

AI SUMMIT

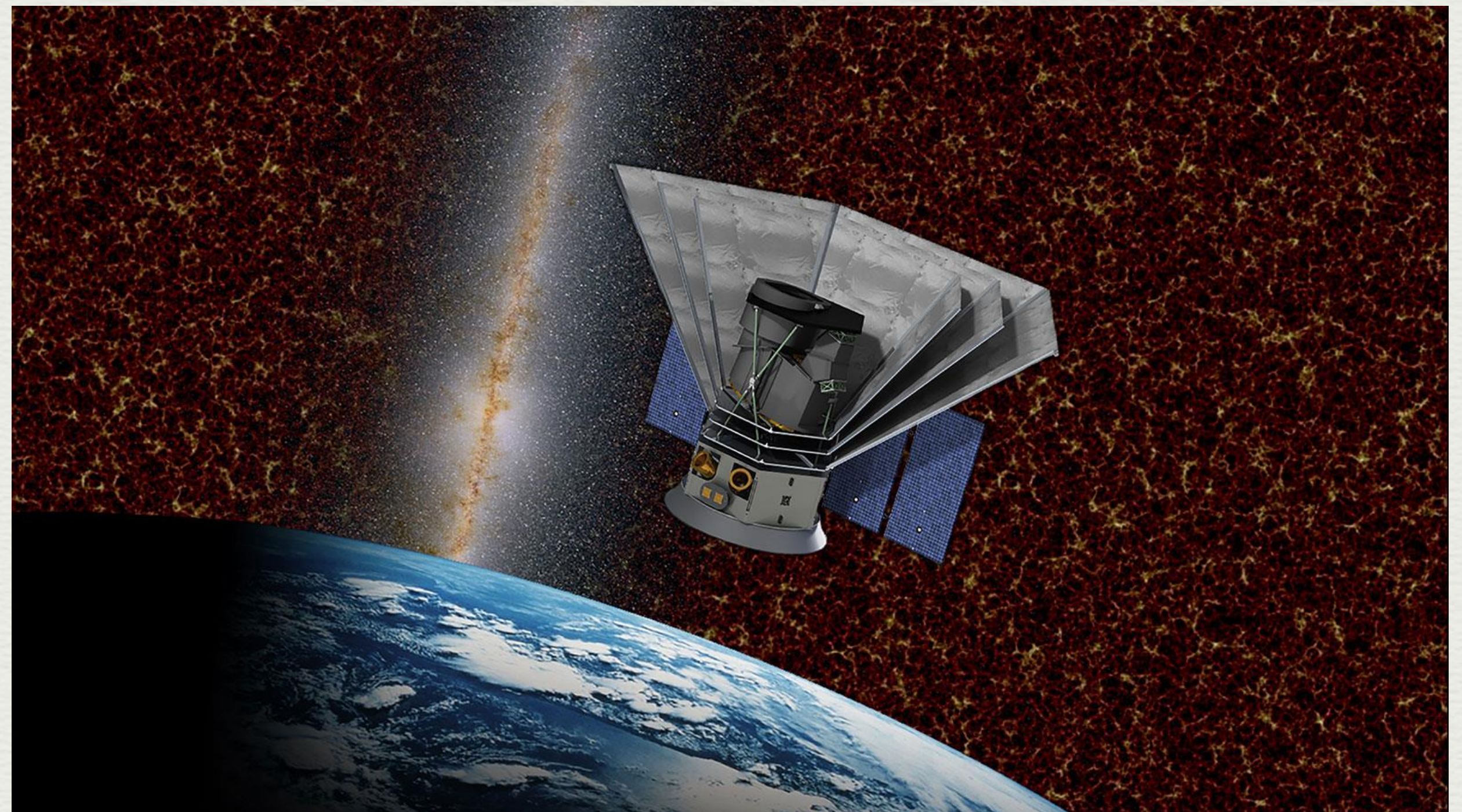
**Hogyan segíthet az AI a
kozmosz megfejtésében?**

Kiss László
főigazgató
HUN-REN Csillagászati és
Földtudományi Kutatóközpont



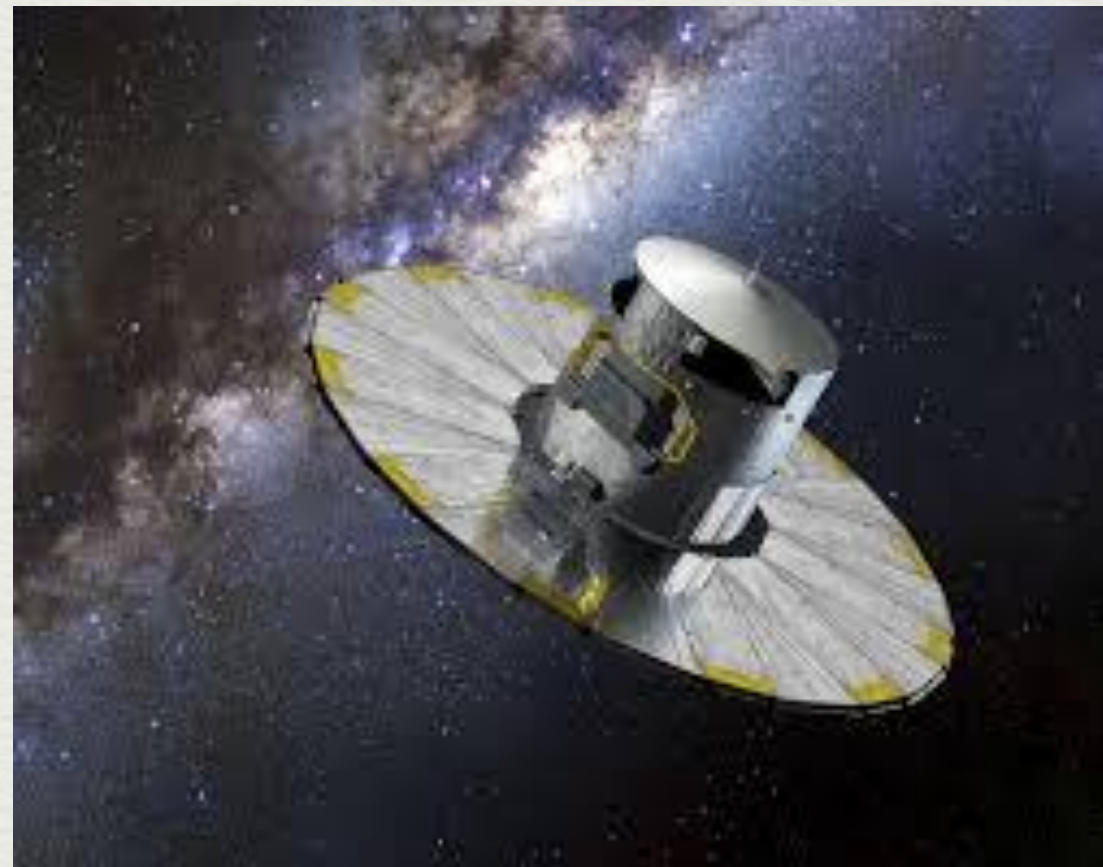
A csillagászat “nagy kérdései”

- Hogyan és mikor keletkezett az Univerzum? Miből jött létre?
- Hogyan jöttek létre a kozmikus struktúrák (bolygók, csillagok, galaxisok)?
- Mennyire különleges a Föld? Egyedül vagyunk a Világegyetemben?

