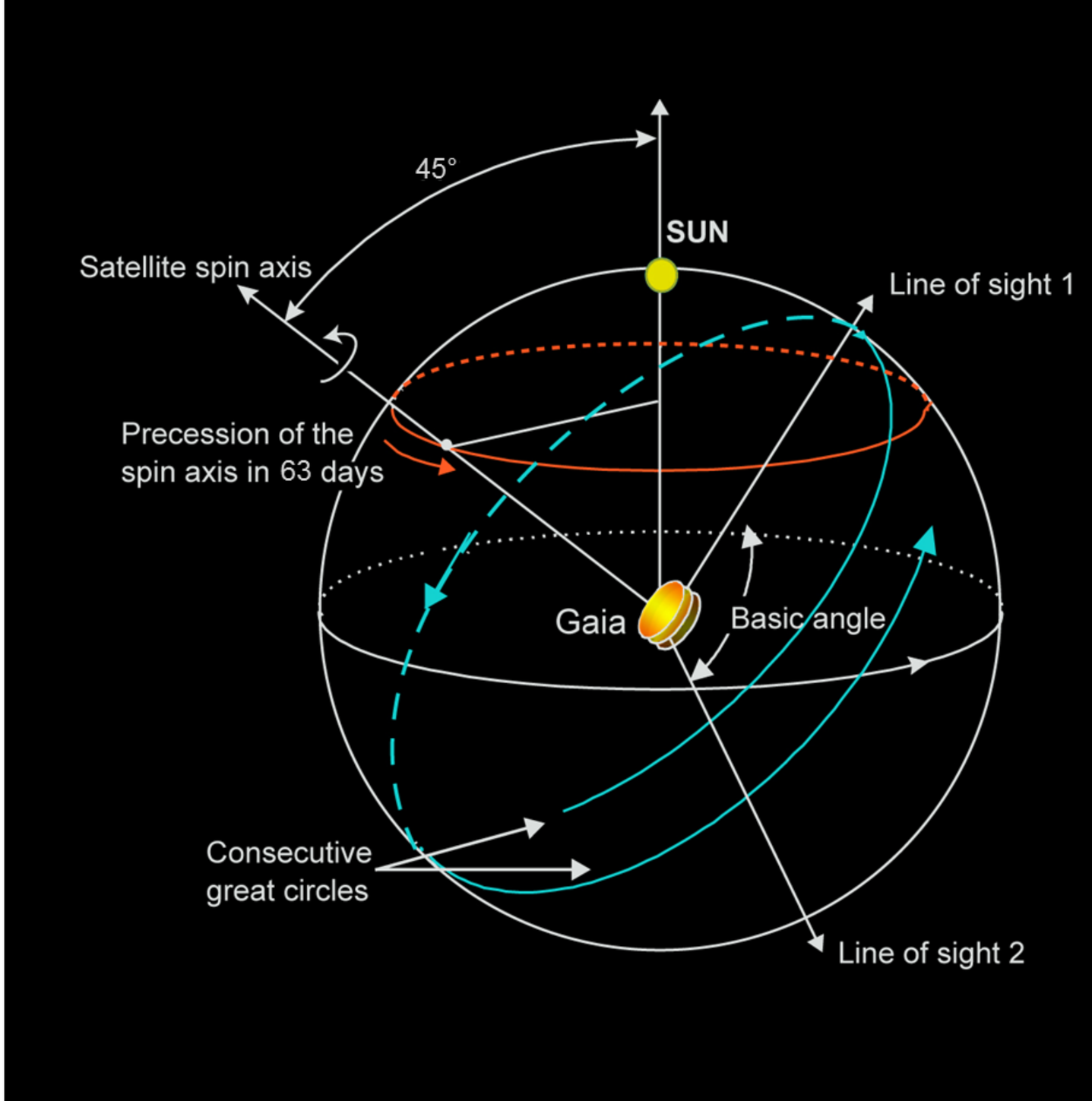

NGC 6101
Mel 66
NGC 6362
IC 4499
Carina
NGC 2257
LMC
NGC 1851
SMC
47 Tuc
NGC 362
NGC 1261



