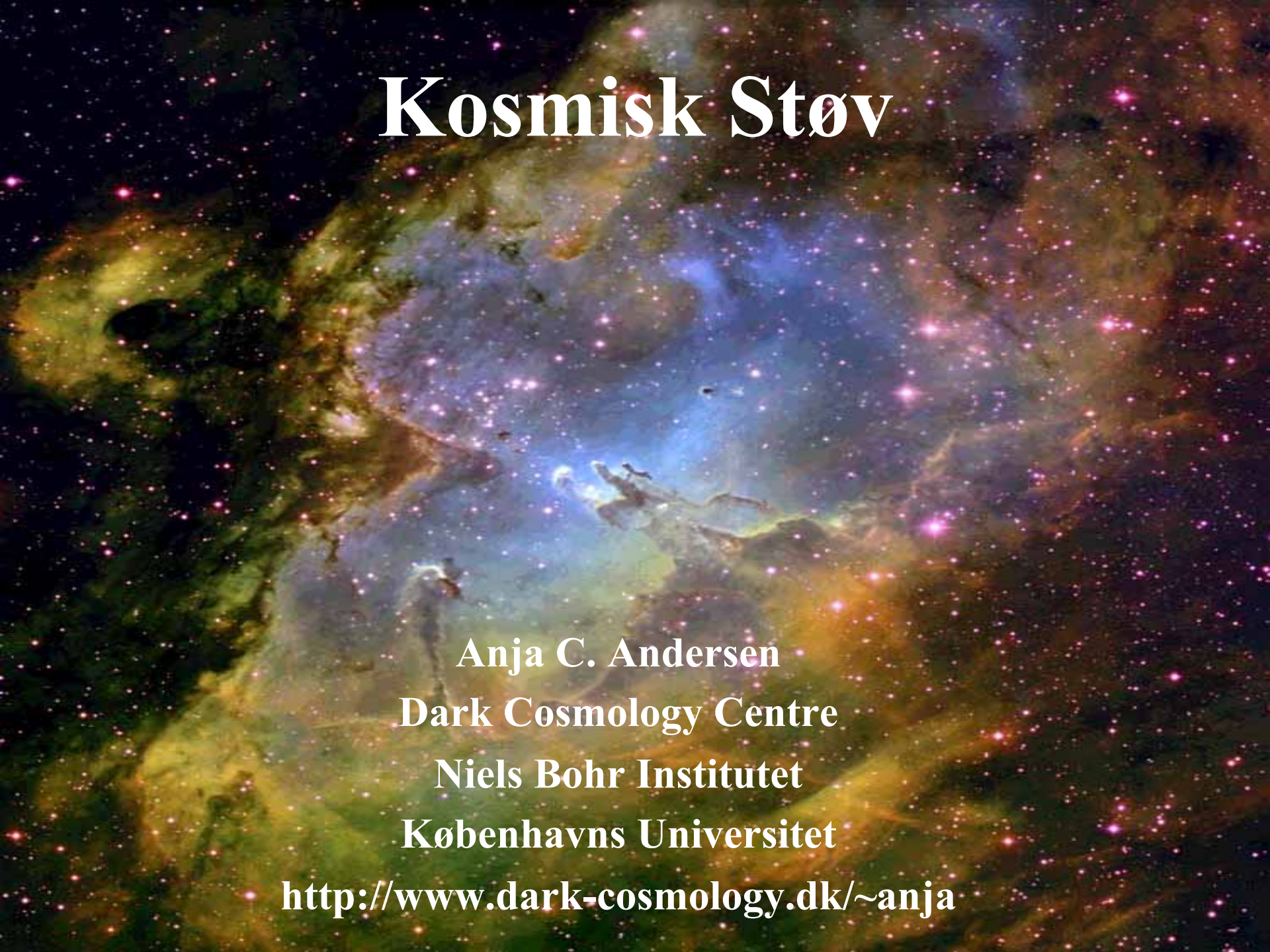
Kosmisk Støv



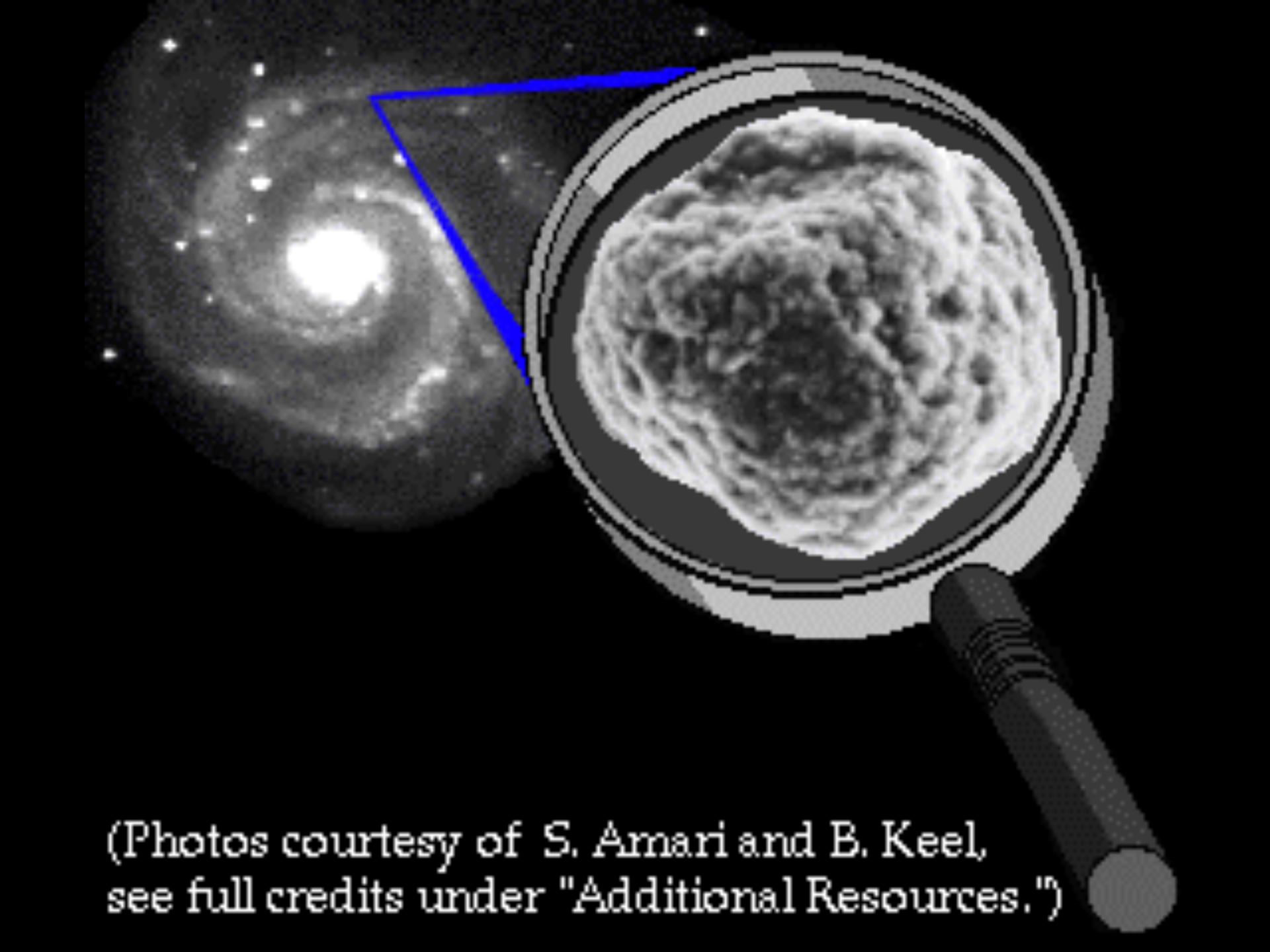
Anja C. Andersen

Dark Cosmology Centre

Niels Bohr Institutet

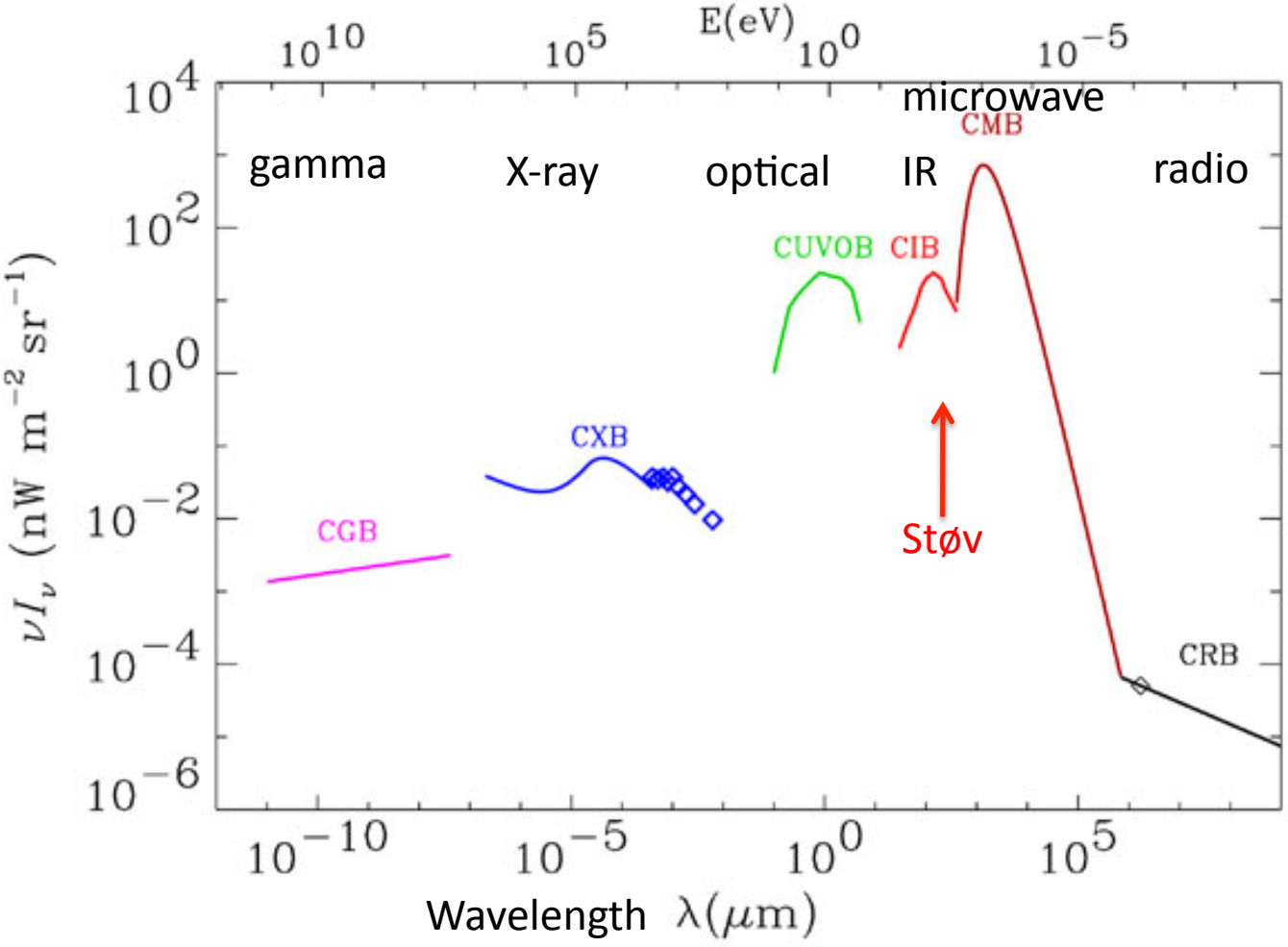
Københavns Universitet

http://www.dark-cosmology.dk/~anja



(Photos courtesy of S. Amari and B. Keel,
see full credits under "Additional Resources.")

