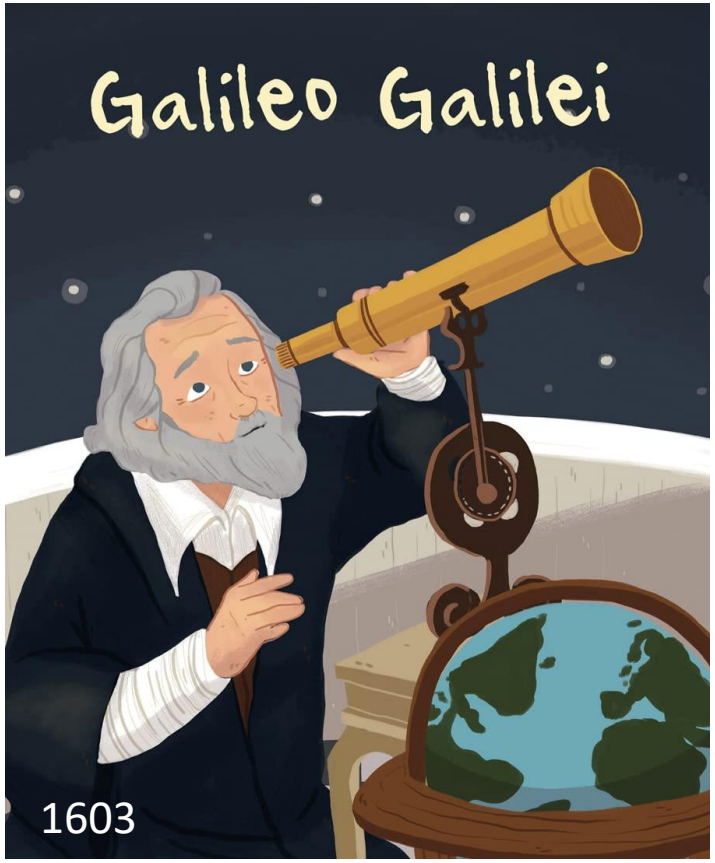
LWSK ALV 18 maart 2025 J. v. Kuilenburg.