van der Marel &
Sahlmann, 2016

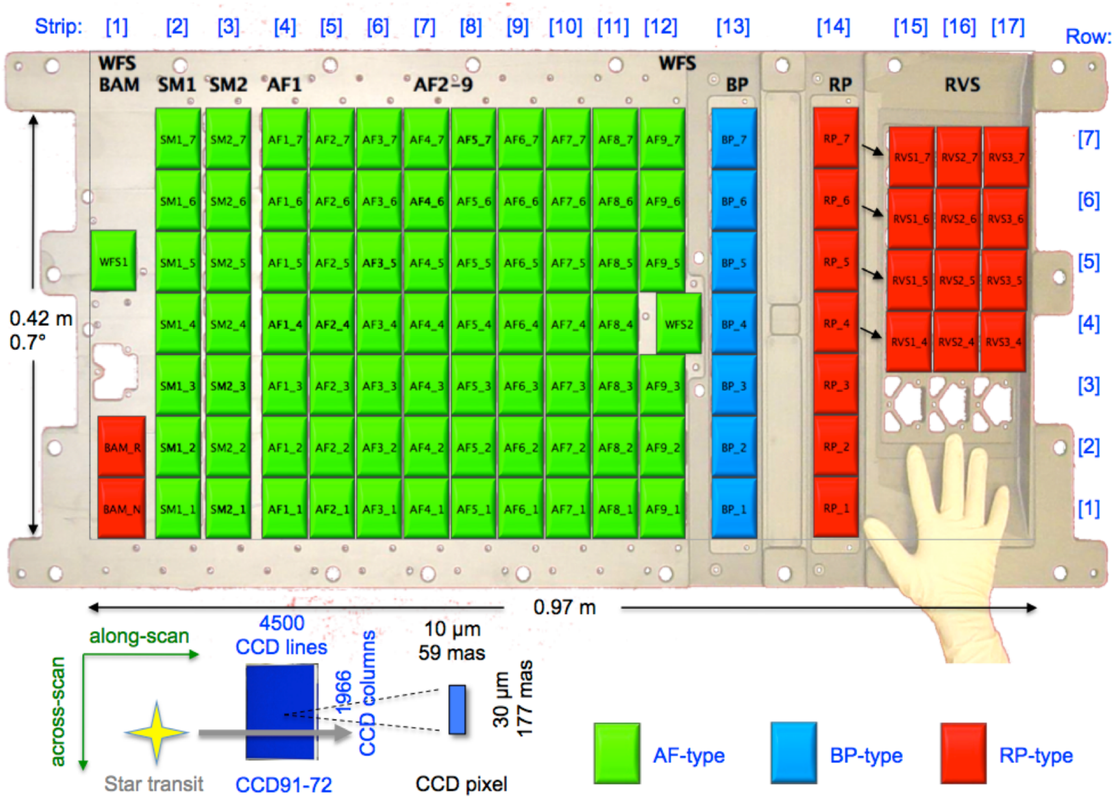
Gaia operations

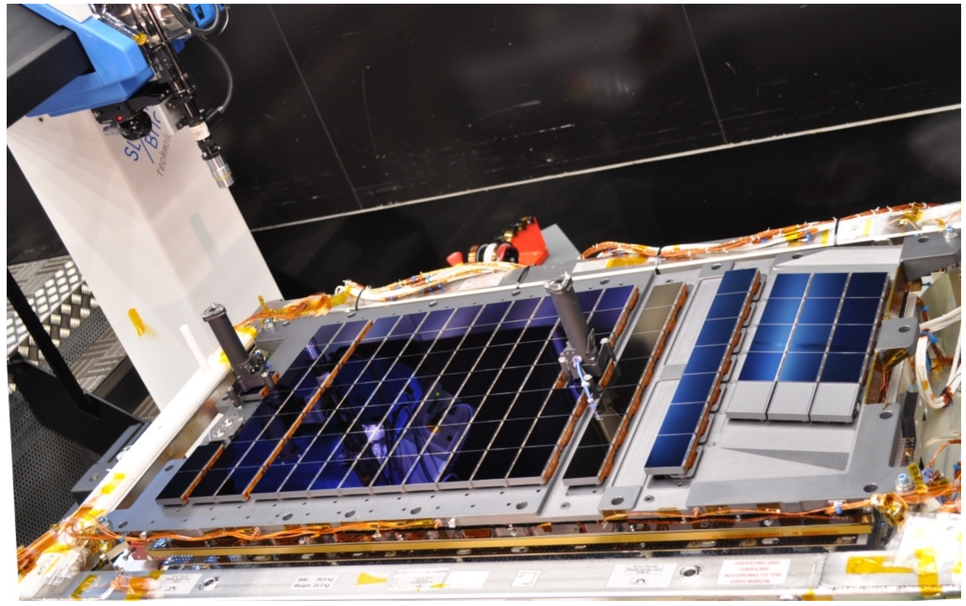
- Gaia in routine operations since July 2014
- Scanning operations with observing strategy of continuous measuring
  - Dead-time: orbit maintenance, micrometeoroids, decontaminations, ground station weather
- Nominal 5-year mission ends mid-2019
- Estimated end of mission due to cold gas exhaustion end-2023 (±1year)
  - Process started to seek funding for mission extension (mid-2019 till the end)