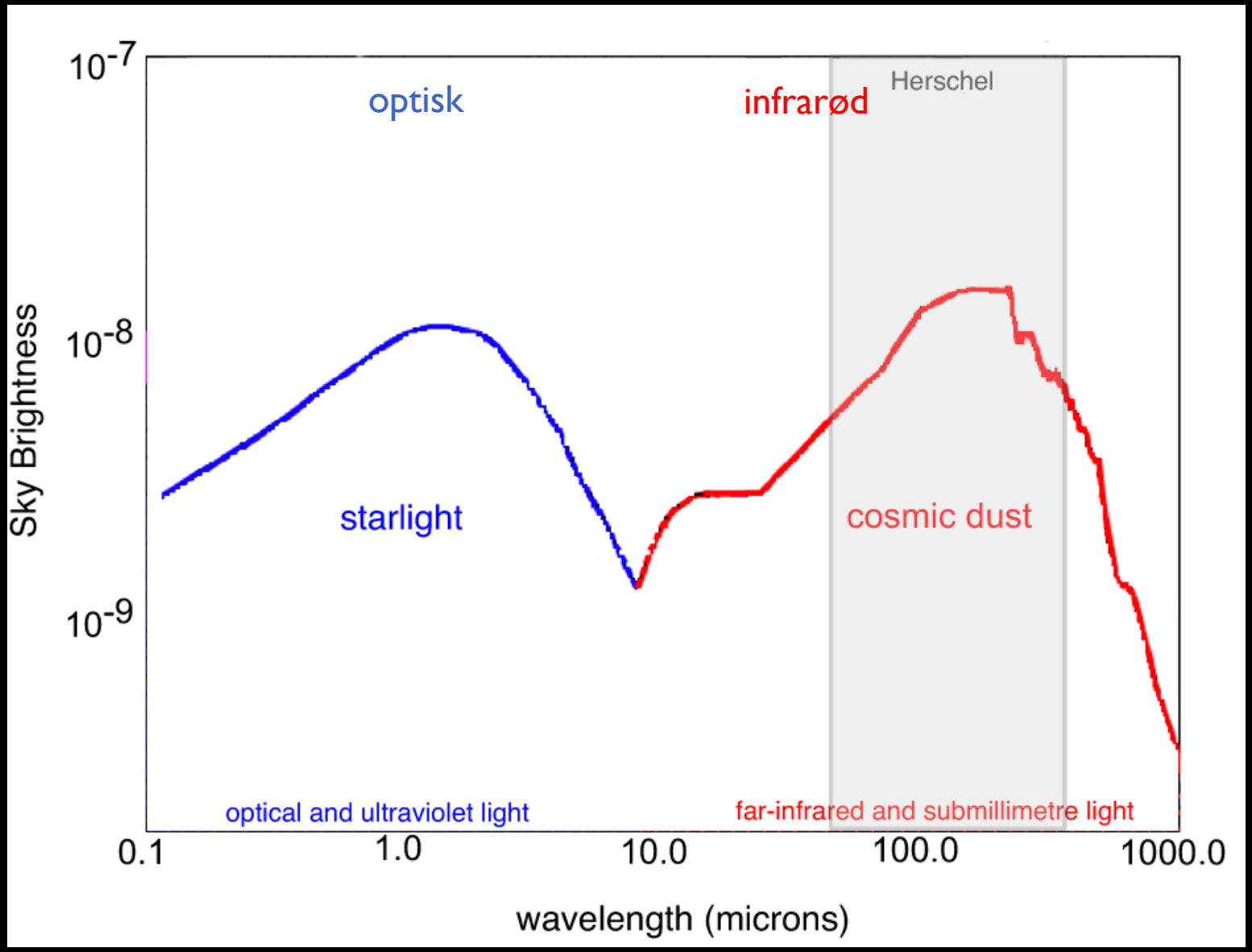
Kosmisk baggrund stråling



Flux

Hauser & Dwek 2001

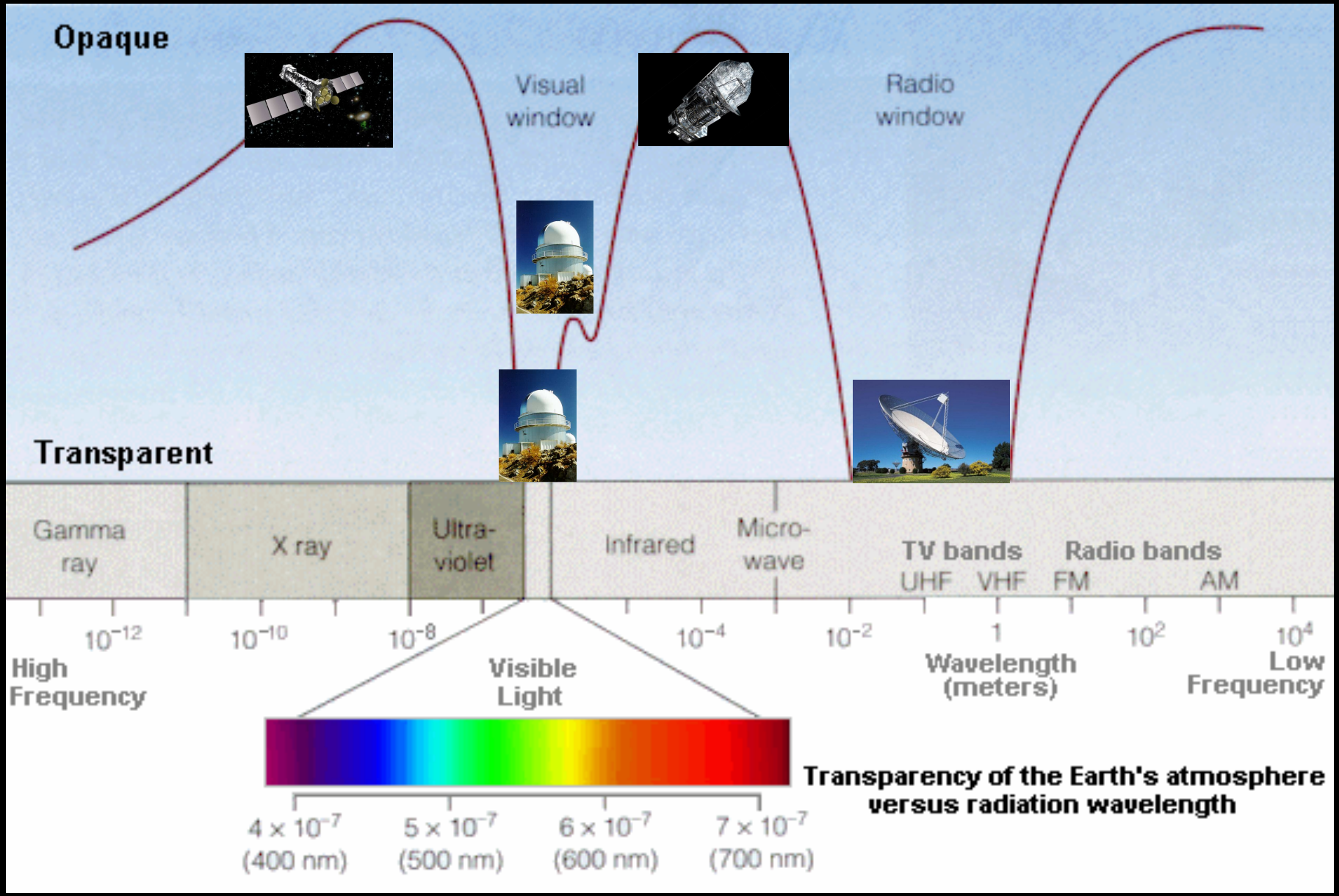
Mængden af lys fra stjernerne = mængden af lys fra støvet



Astronomi

Astronomer arbejder med at undersøge og forstå universet. Arbejdsredskaber er kikkerter, satellitter og computere.