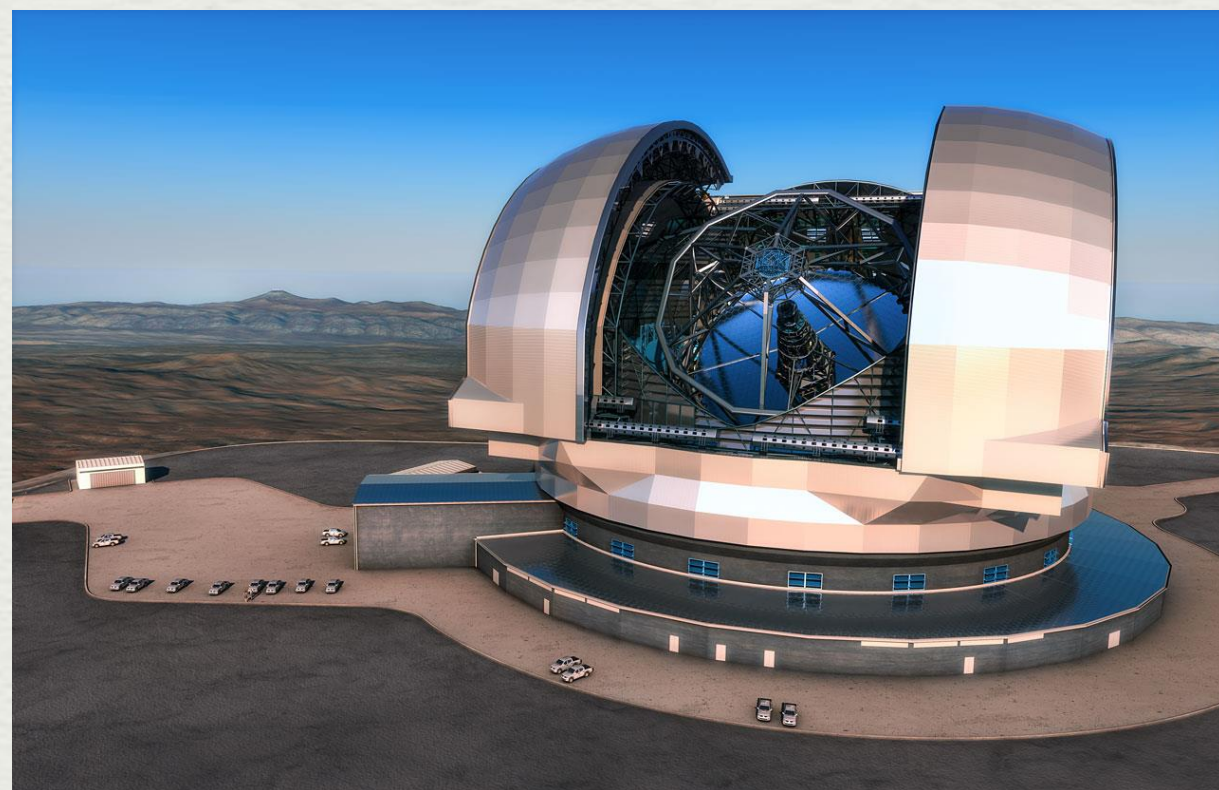
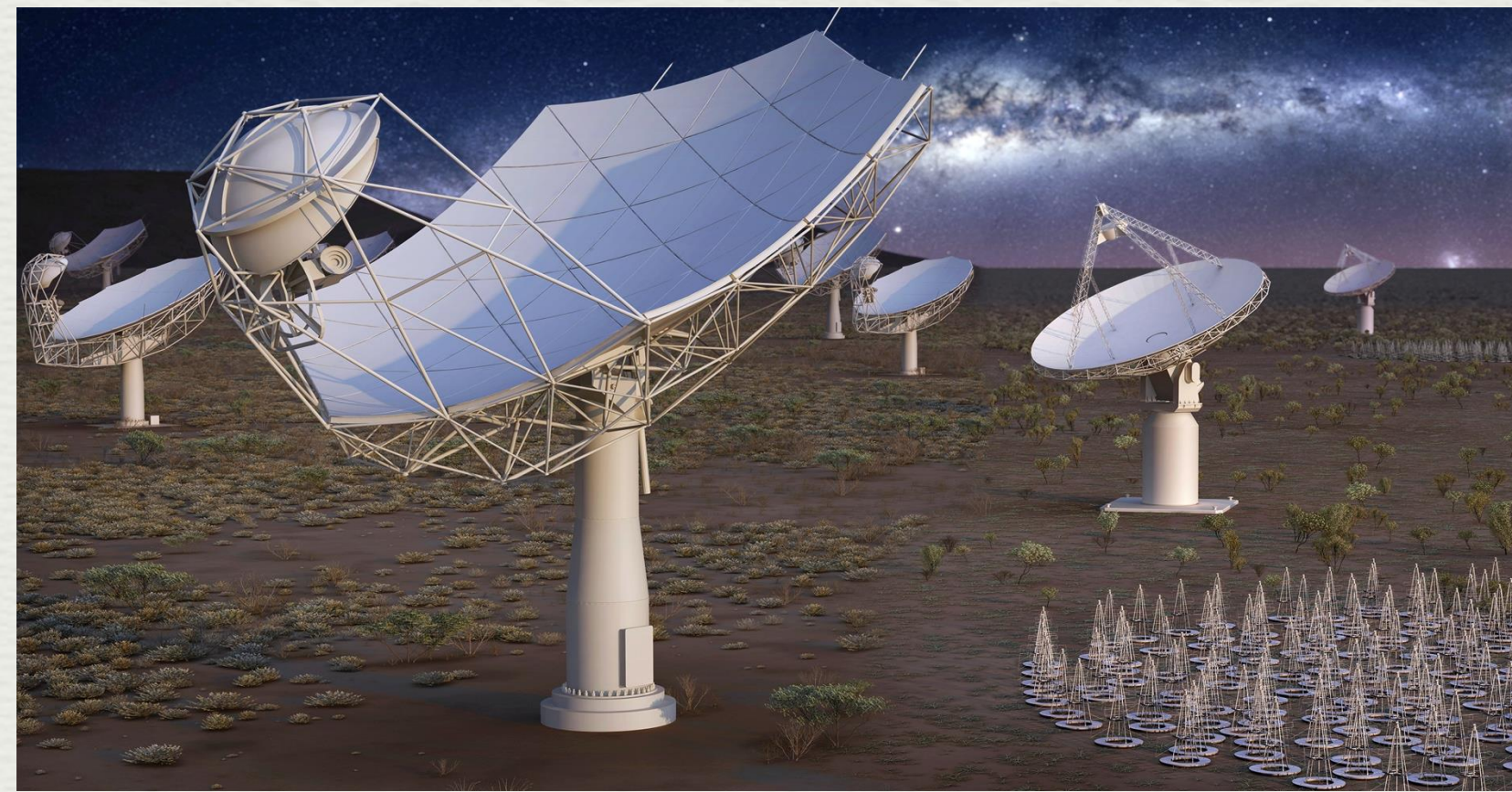