Gaia astrometry

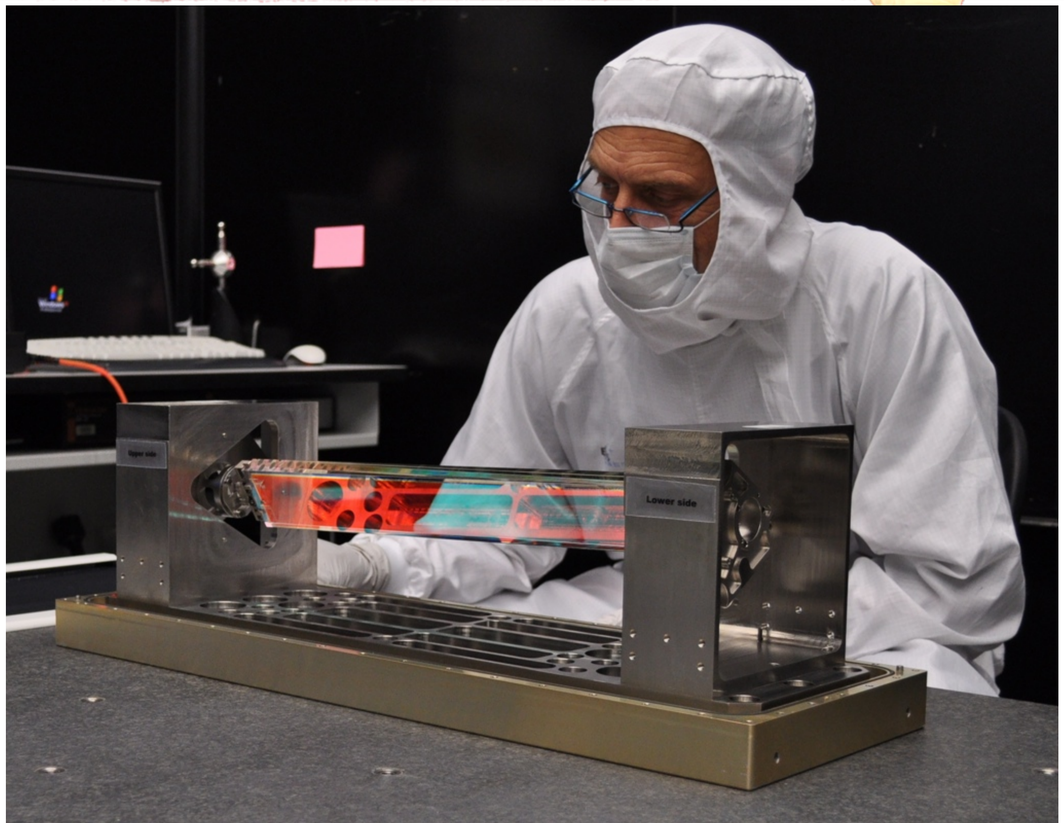
- Astrometric measurements: 556 billion
  - G<20.7 mag
- In crowded regions on-board resource allocation exhausted
  - Selected crowded regions imaged with Gaia Sky Mapper
- Bright limit around G=2-3 mag
  - All bright stars imaged (G<3 mag) (Gaia SM)
  - Looking into more complete data collection for these stars





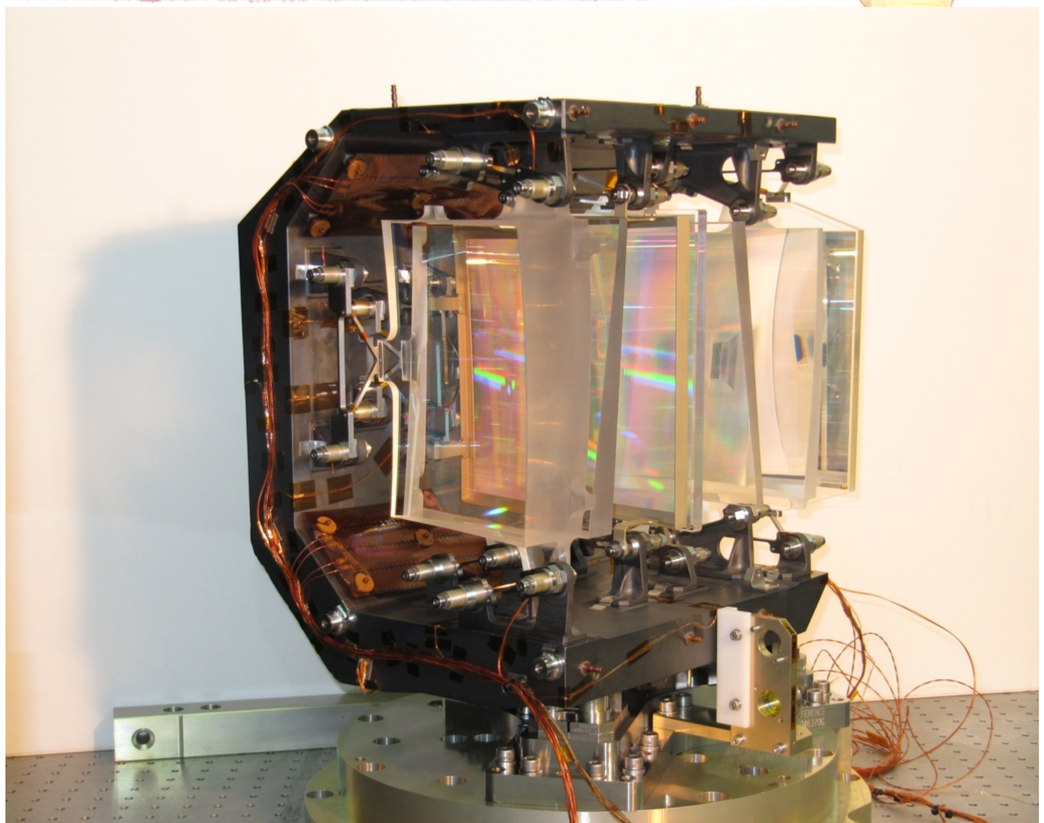
Gaia photometry

- Photometric measurements: 120 billion
  - G<20.7 mag
  - Spectrophotometry
    - 330-680 nm BP
    - 640-1050 nm RP
- Astrometric measurements also photometric in G-band
- In crowded regions on-board resource allocation exhausted
- Bright limit around G=2-3 mag
  - Looking into more complete data collection for these stars