Jordens atmosfæres gennemsigtighed




Ørnetågen

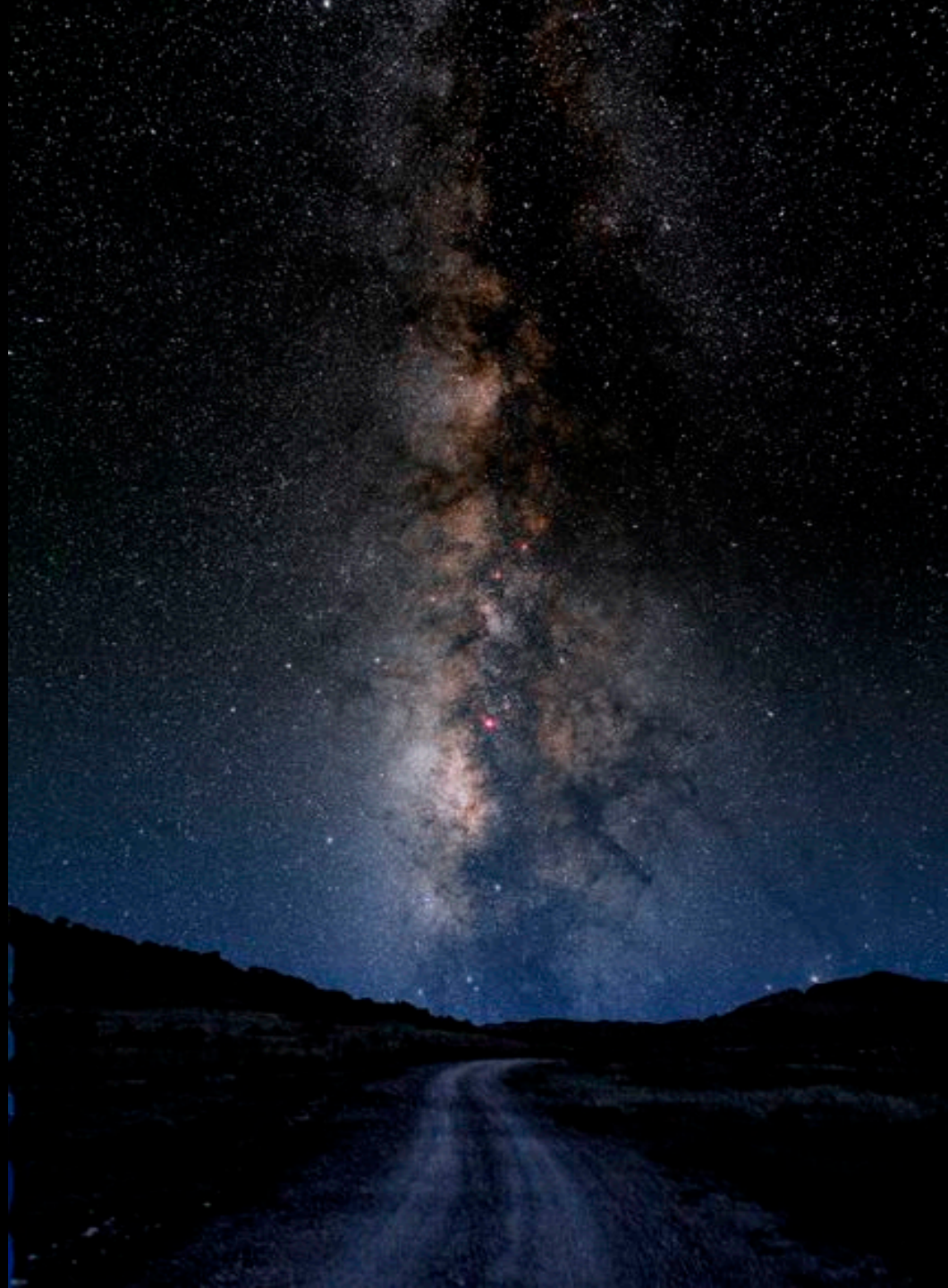

M16 i synligt lys


M16 i infrarødt lys

Mælkevejen

Interstellar Matter Matters !

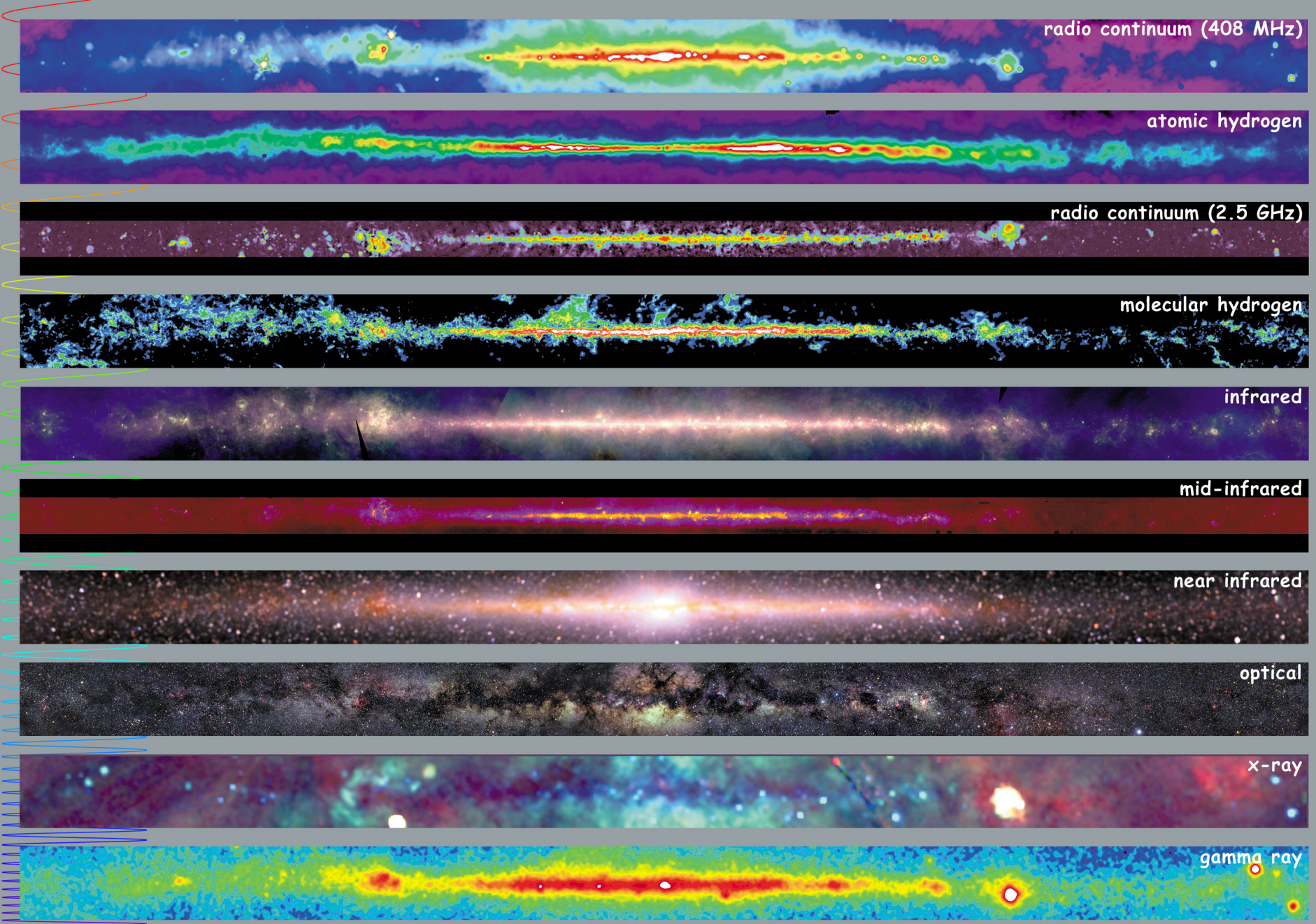
The centre of the Milky Way would be a billion times brighter if not for cosmic dust...



www.spacetelescope.org

Kosmisk Støv - ”de hårde fakta”

- Omkring 1/5 af den del af Mælkevejens masse der består af stjerner, planeter og andet “baryon stof” er i form af gas og støv. Af denne 1/5 er 99% gas og 1% støv.
- Røgpartikler der formentlig består af C, O, Si, Mg, Al, Fe.