„Forradalmak” a csillagászatban

Gaia



SKA



ELT



LIGO



LSST

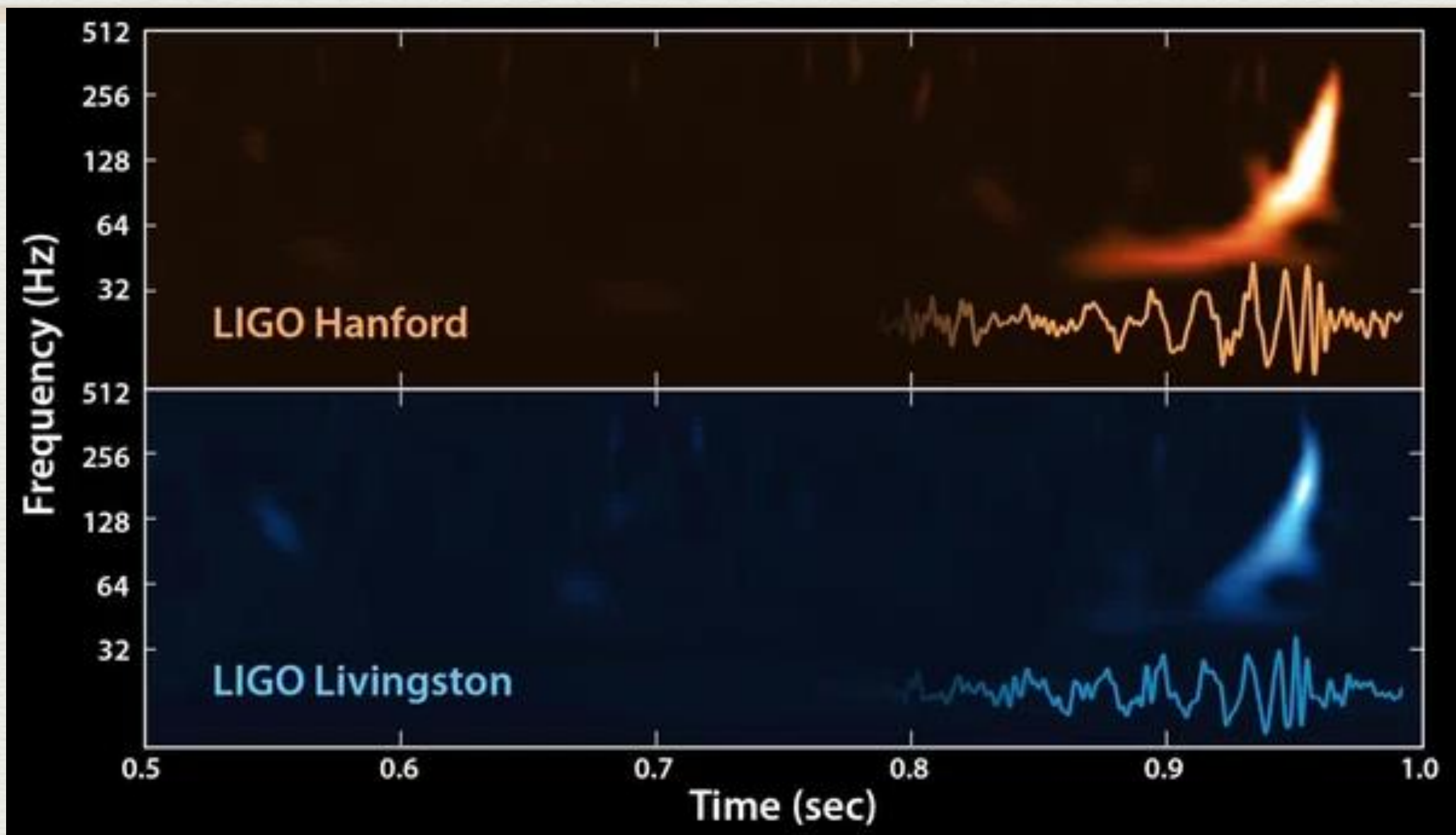
SQUARE KILOMETRE ARRAY

36 Tb/s, 2030-ra 5 Zettabyte*



*1 Zettabyte =
1 milliárd Tb

<https://www.skao.int>

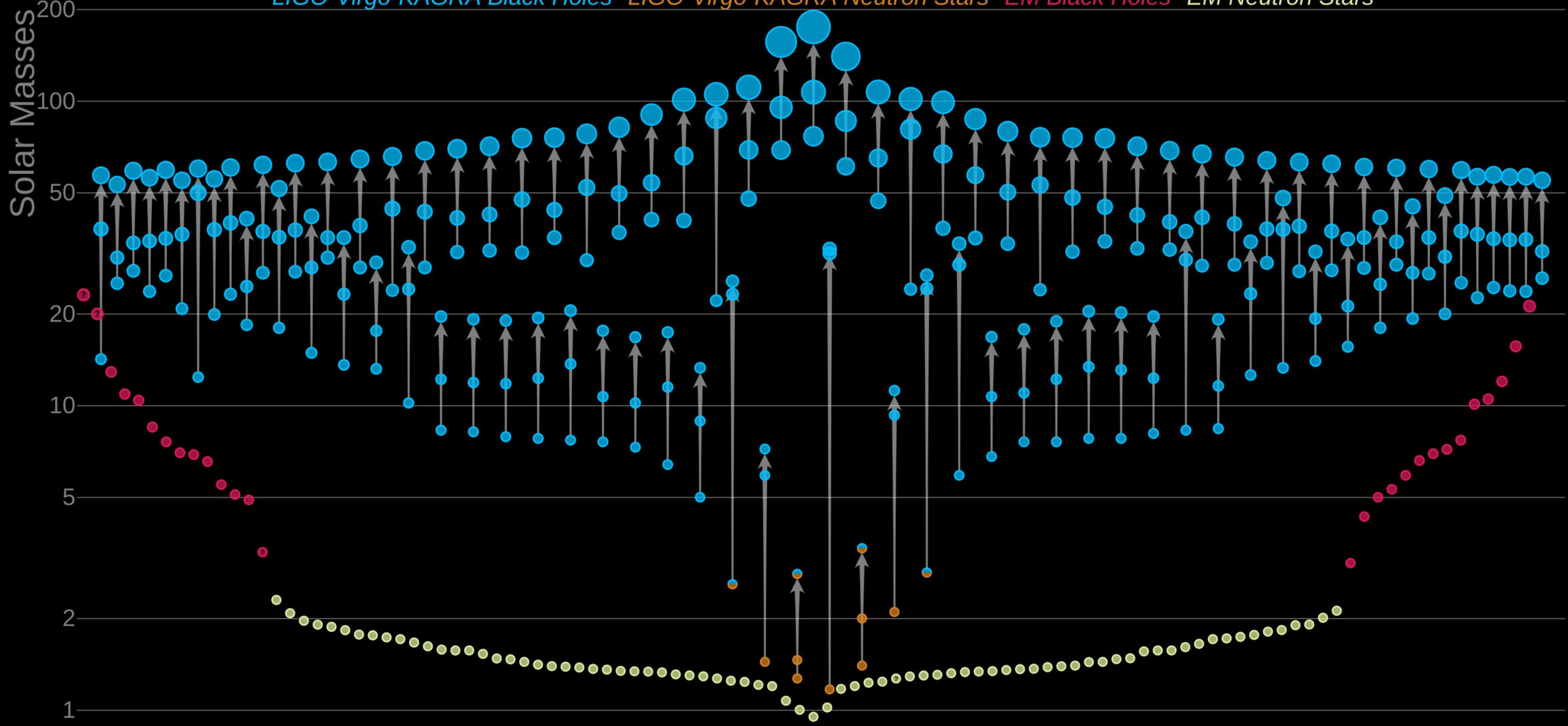


LIGO

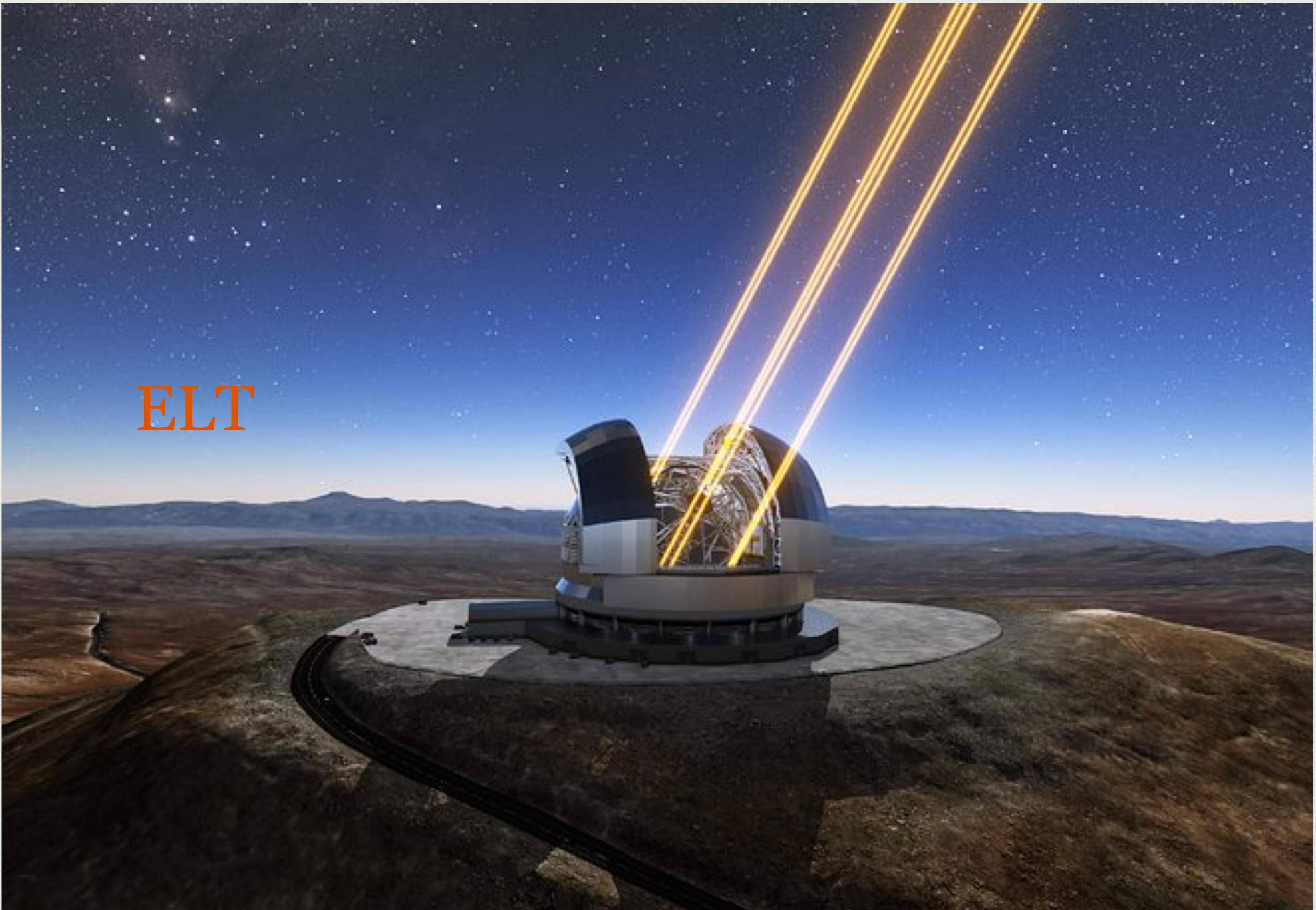


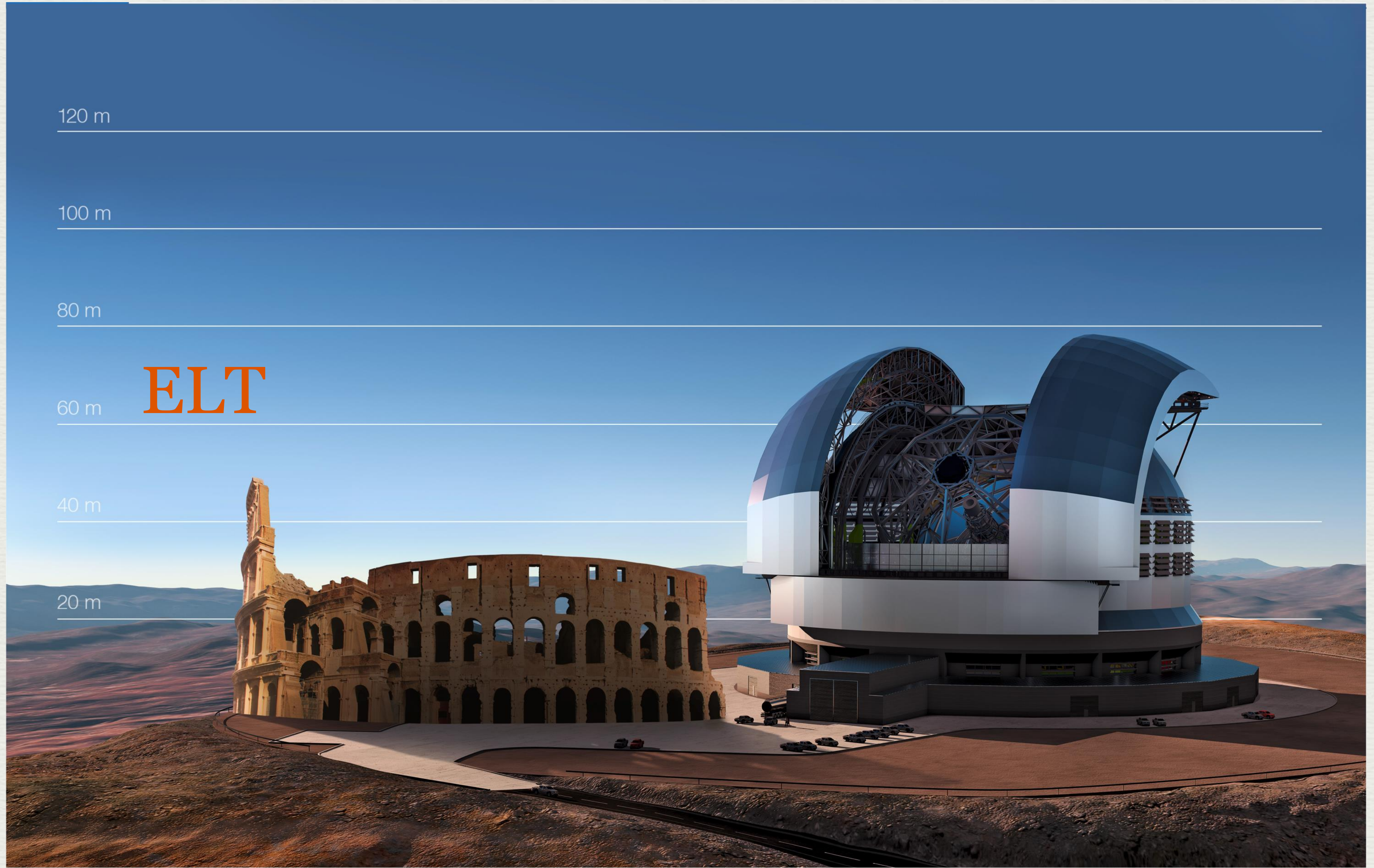
Masses in the Stellar Graveyard

LIGO-Virgo-KAGRA Black Holes *LIGO-Virgo-KAGRA Neutron Stars* *EM Black Holes* *EM Neutron Stars*