Gaia spectroscopy

- Spectroscopic measurements: 11 billion
  - G_{RVS}<16.2 mag
  - 845-872 nm with R about 11,000
  - Radial Velocity Spectrometer for >100 million radial velocities
  - Spectroscopy till about G_{RVS}=12 mag
- In crowded regions on-board resource allocation exhausted to some extent, but crowdedness sets in earlier
- Bright limit around G=2-3 mag
  - More complete data collection for these stars may take place

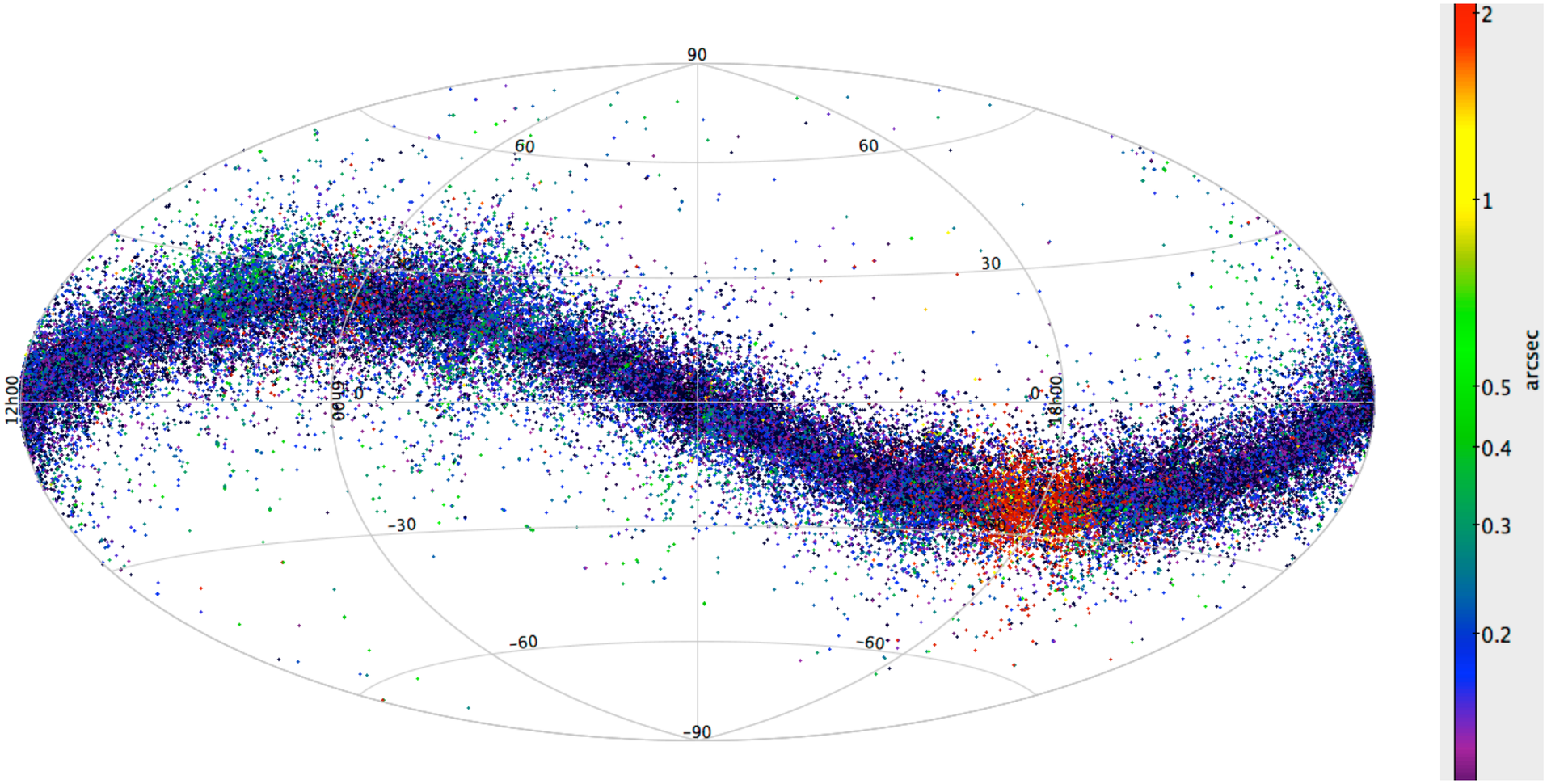


Scientific performance

End of mission scientific performance estimates for an unreddened Solar type (G2V) star