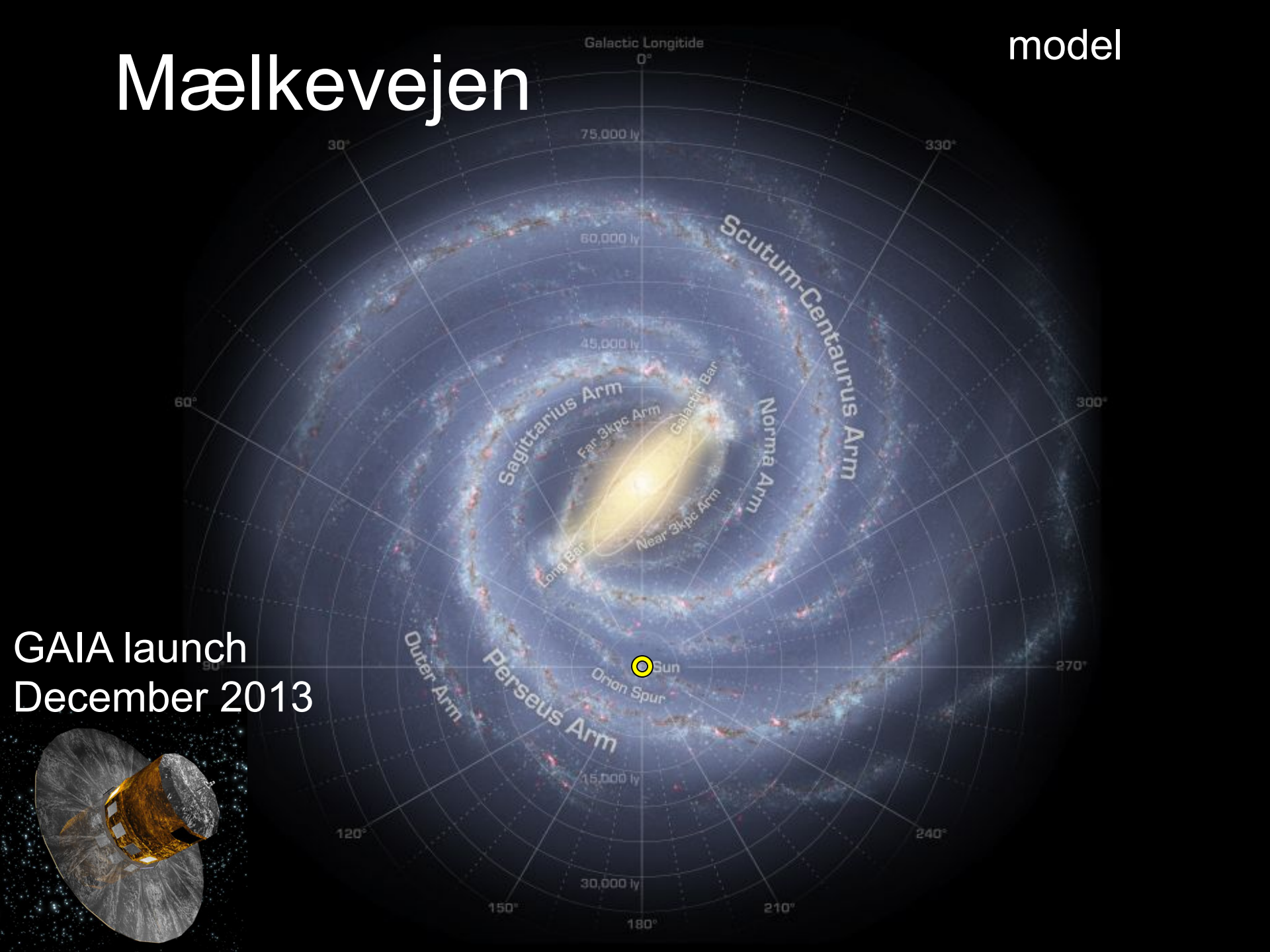


Multiwavelength Milky Way

http://adc.gsfc.nasa.gov/mw

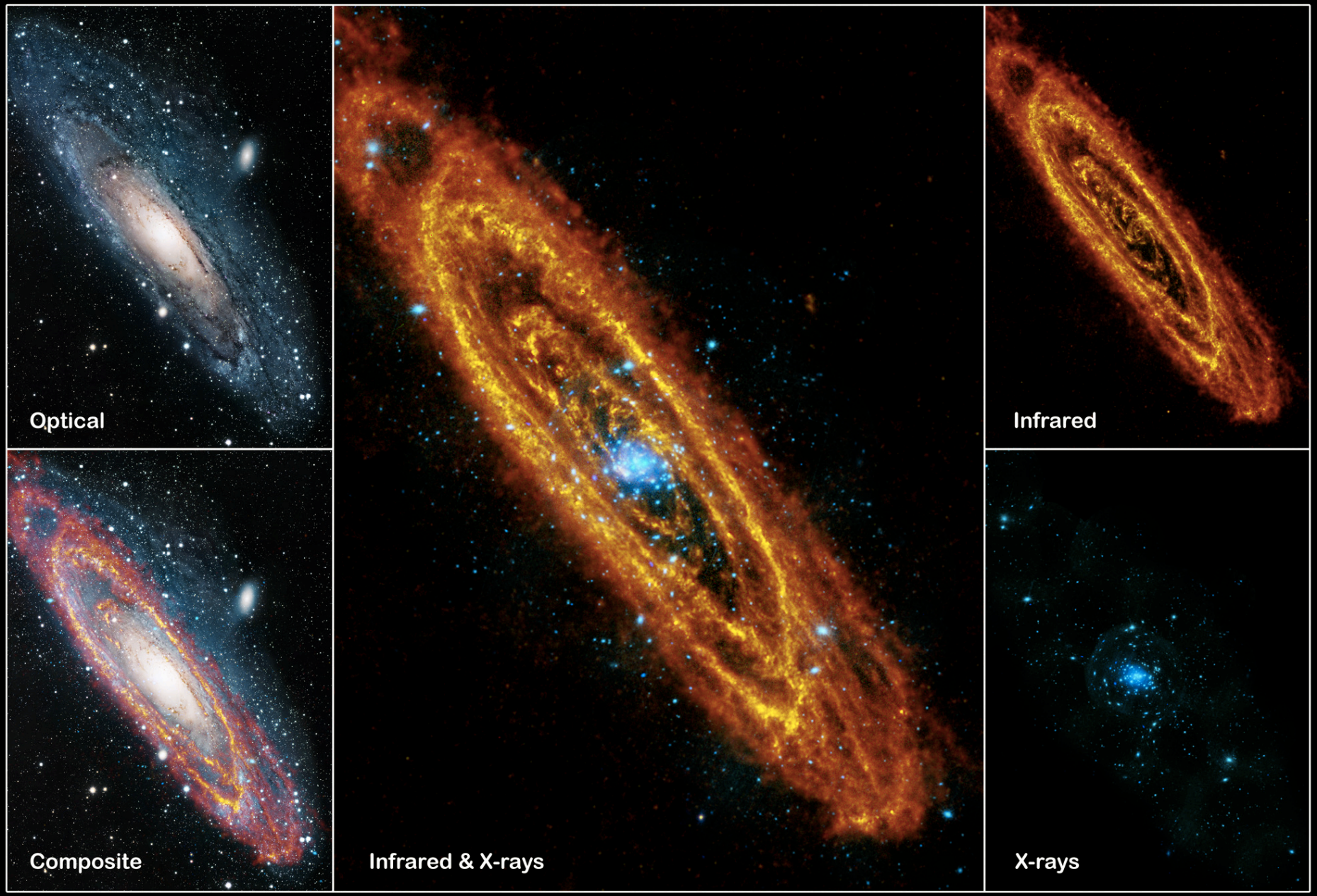
Mælkevejen

model



GAIA launch
December 2013

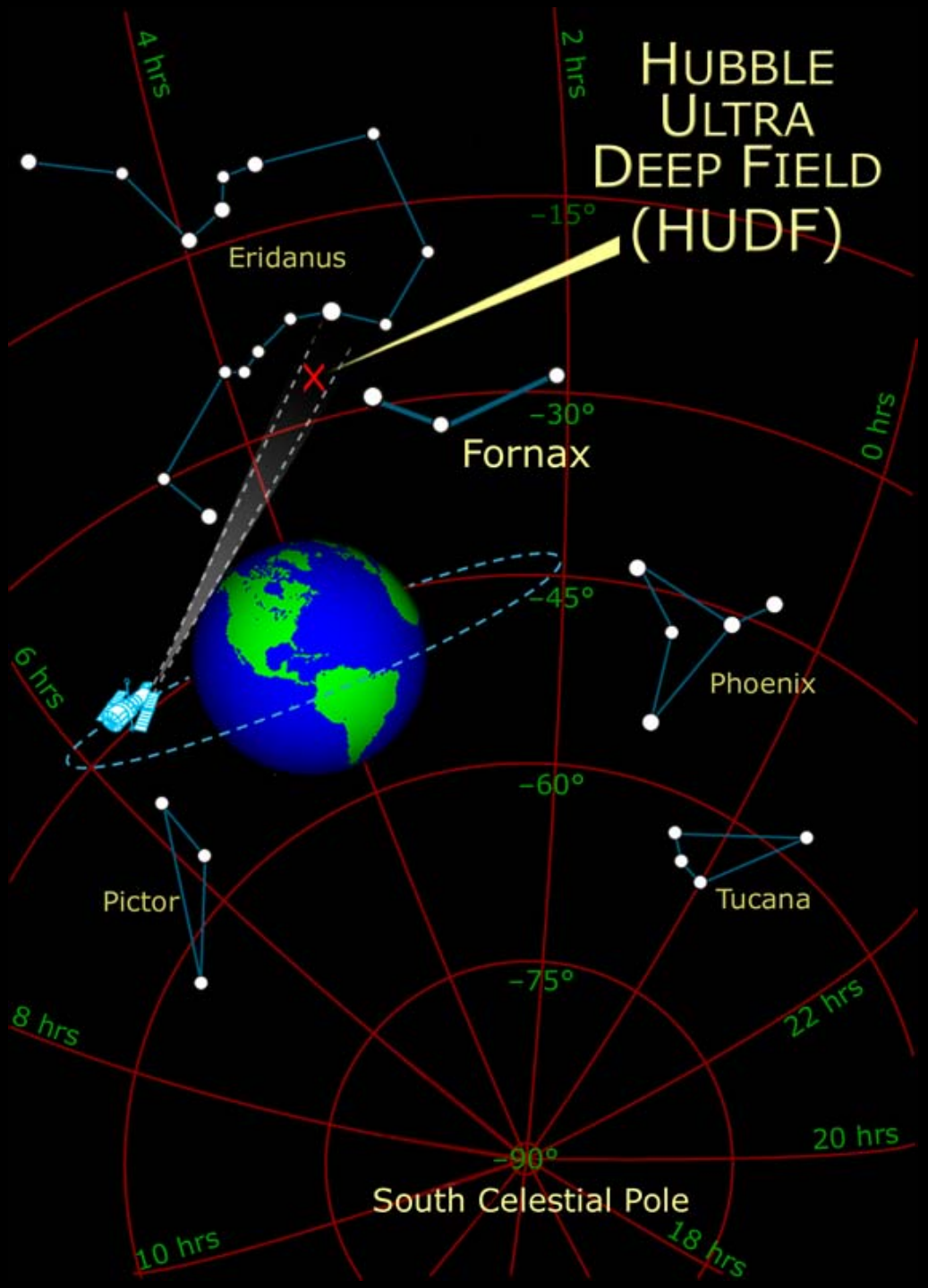

Andromeda galaksen
2,4 millioner lysår


Optical
Infrared
Composite
Infrared & X-rays