ELT





120 m

100 m

80 m

60 m

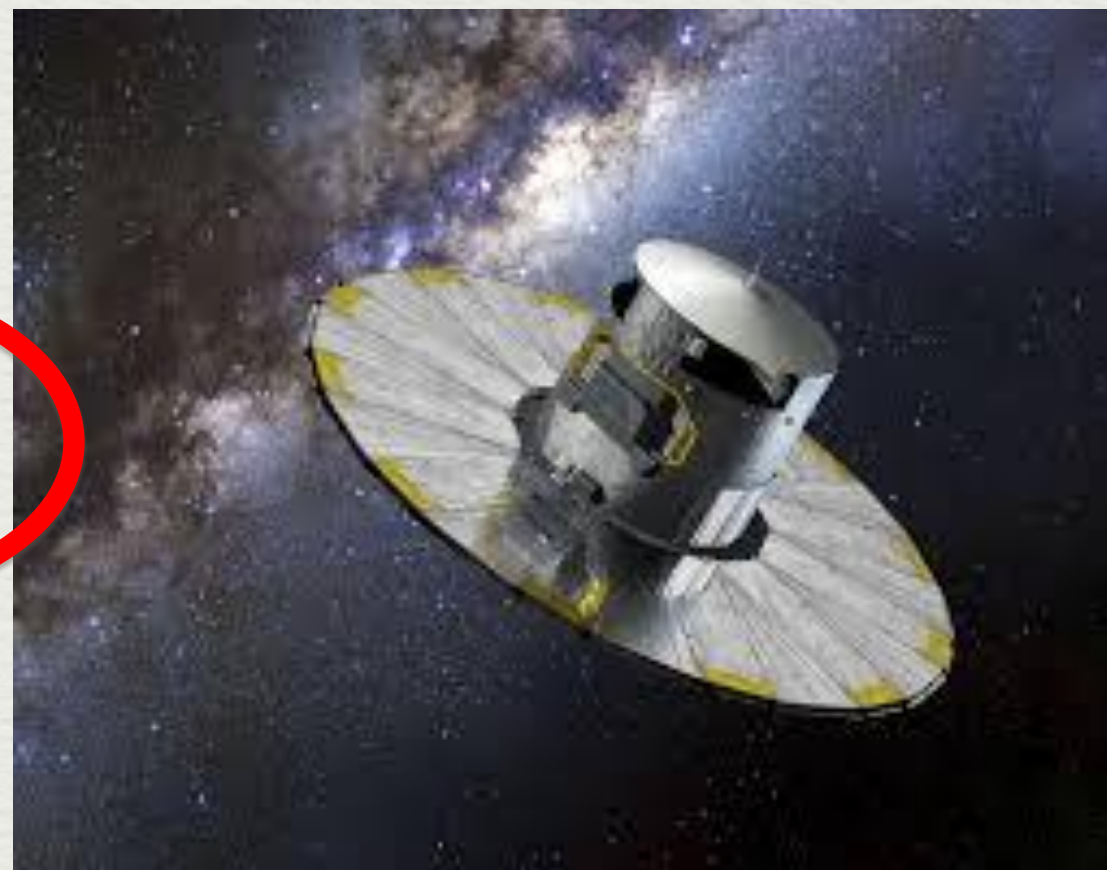
40 m

20 m

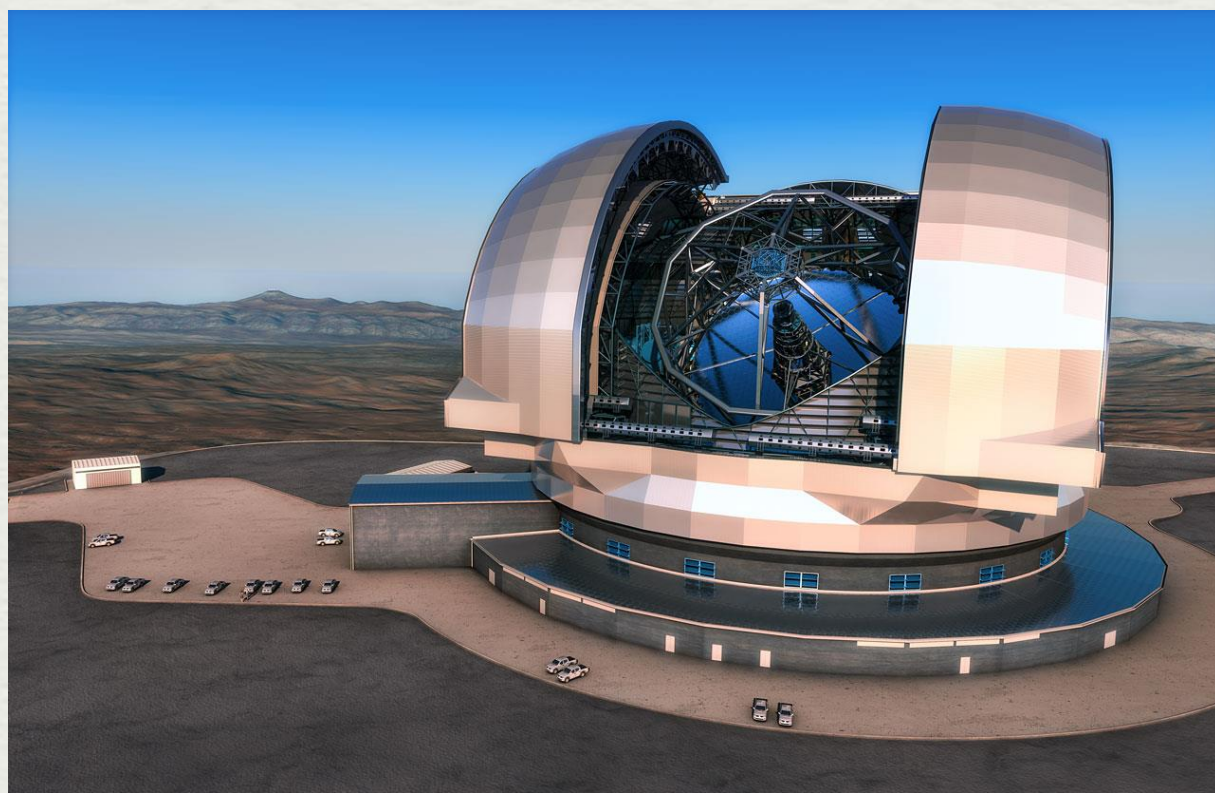
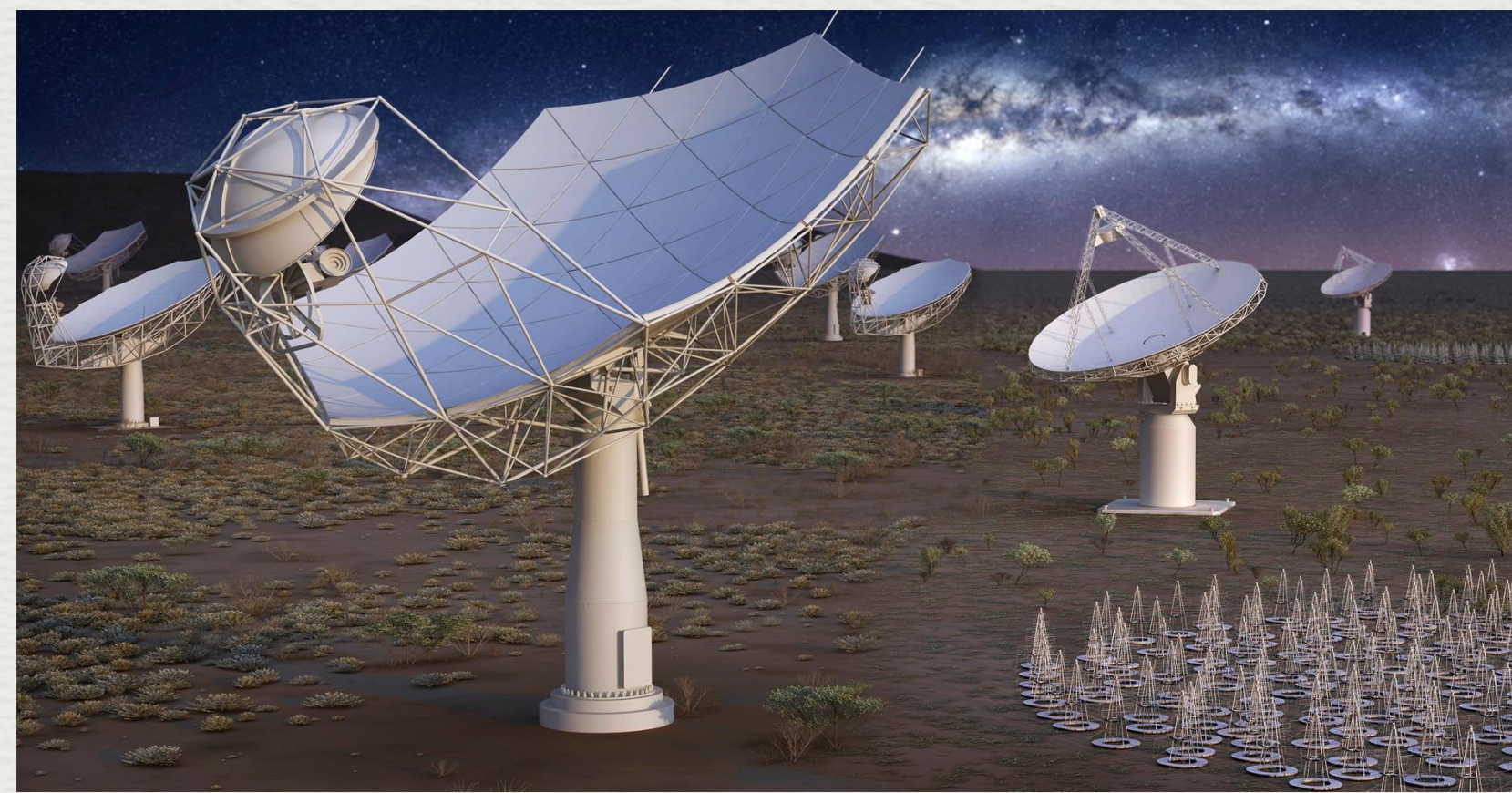
ELT