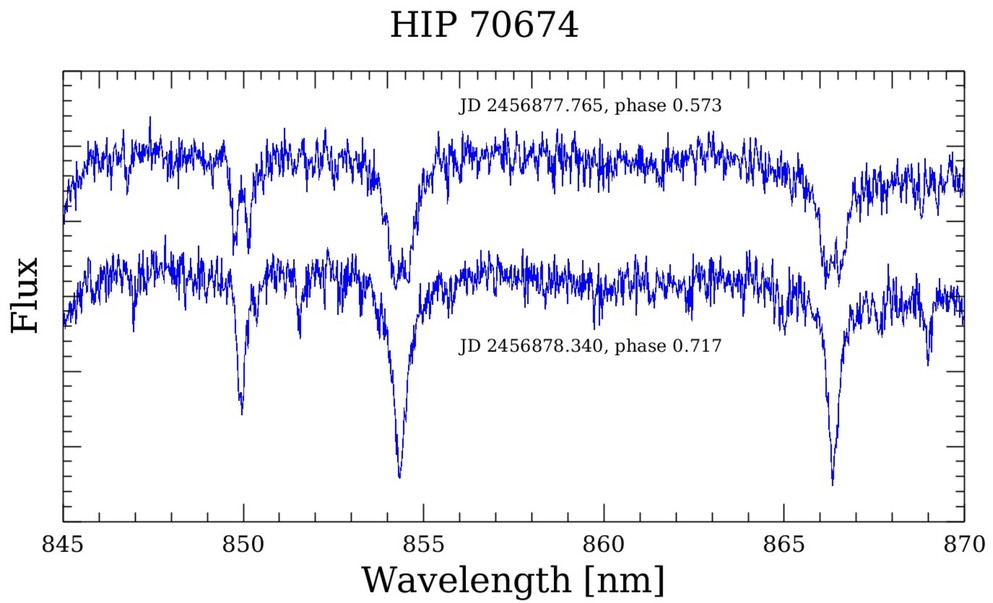
V-magnitude	Astrometry (parallax)	Photometry (BP/RP integrated)	Spectroscopy (radial velocity)
6 to 12	5-14 μas	4 mmag	1 km/s
15	25 μas	4 mmag	13 km/s
20	540 μas	60 (RP) – 80 (BP) mmag	

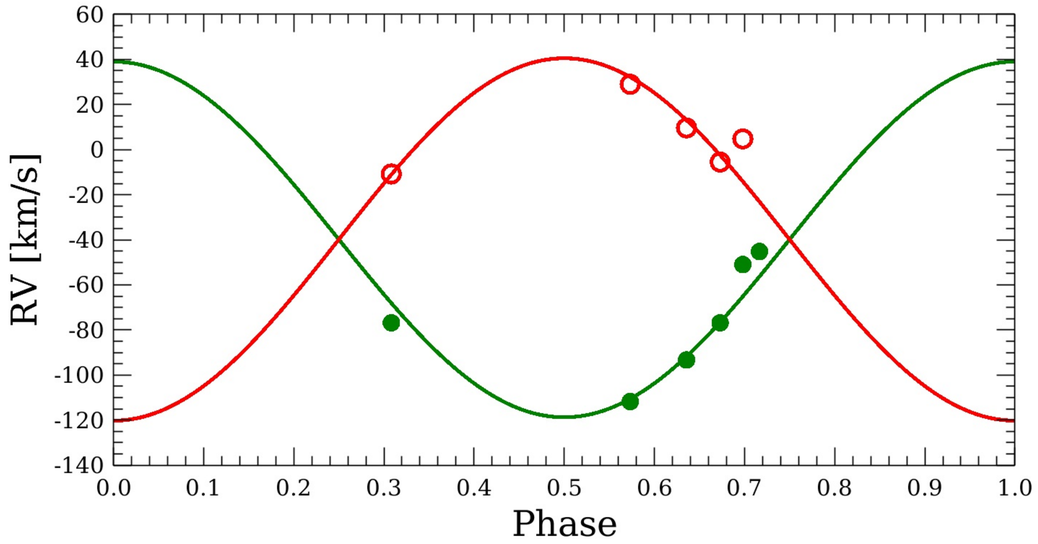
Asteroid detection



Credits: ESA/Gaia/DPAC/ CU4, L. Galluccio, F. Mignard, P. Tanga (Observatoire de la Côte d'Azur)