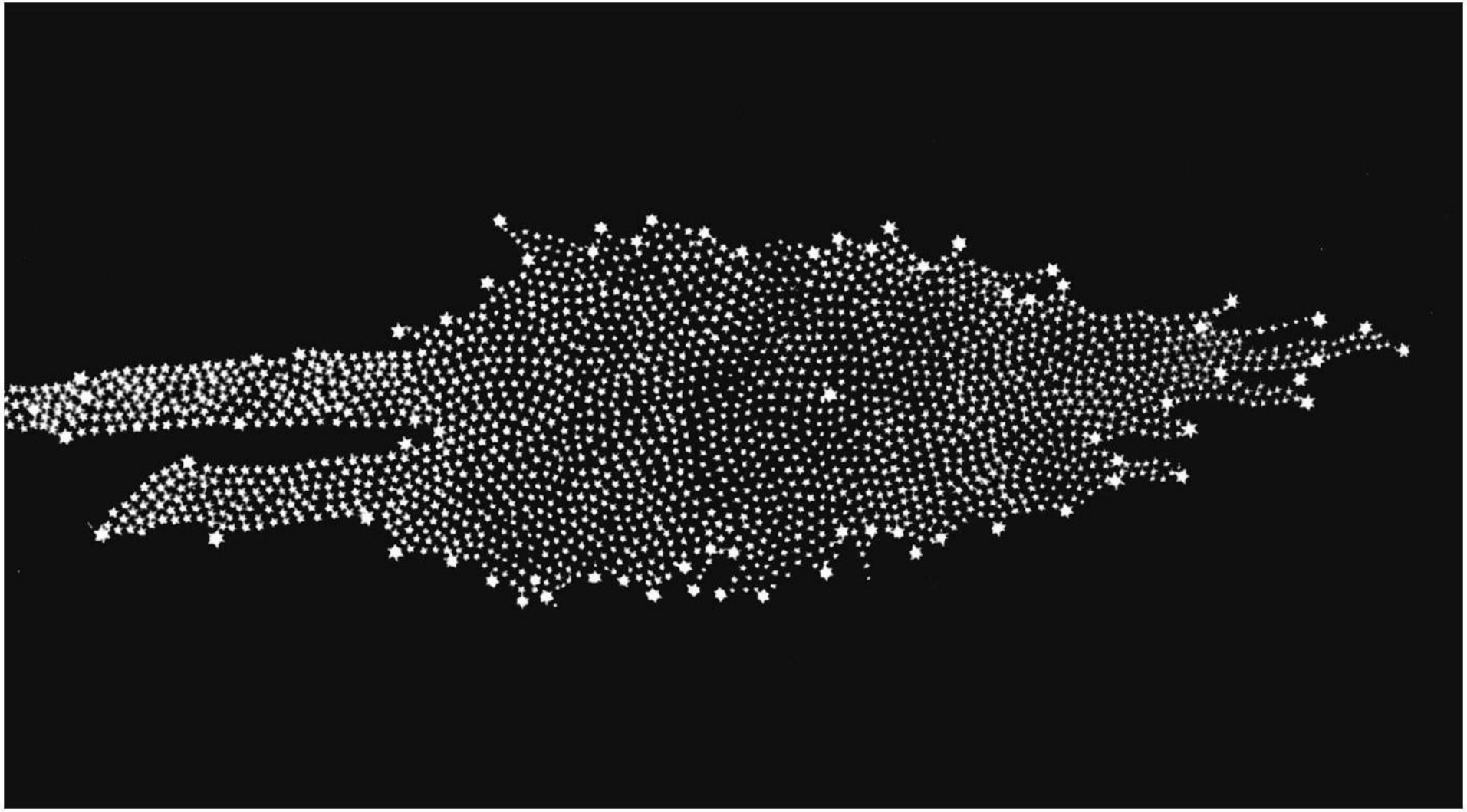
Heliocentrisch wereldbeeld

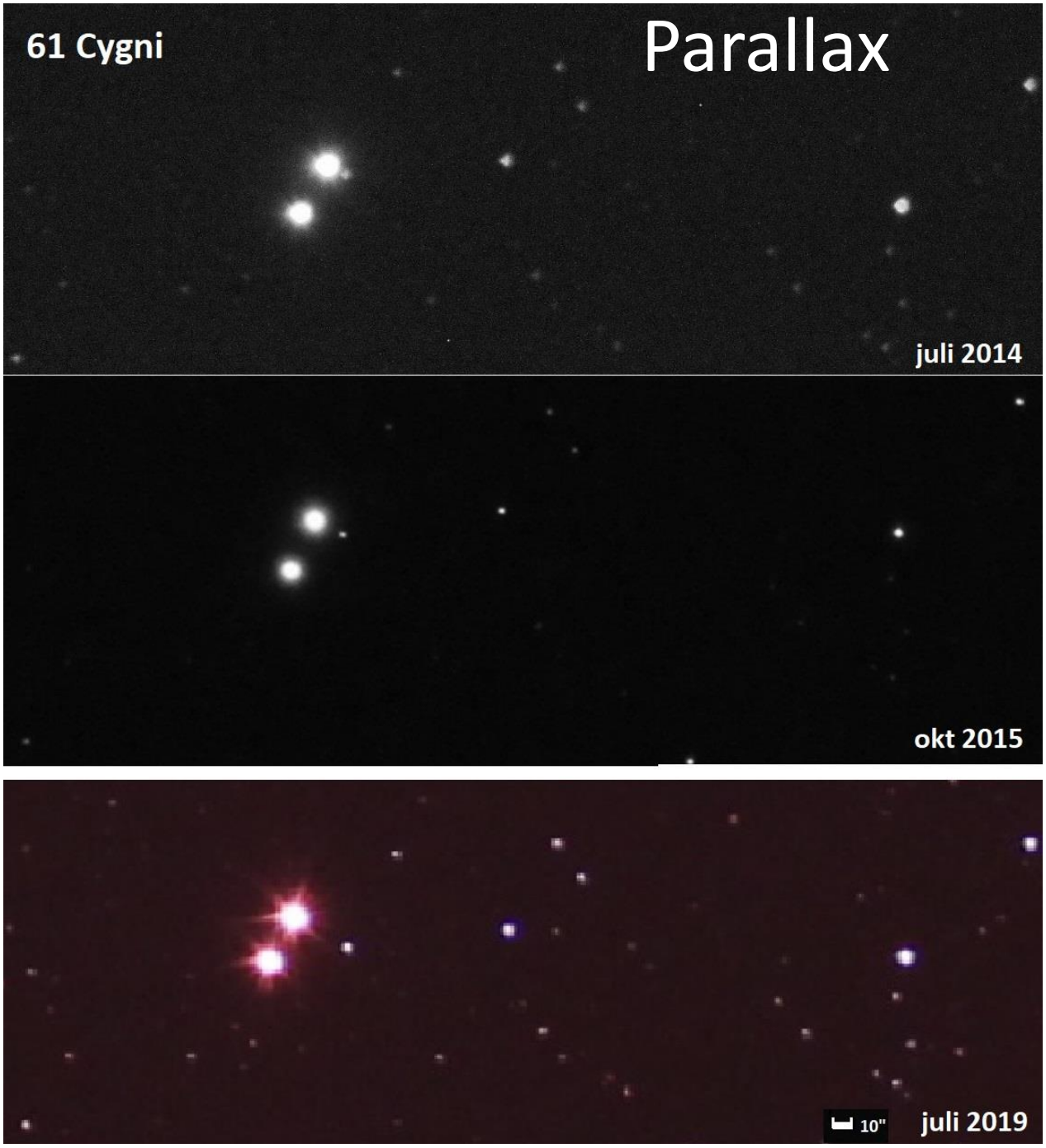


Filosoferen over het ontstaan van planeten.