„Forradalmak” a csillagászatban

Gaia



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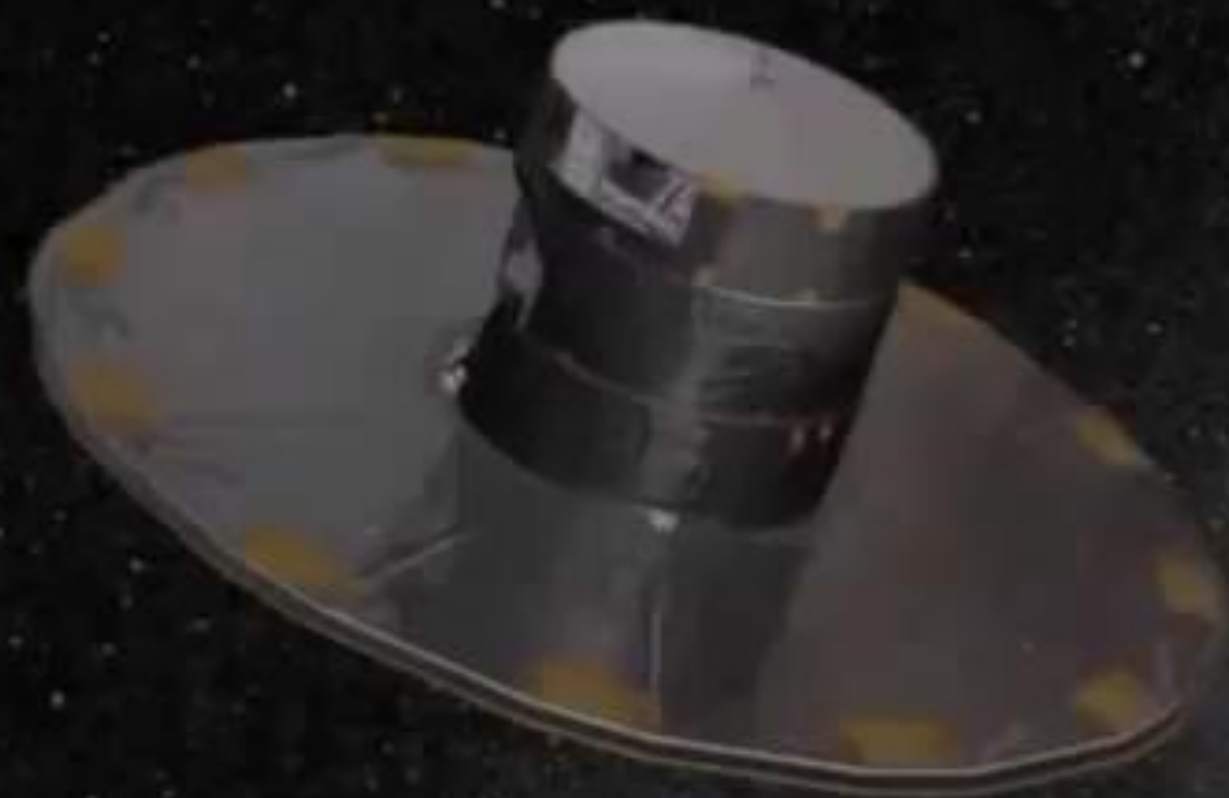
ELT



LIGO

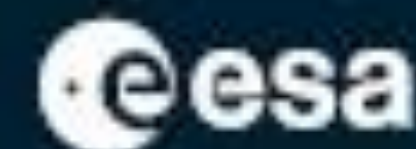


LSST



Gaia EDR3: 2020. december 3.