X-rays

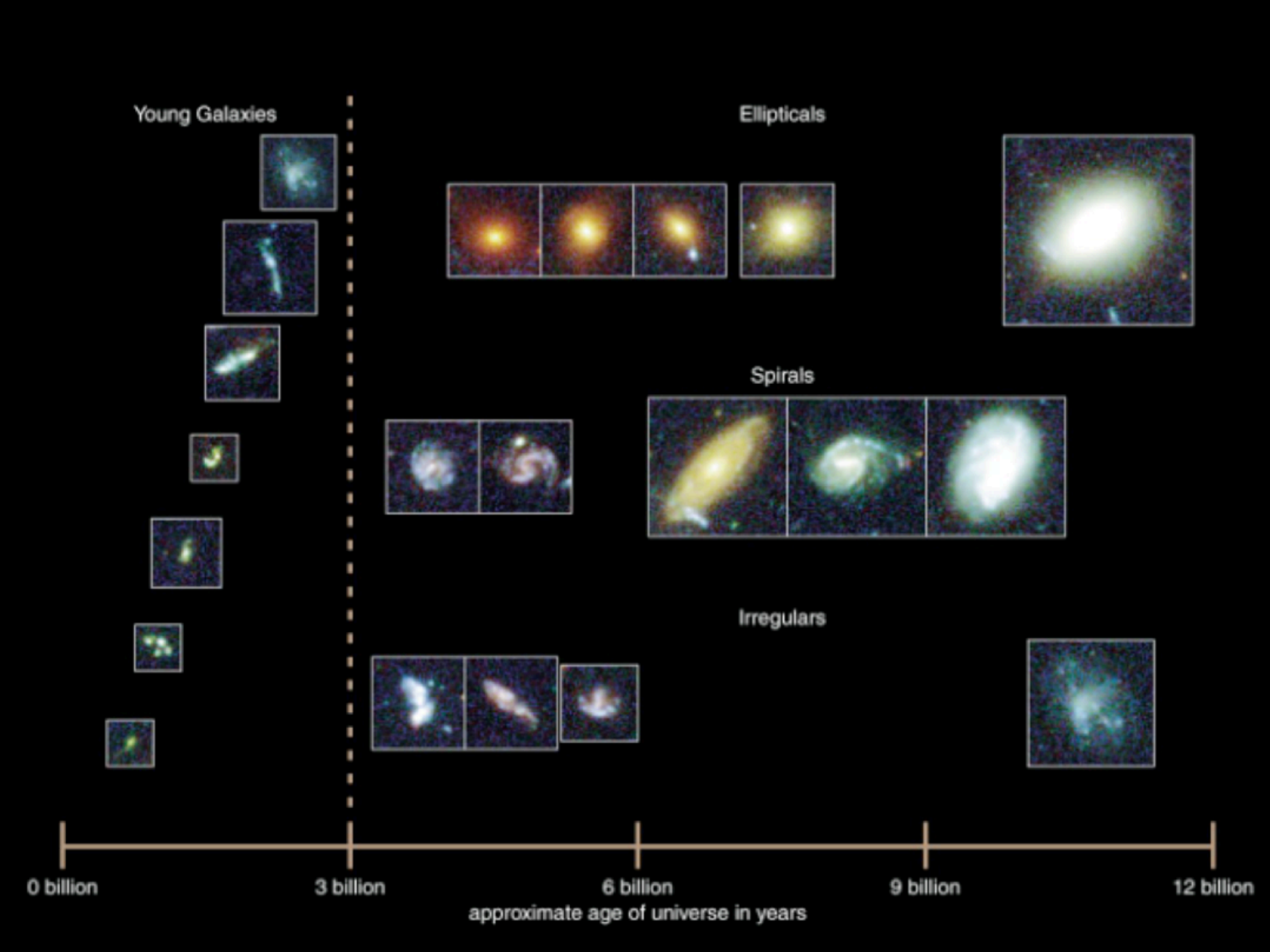
Hubble Ultra Deep Field:

11 døgns eksponeringstid

en tidsmaskine!

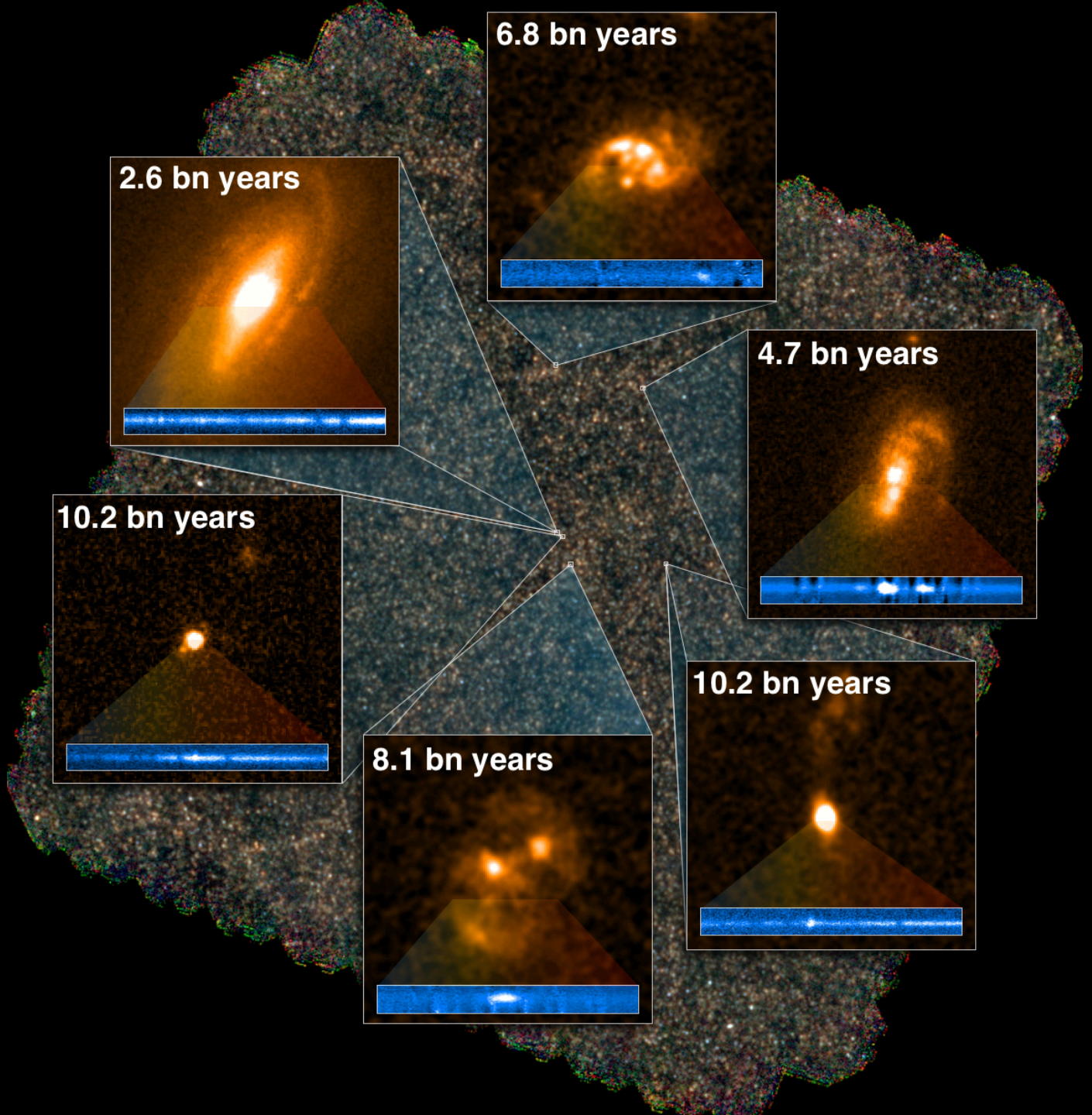


Hubble Ultra Deep Field:


Young Galaxies
Ellipticals
Spirals
Irregulars
0 billion
3 billion
6 billion
9 billion
12 billion
approximate age of universe in years