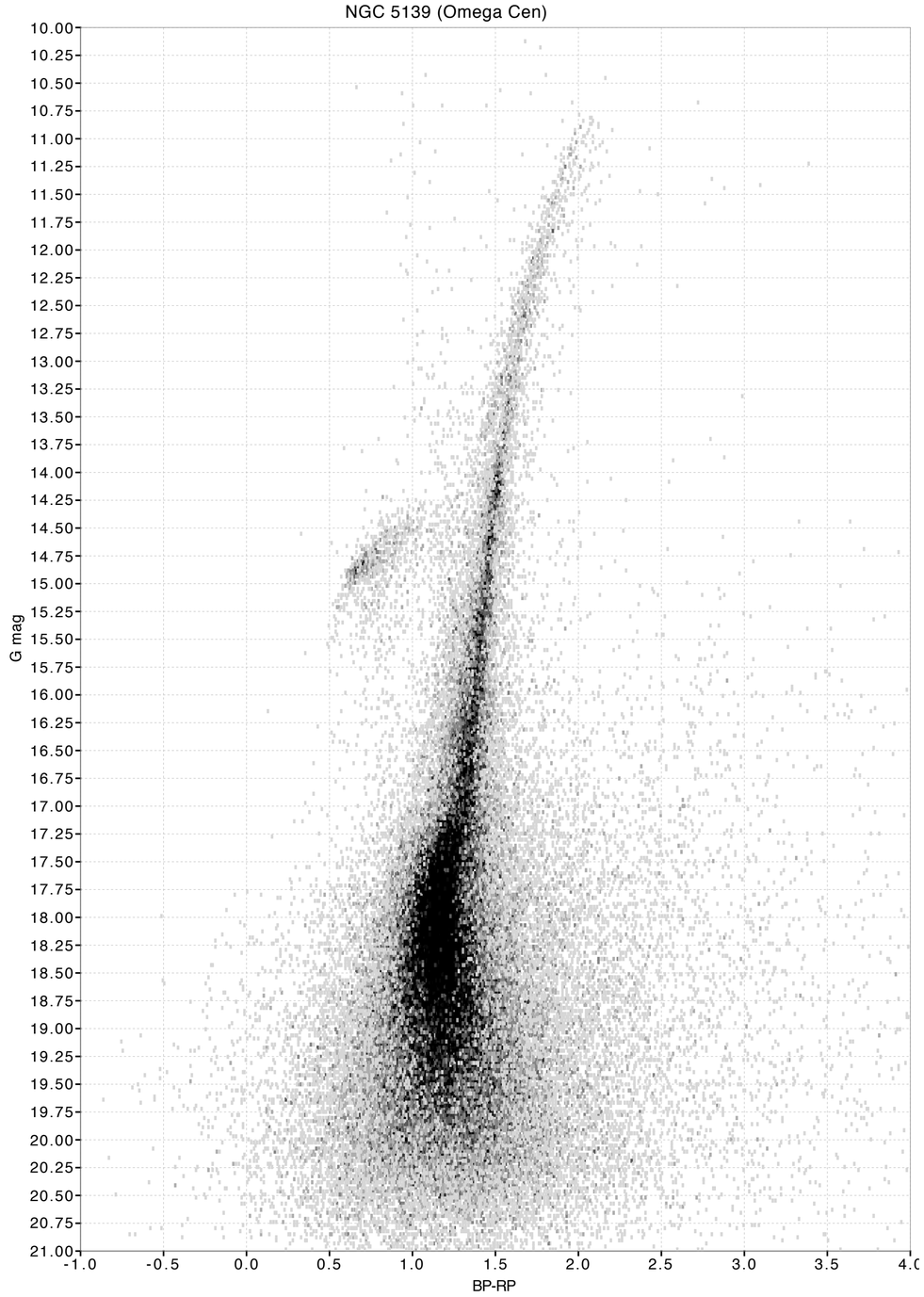
Double lined spectroscopic binaries





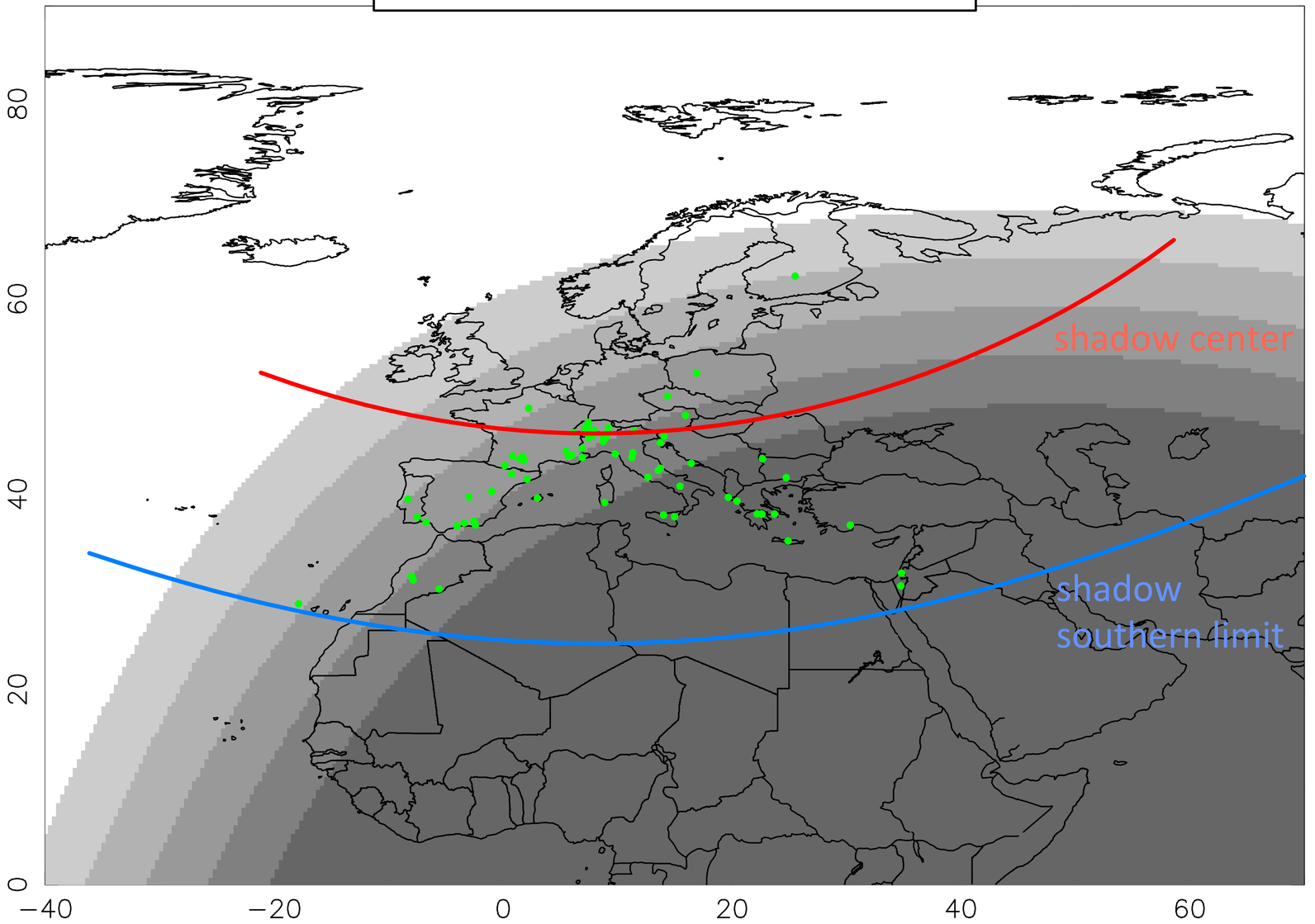
credits: ESA/Gaia/DPAC/CU6/Yassine Damerdji (Observatoire d'Alger/ Institut d'Astrophysique et de Géophysique de Liège) & Pasquale Panuzzo (CNRS/Observatoire de Paris)