GAIA EARLY DATA RELEASE 3



1 811 709 771
stellar positions

1 806 254 432
brightness
in white light

1 542 033 472
brightness
in blue light

1 540 770 489
colour

1 467 744 818
parallax and
proper motions

1 614 173
extragalactic
sources

1 554 997 939
brightness
in red light



Gaia

Nearby stars with
trigonometric parallaxes



100 pc
303 446 stars

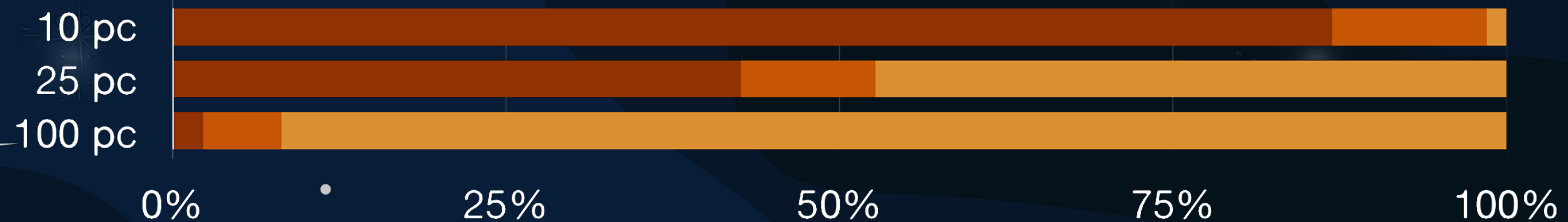
25 pc
5 423 stars

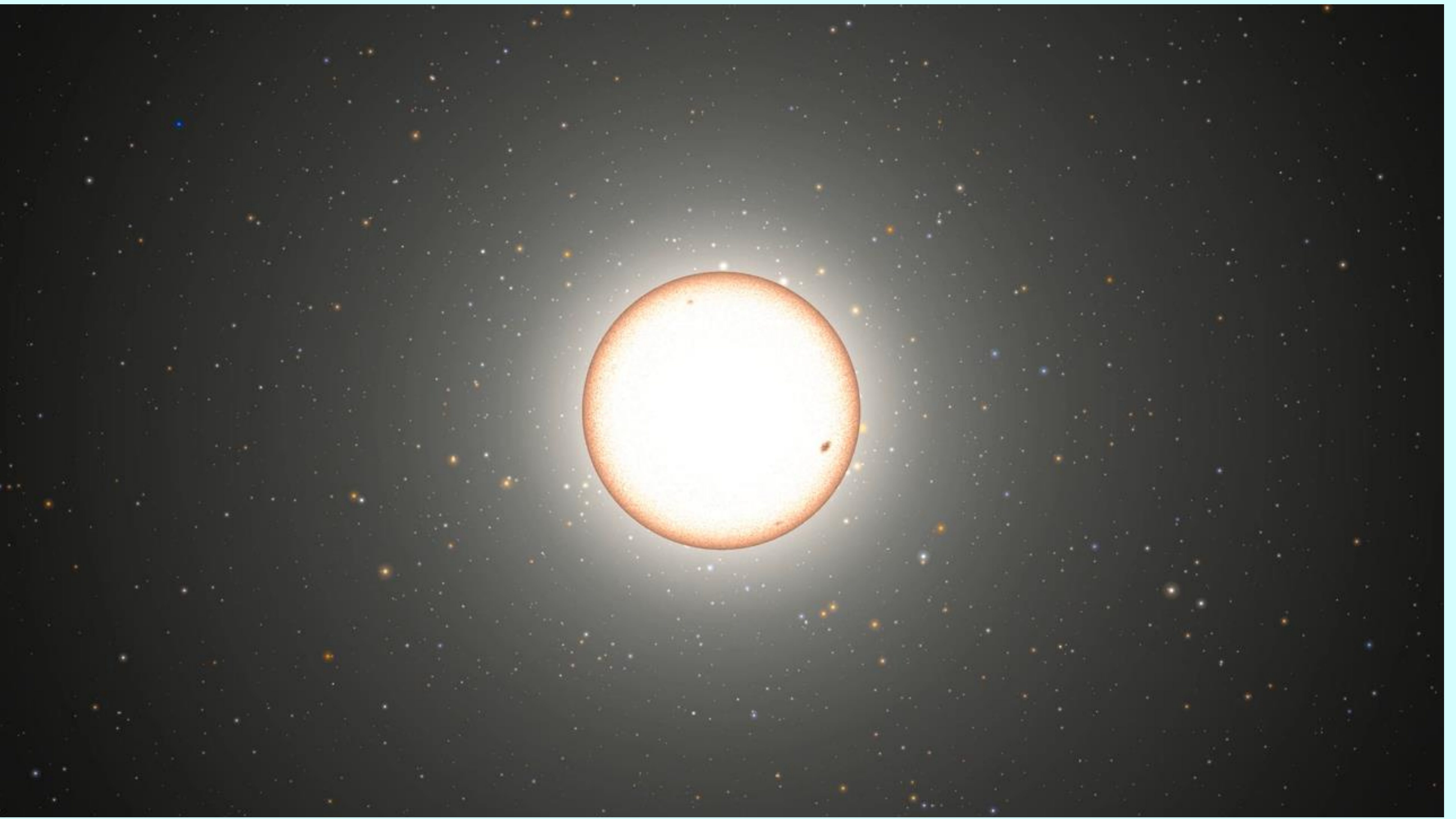
10 pc
382 stars

Gaia Catalogue
of Nearby Stars

Hipparcos

Ground
Based



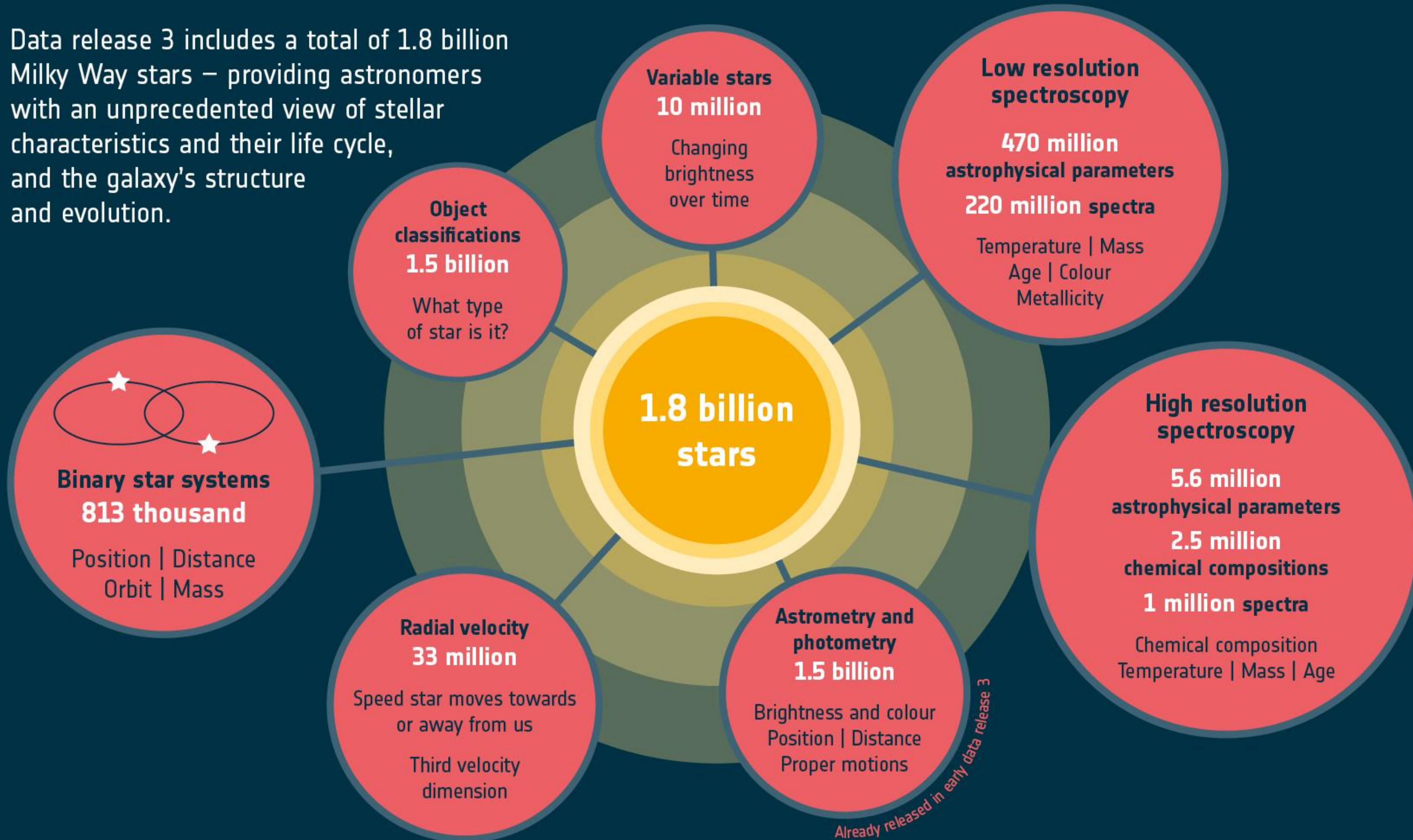


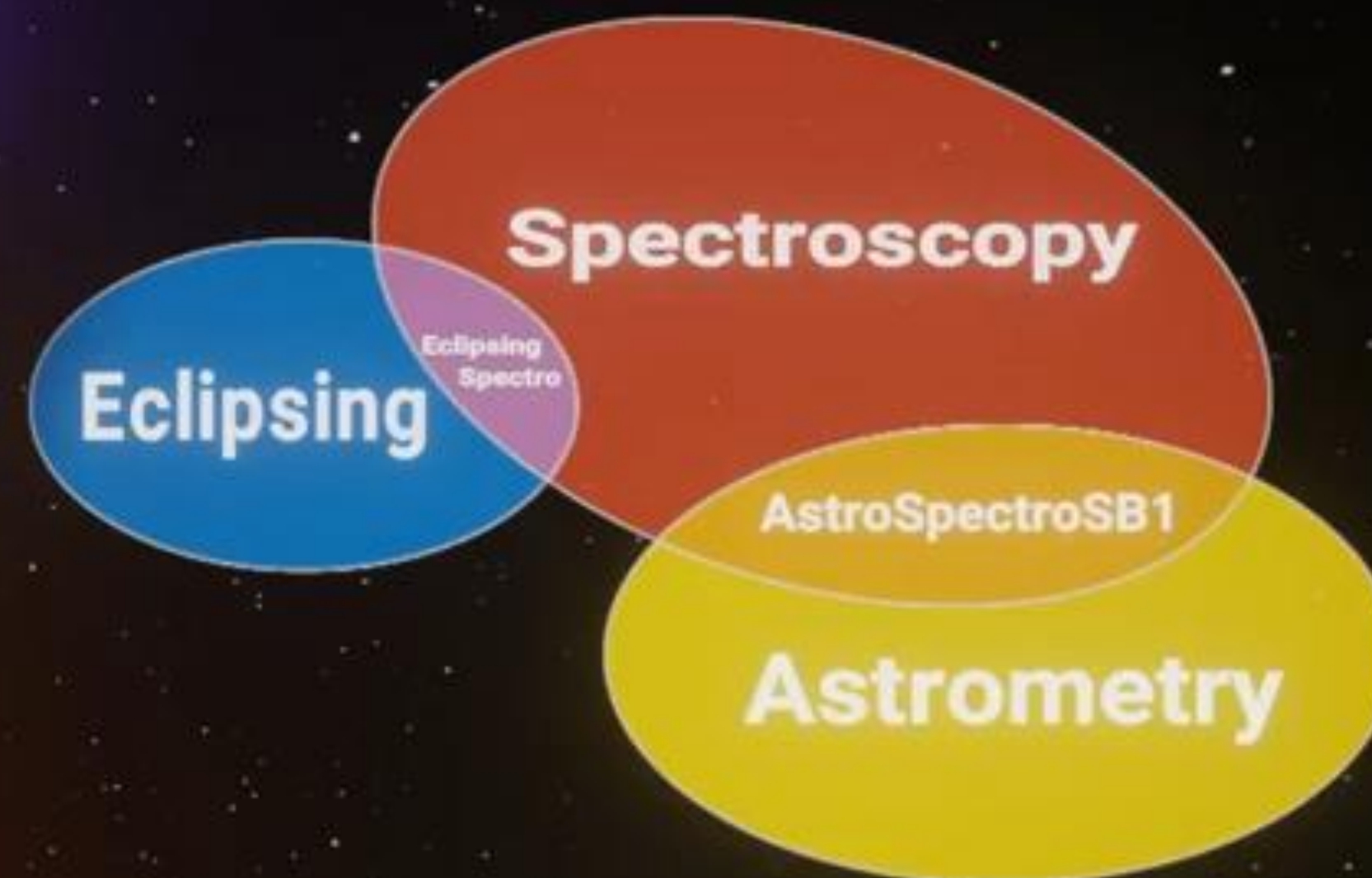
Gaia DR3: 2022. június 13.

MILKY WAY STARS



Data release 3 includes a total of 1.8 billion Milky Way stars – providing astronomers with an unprecedented view of stellar characteristics and their life cycle, and the galaxy's structure and evolution.





SKY-SCANNING COMPLETE FOR ESA'S MILKY WAY MAPPER GAIA

From 24 July 2014 to 15 January 2025, Gaia made more than three trillion observations of two billion stars and other objects, which revolutionised the view of our home galaxy and cosmic neighbourhood.