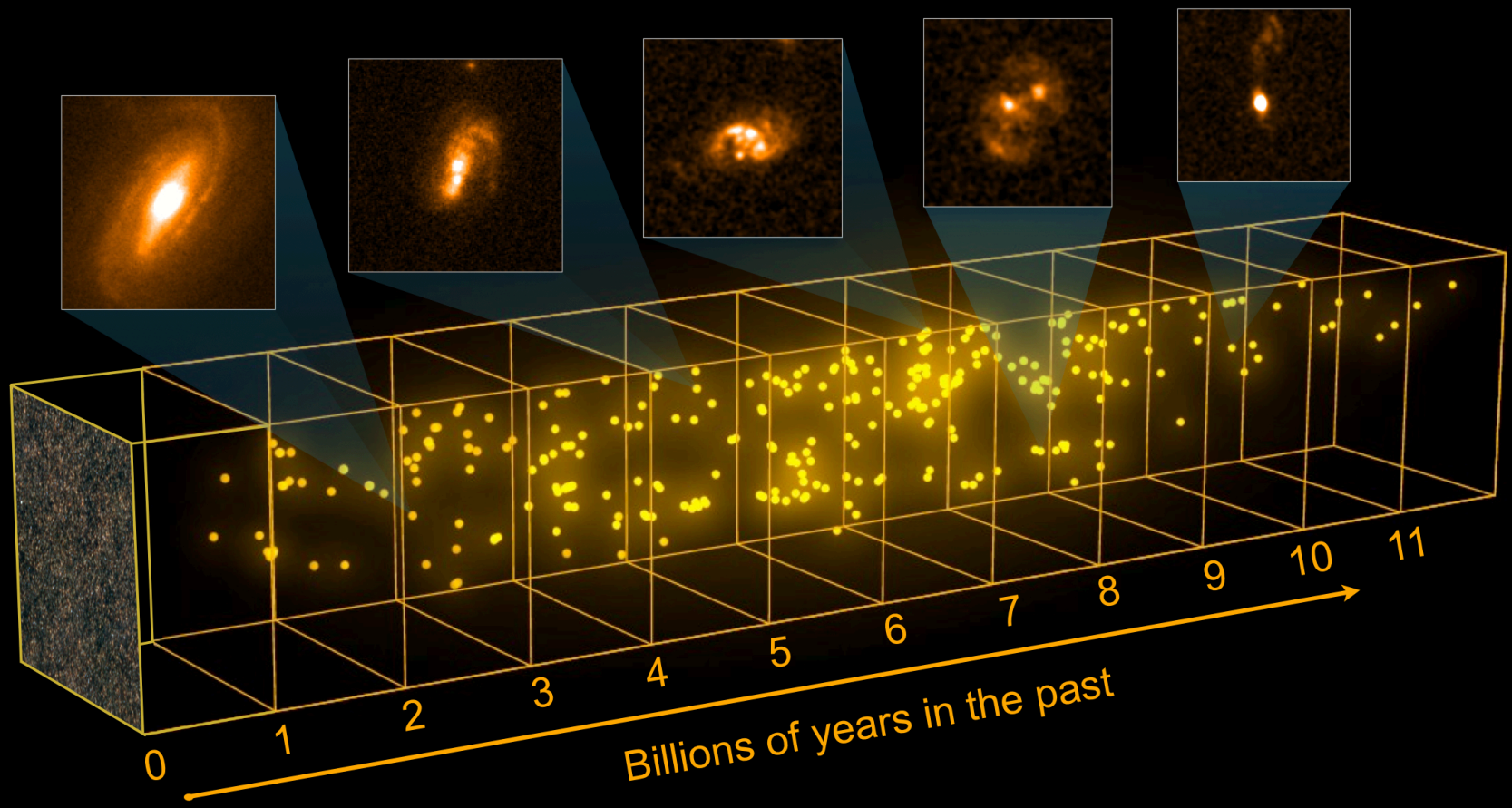
Infrarød

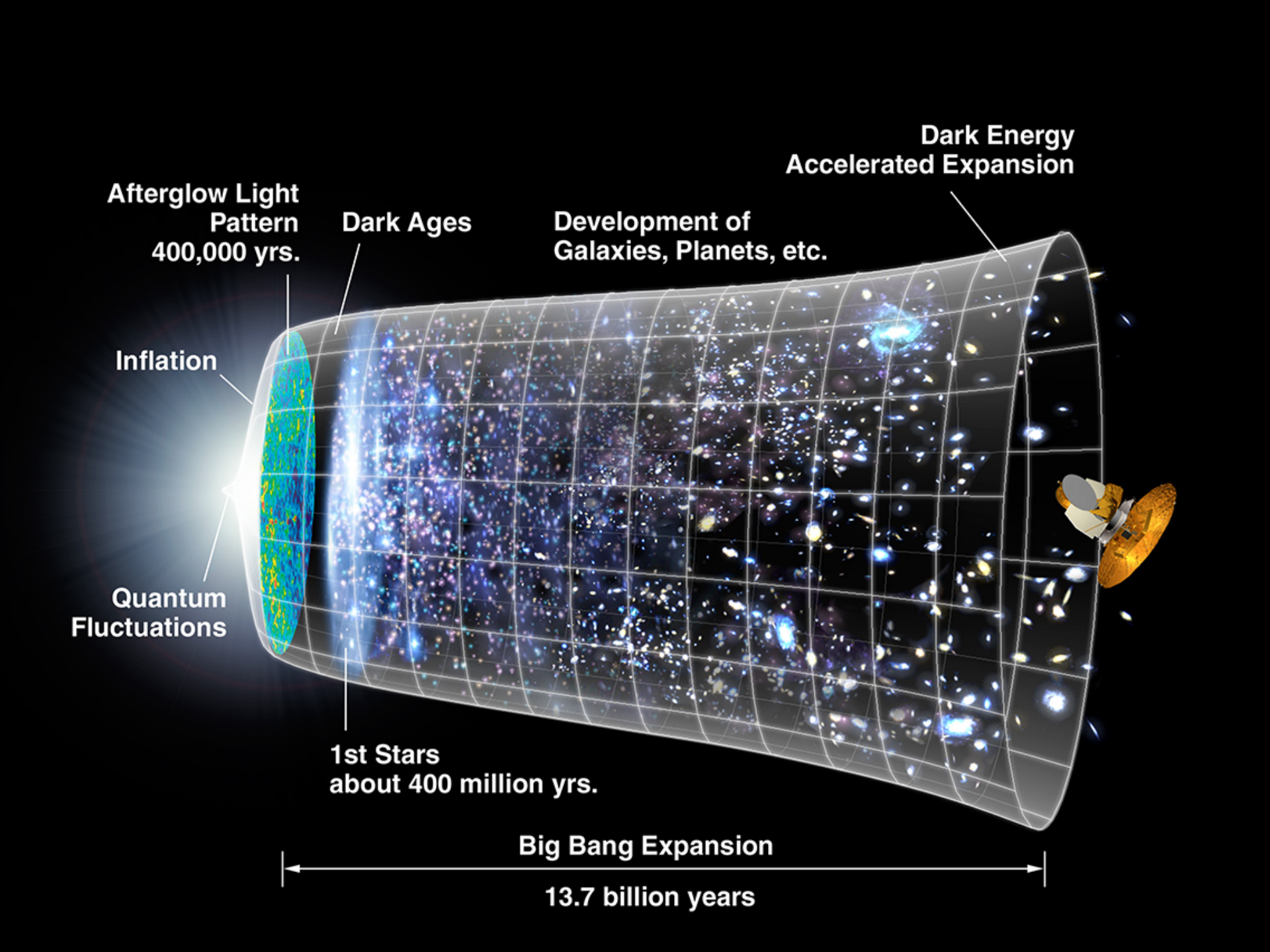
Herschels infrarøde observationer af fjerne galakser


6.8 bn years
2.6 bn years
4.7 bn years
10.2 bn years
10.2 bn years
8.1 bn years

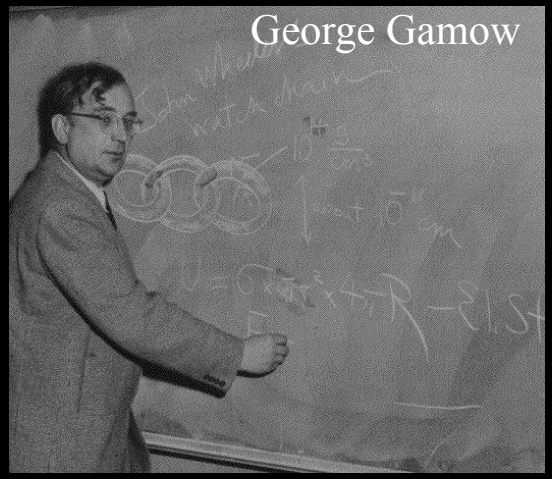
Infrarød

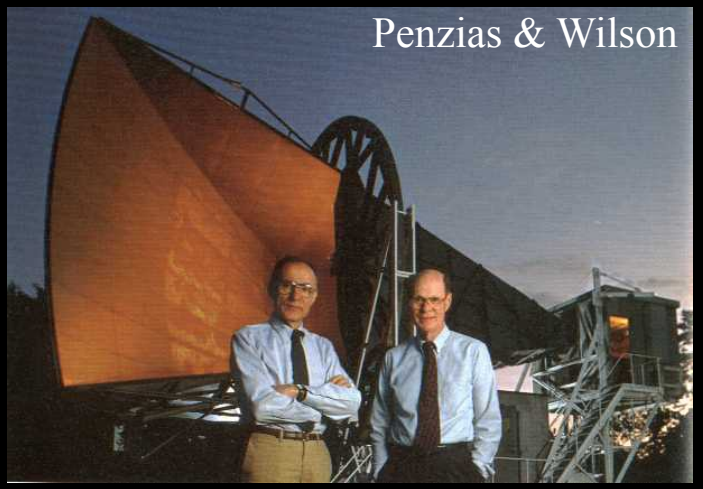
Infrarød



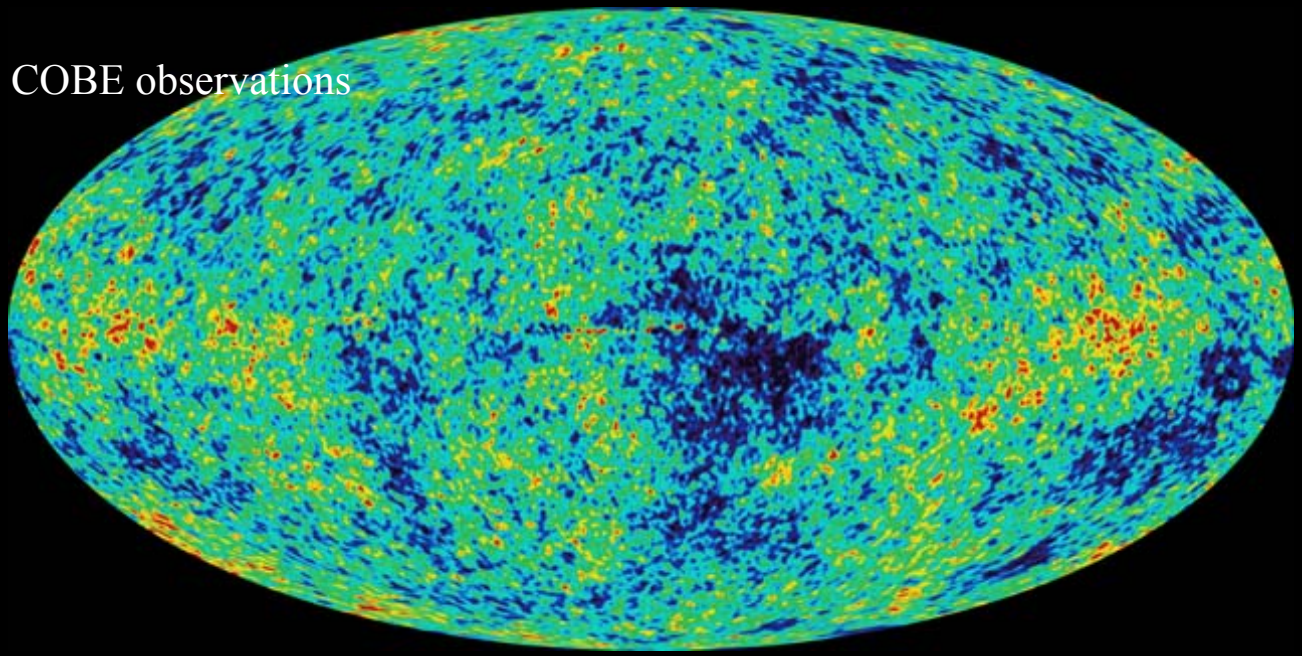

Dark Energy
Accelerated Expansion
Afterglow Light
Pattern
400,000 yrs.
Dark Ages
Development of
Galaxies, Planets, etc.
Inflation
Quantum
Fluctuations
1st Stars
about 400 million yrs.
Big Bang Expansion
13.7 billion years