Preliminary photometry



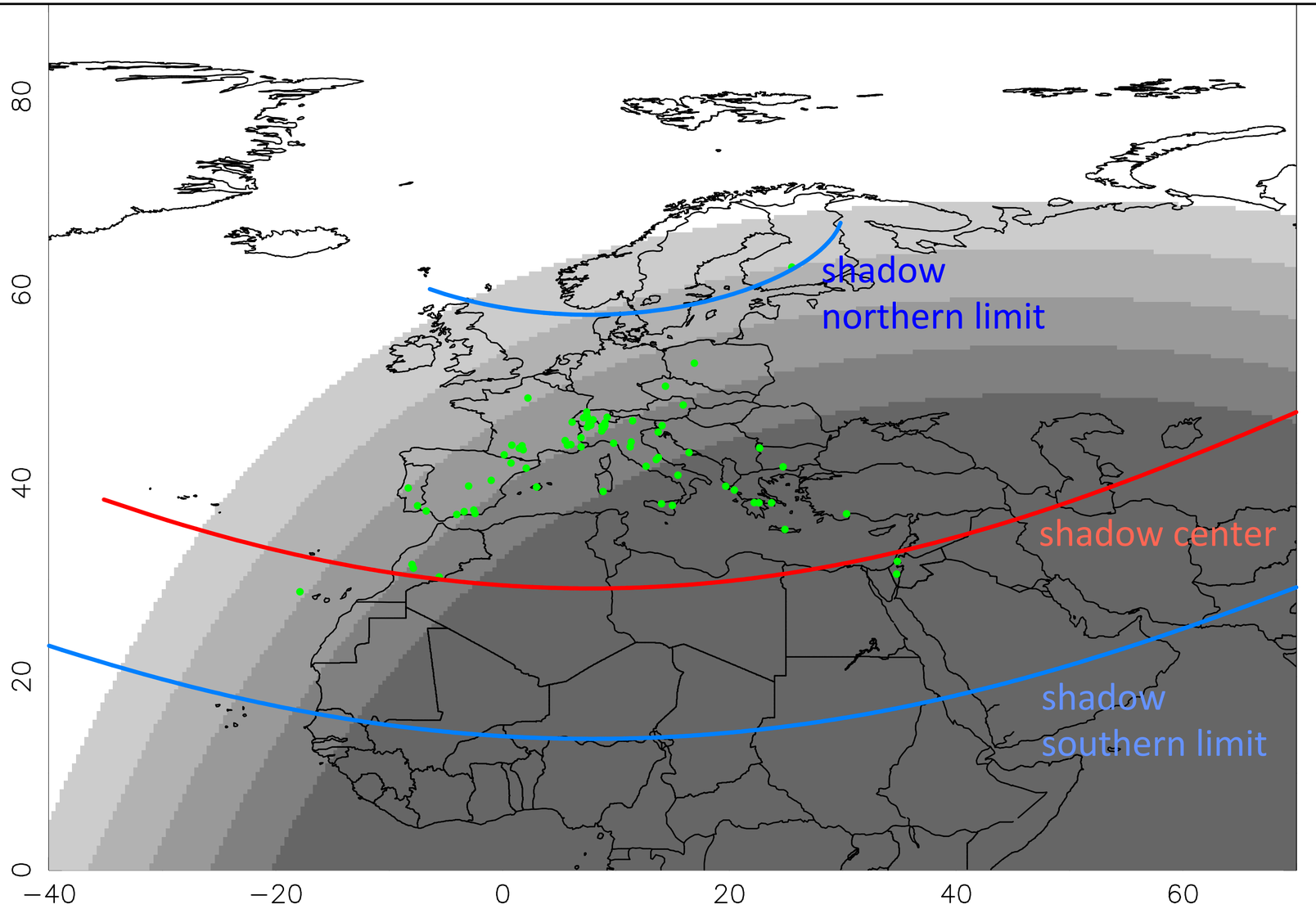
ESA/Gaia/DPAC/CU5/F. De Angeli,
D.W. Evans, M. Riello (University of Cambridge)