3 TRILLION
Observations

2 BILLION
Stars & other objects observed

938 MILLION
Camera pixels on board

15 300
Spacecraft 'pirouettes'

55 KG
Cold nitrogen gas consumed

3827
Days in science operations

50 000 HOURS
Ground station time used

580 MILLION
Accesses of Gaia catalogue so far

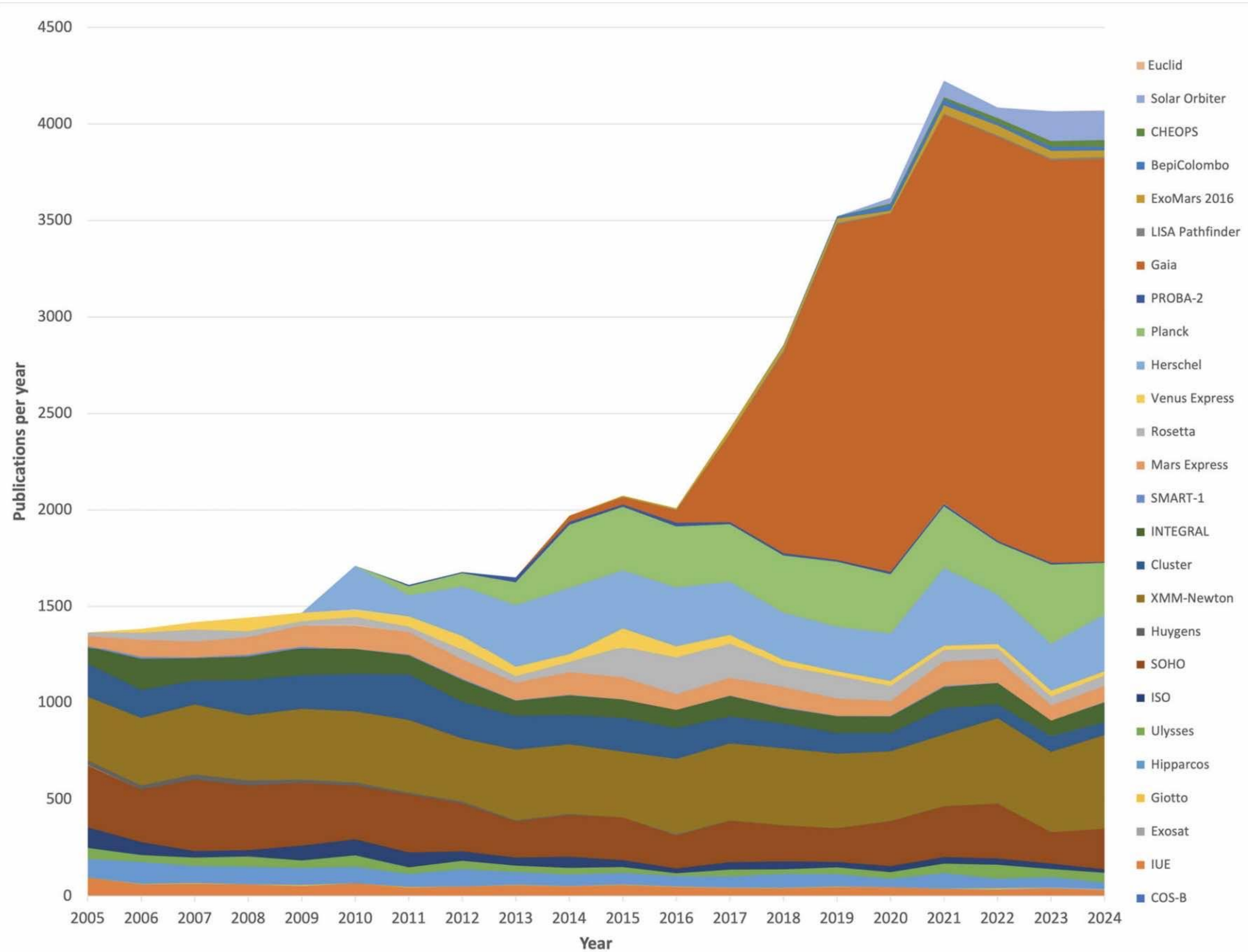
13 000
Refereed scientific publications so far

2.8 MILLION
Commands sent to spacecraft

142 TB
Downlinked data (compressed)

500 TB
Volume of data release 4
(5.5 years of observations)

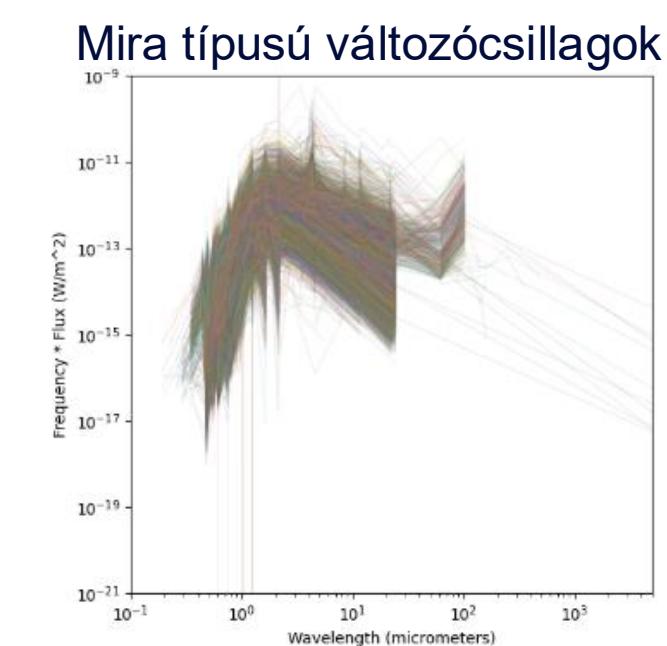
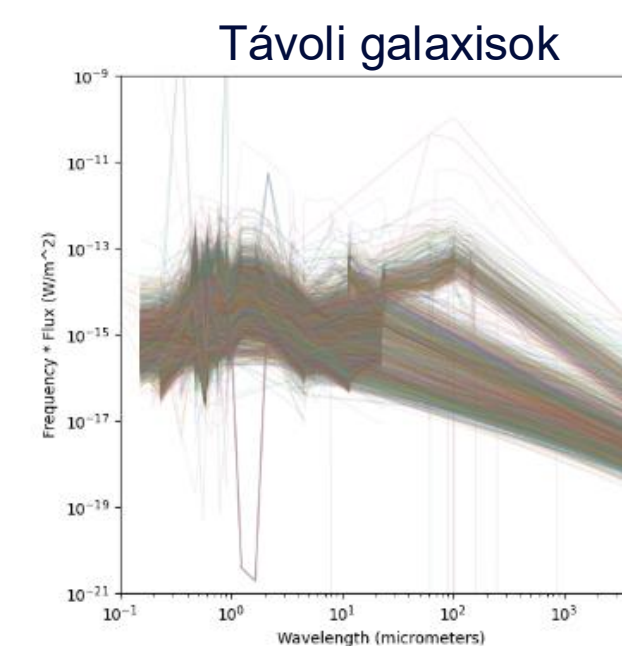
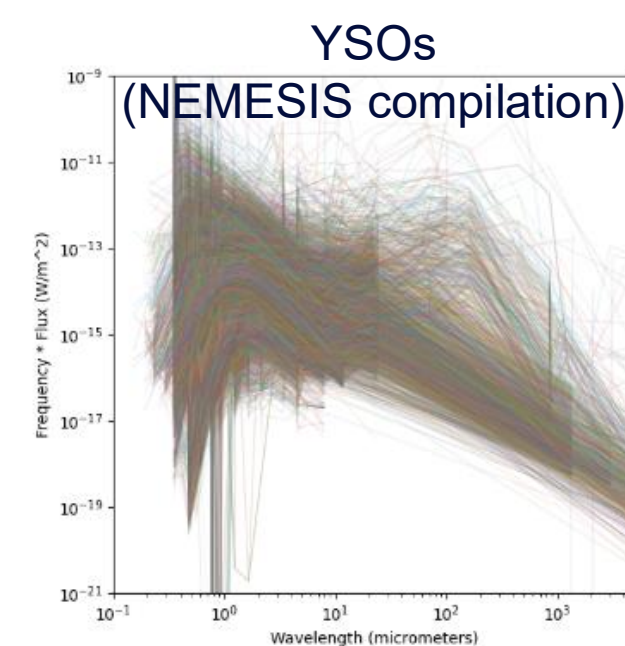