Mikrobølge baggrundstårlingen

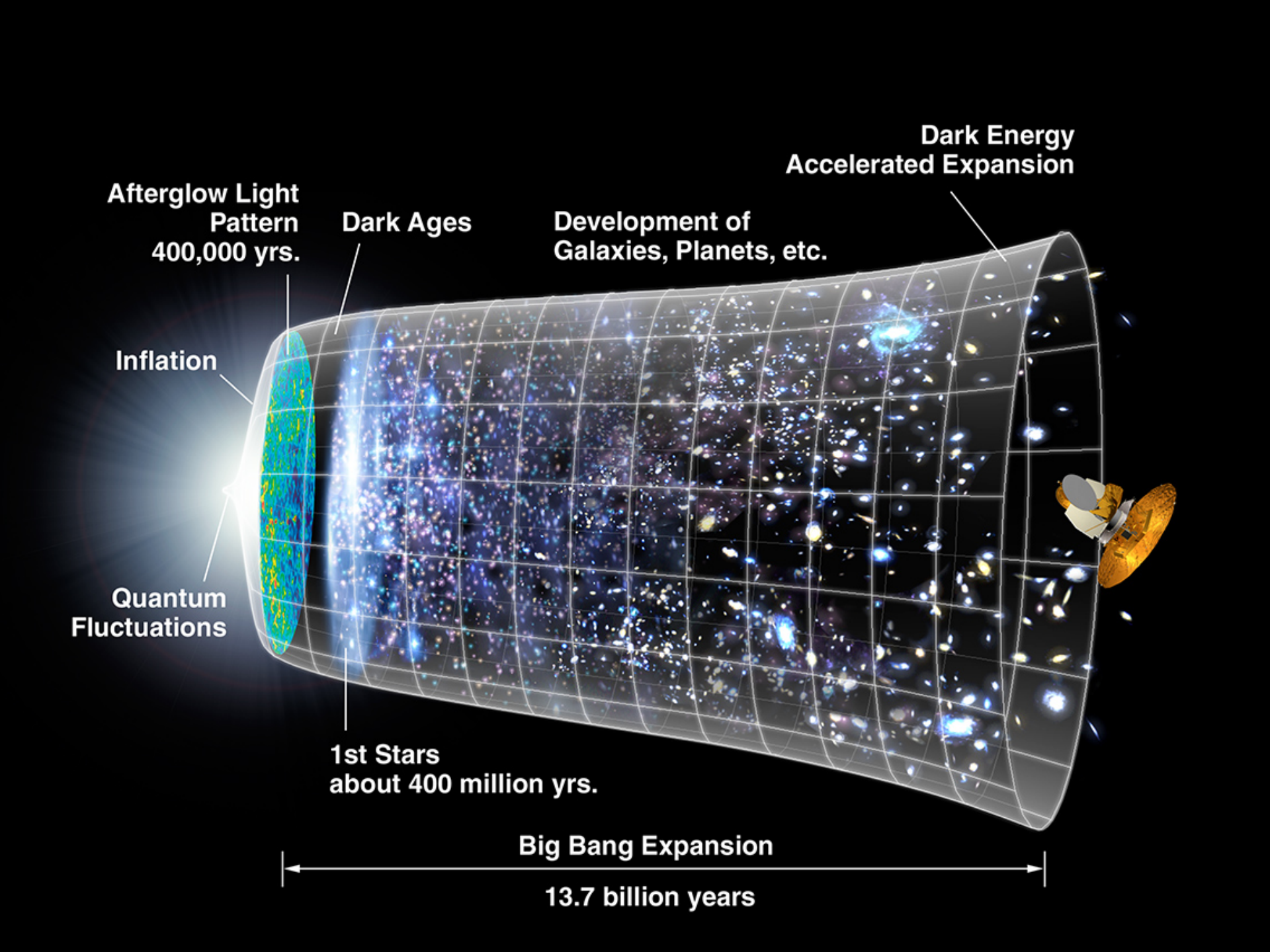

George Gamow


Penzias & Wilson

COBE observations



Forslået af George Gamow i 1946. Tilfældigt opdaget (serendipity) af Arno Penzias og Robert Wilson i 1964. Nobel pris i 1978.


Dark Energy
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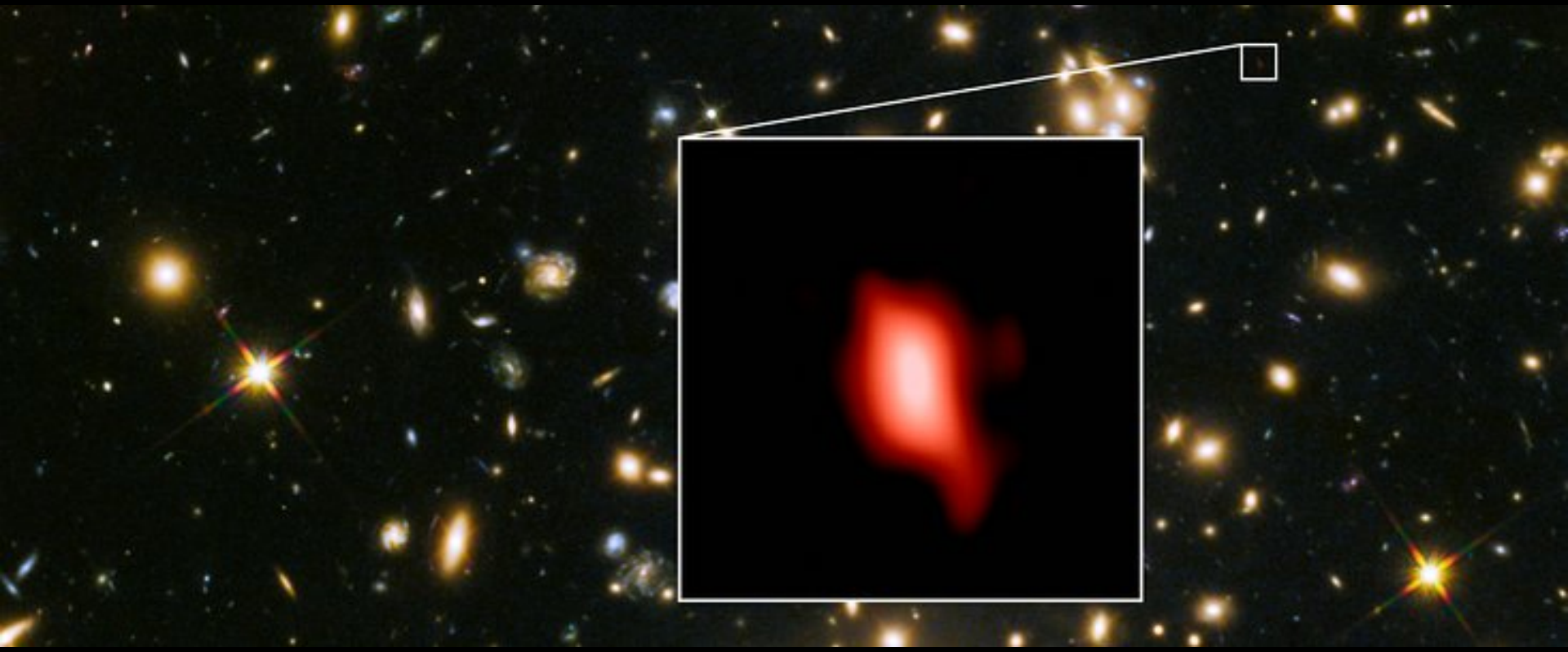
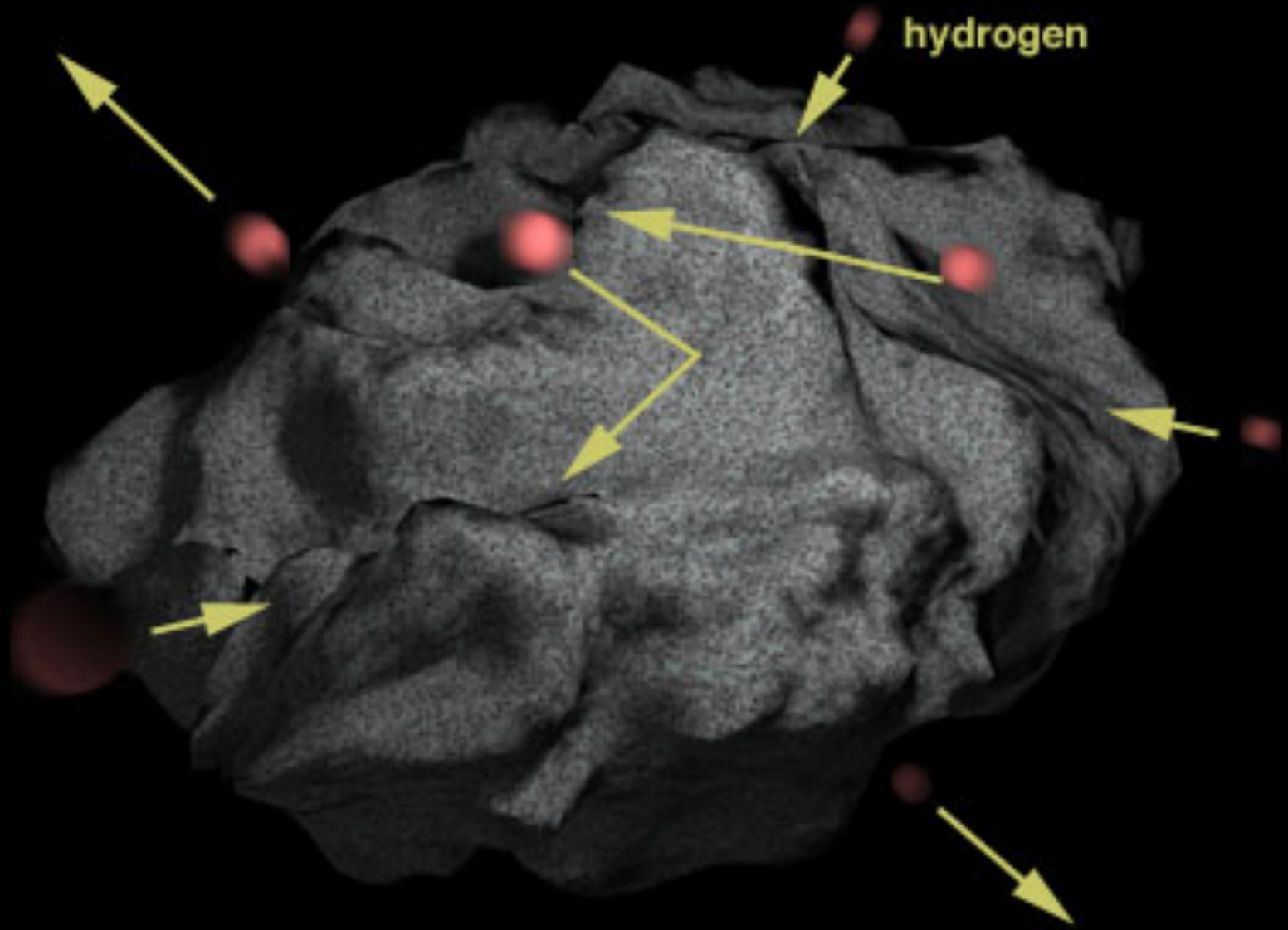
ALMA observationer af det første ilt i galaksen MACS1149–JD1, 250 millioner år efter Big Bang