The July 19, 2016 Pluto occultation
our prediction as of early July



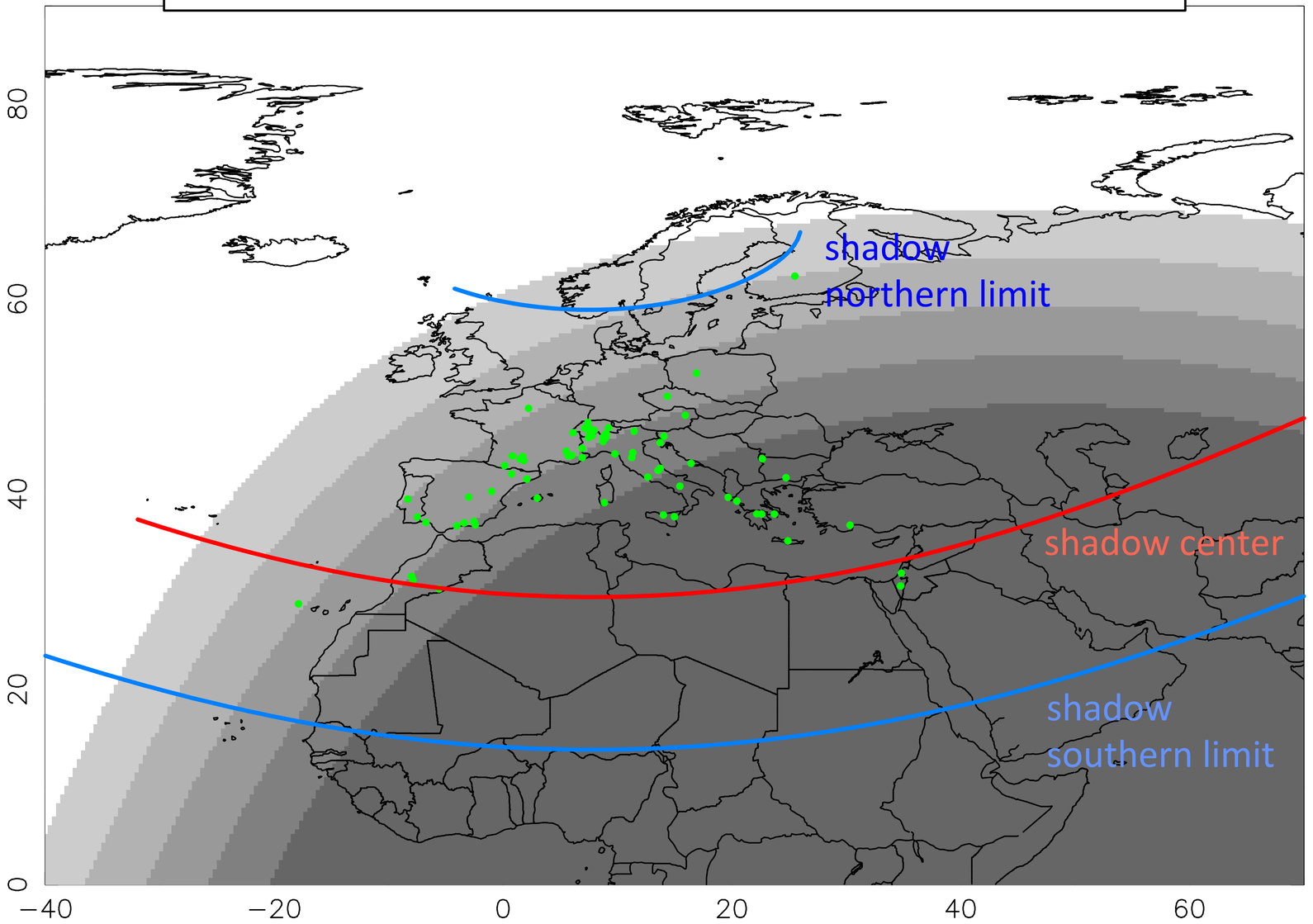
green dots: sites involved in the campaign (not all got data!)

The July 19, 2016 Pluto occultation, prediction using
the GAIA star position (and estimation of its pm), plus the New Horizons-updated ephemeris



green dots: sites involved in the campaign (not all got data!)

The July 19, 2016 Pluto occultation
post-occultation reconstructed path (what really happened)



green dots: sites involved in the campaign (not all got data!)

Conclusions

- Gaia is on the way to fulfil its promise
- Processing task is huge and DPAC work in the coming years is essential