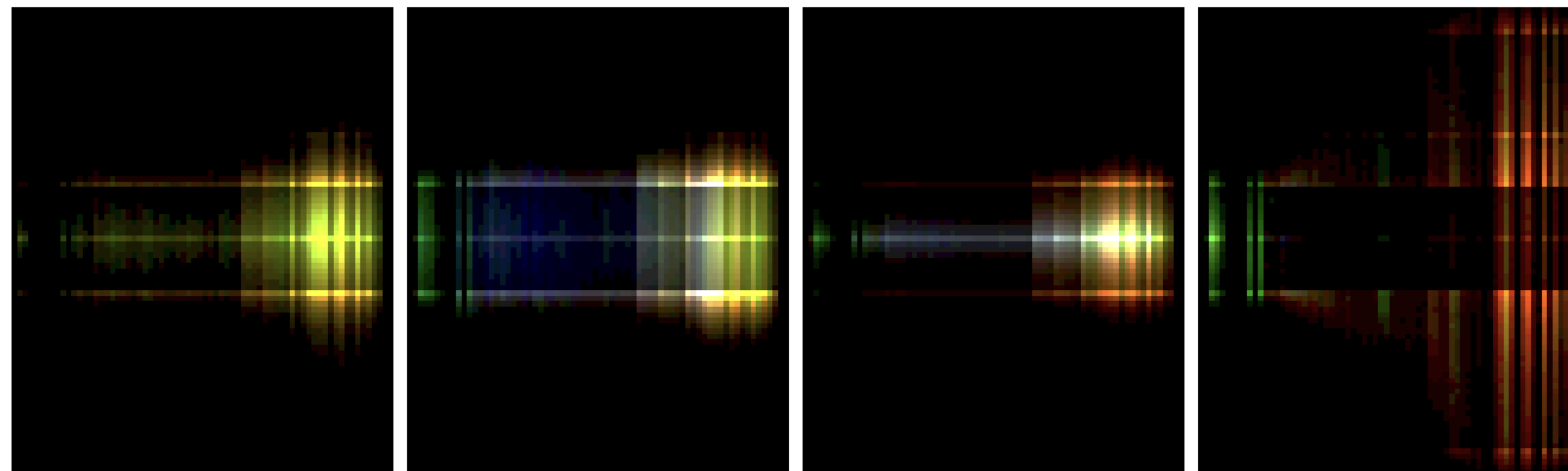


YSO azonosítás - felügyelt tanítás CNN segítségével képek alapján

- Spektrális energiaeoszlás diagramok



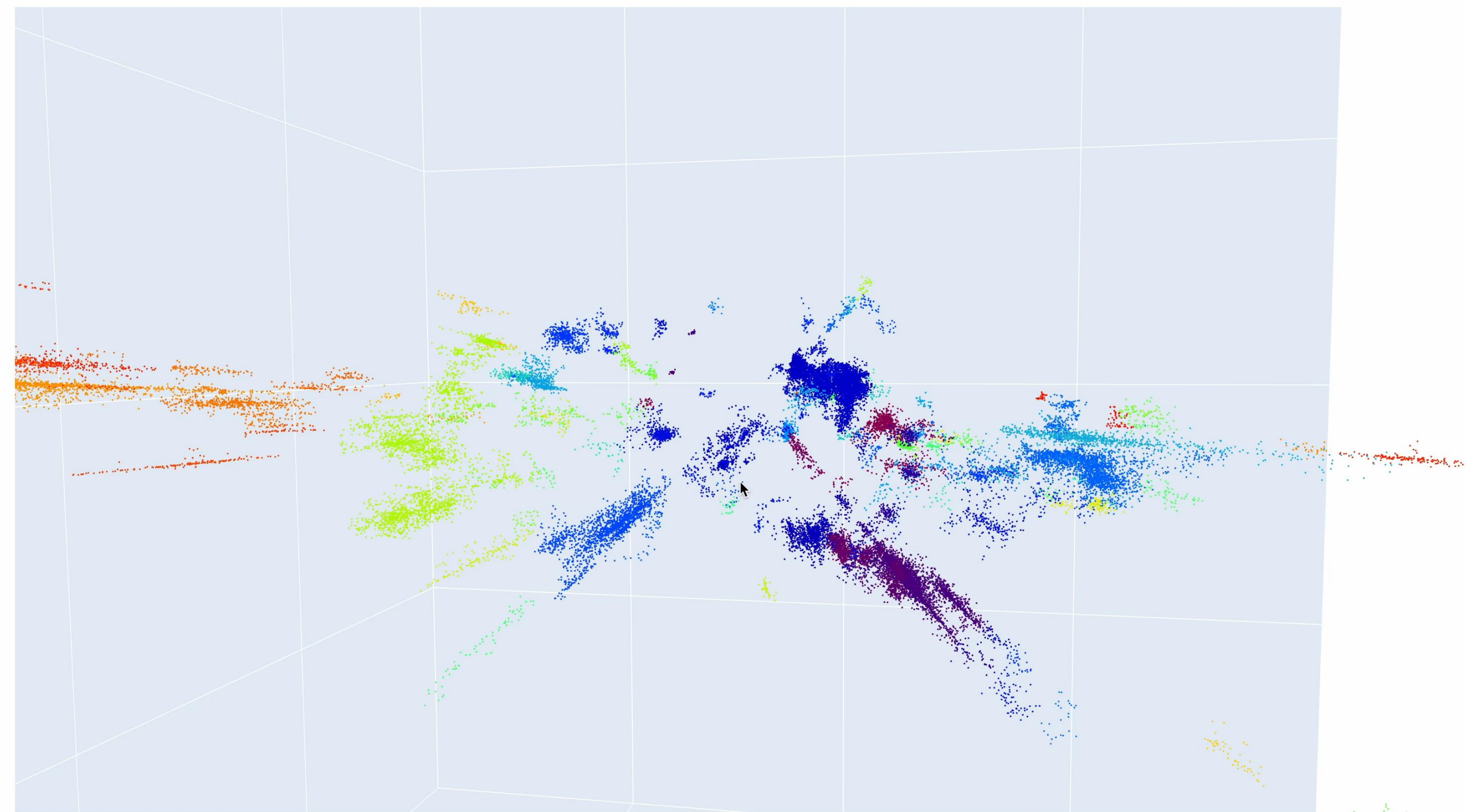
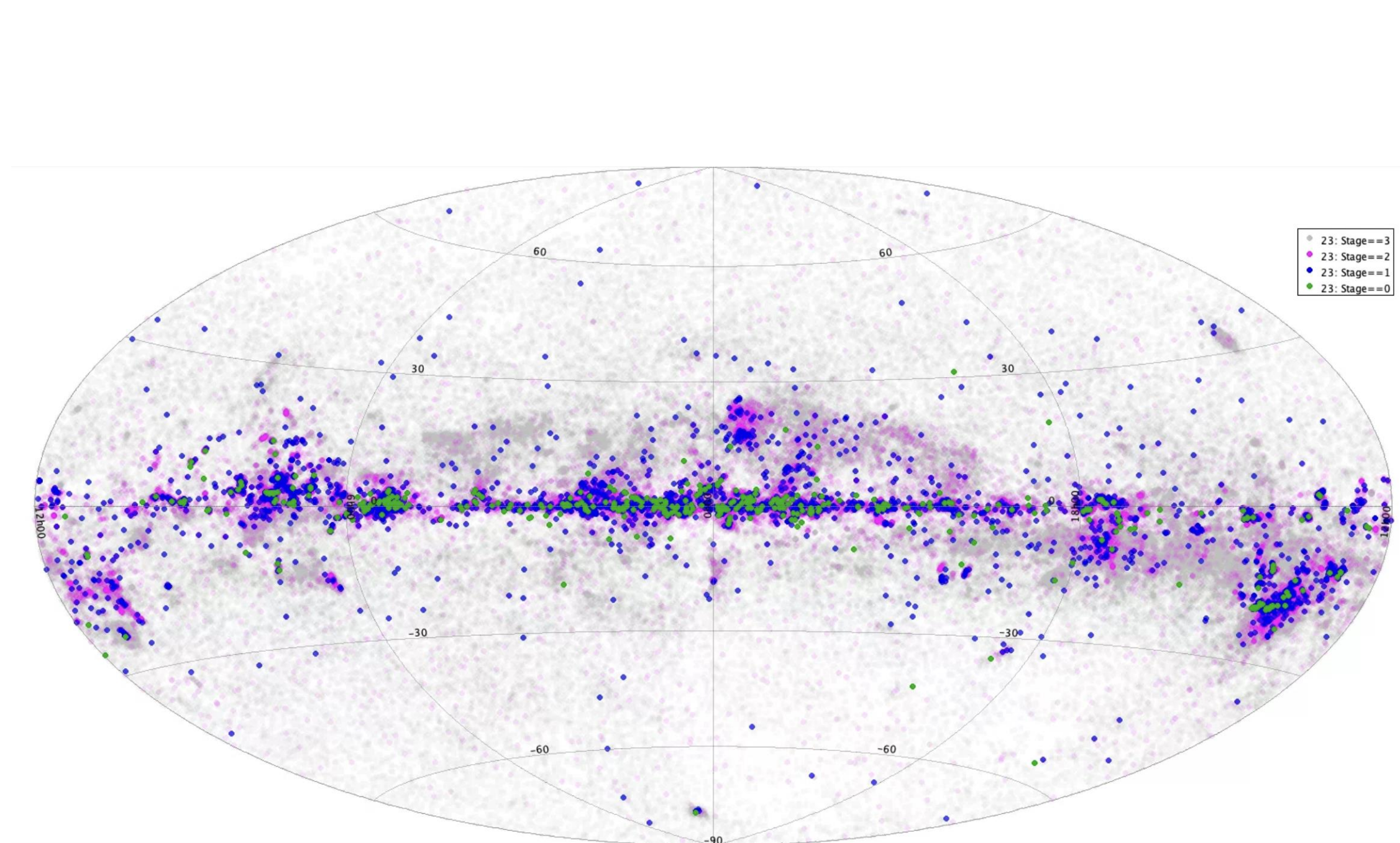
- ZTF fénygörbék (idősorok)



- RGB bélyegképek



Eredmények ~373000 fiatal csillag jelölt



AI és a kozmosz titkainak fürkészése

1. Adatínség – adatbőőség
2. Alakfelismerés, osztályozás
3. Kódfejlesztés (ChatGPT, Claude, etc.)
4. Publikálás, pályázatírás, pályázatértékelés...
5. Hatékonyságnövelés és a felszabaduló idő értelmes felhasználása