Støvets betydning

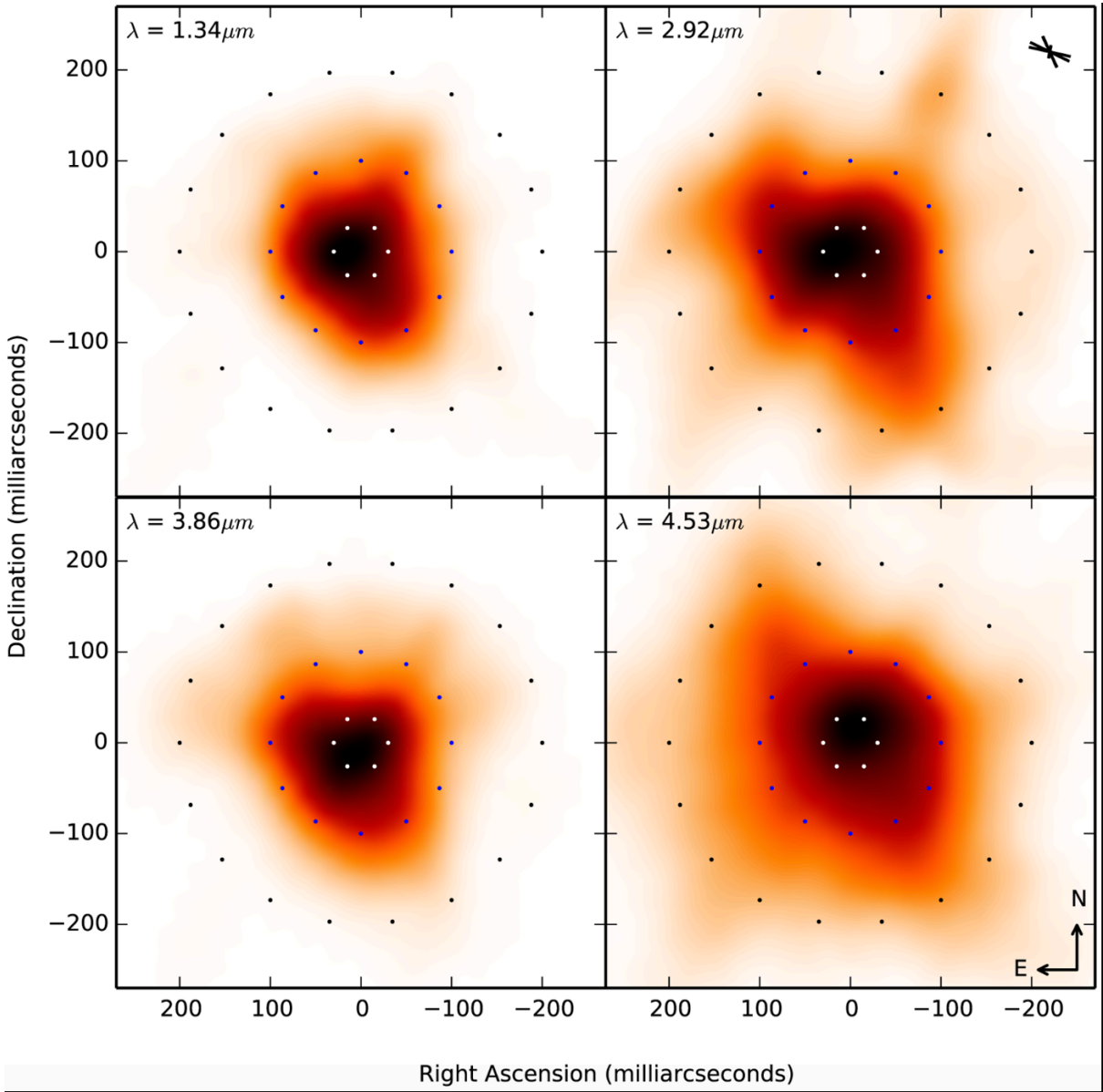


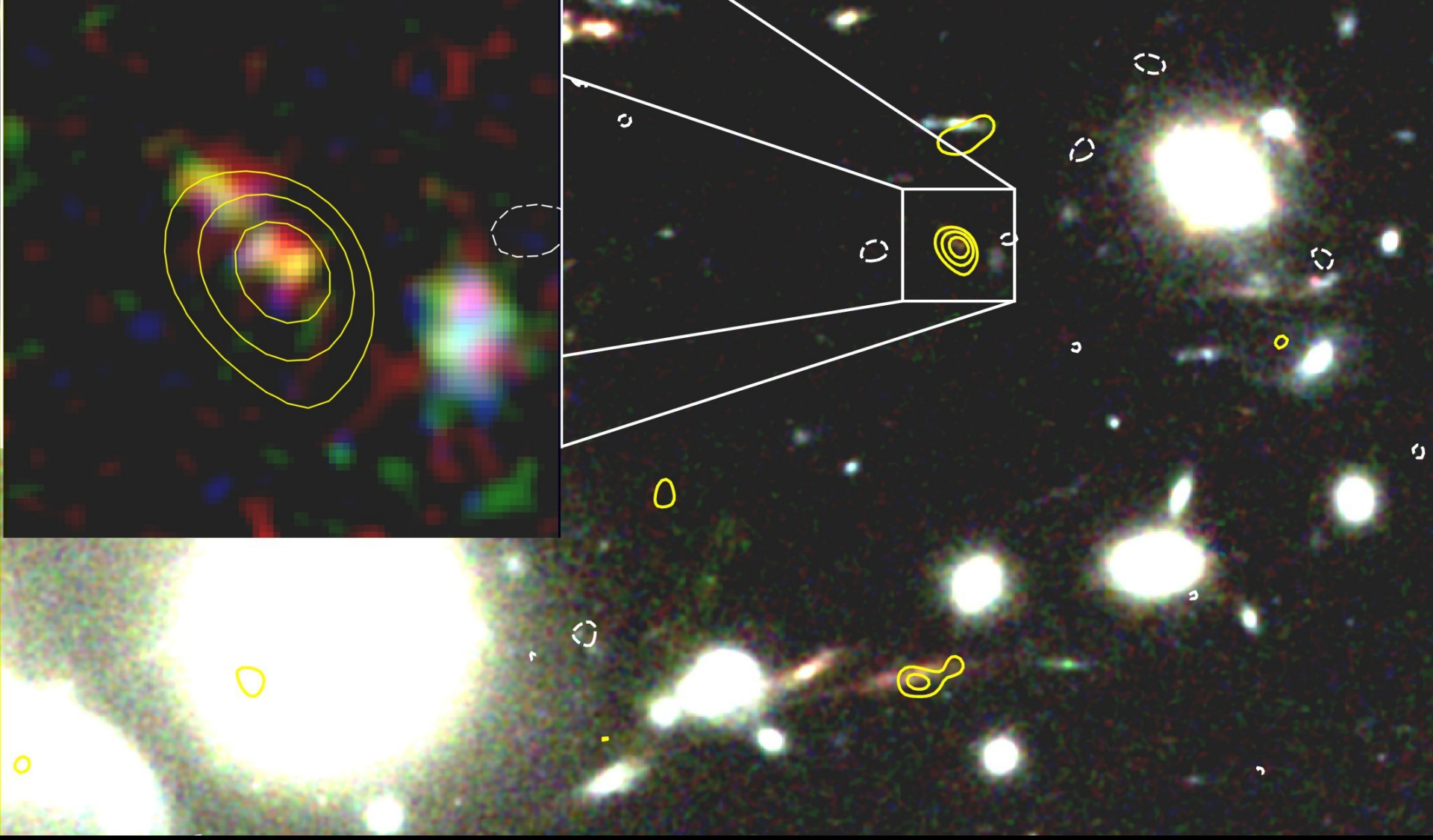
Dynamical atmospheres

The extended molecular atmosphere of **Mira** as seen by the Cassini spacecraft.

Tomographically recovered images in four spectral bands, obtained by watching the star pass behind Saturn's rings.

Steward et al. (2016)





ALMA and VLT observations of the cluster lensed dust galaxy at z=7.4. Dust mass $4 \times 10^7 M_{sun}$

Watson et al. 2015