1755:
Emanuel Kant **”Allgemeine Naturgeschichte und Theorie des Himmels“**

William Herschel's universum




61 Cygni
Parallax
juli 2014
okt 2015
10"
juli 2019

Wánneer wisten we wát?

1675 Leibniz, **differentieren / integreren**
1687 Newton, **klassieke mechanica** "Philosophiae Naturalis Principia Mathematica"
1758 Dollond, **achromatische lens**

1837 **Behoud energie** (thermodynamica)
1859 Bunsen. Kirchhoff, **spectraal analyse (**1864 Huggins, spectroscopie astronomie)
1878 Michelson, Morley, **constante lichtsnelheid**

1916 Einstein, **Algemene Relativiteits Theorie**
1923 Hubble, **afstand M31, expansie heelal**
1925 Payne-Gaposhkin, **H en He als hoofdbestanddeel sterren**
1932 Chadwick, **neutron** (-ino)
1933 Zwicky, **donkere materie**
1939 Bethe (,Eddington), **fusie waterstof als bron energie sterren**

Kapteyn's universum

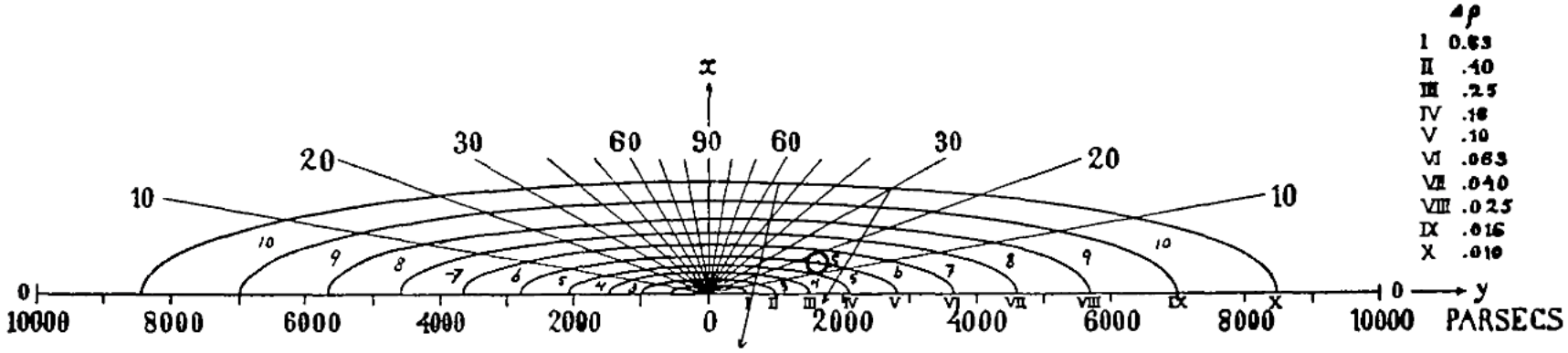
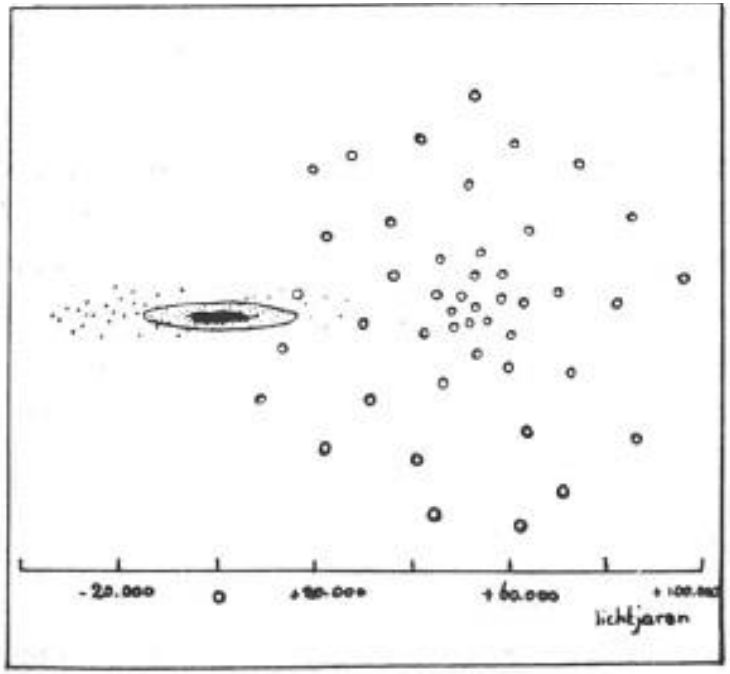
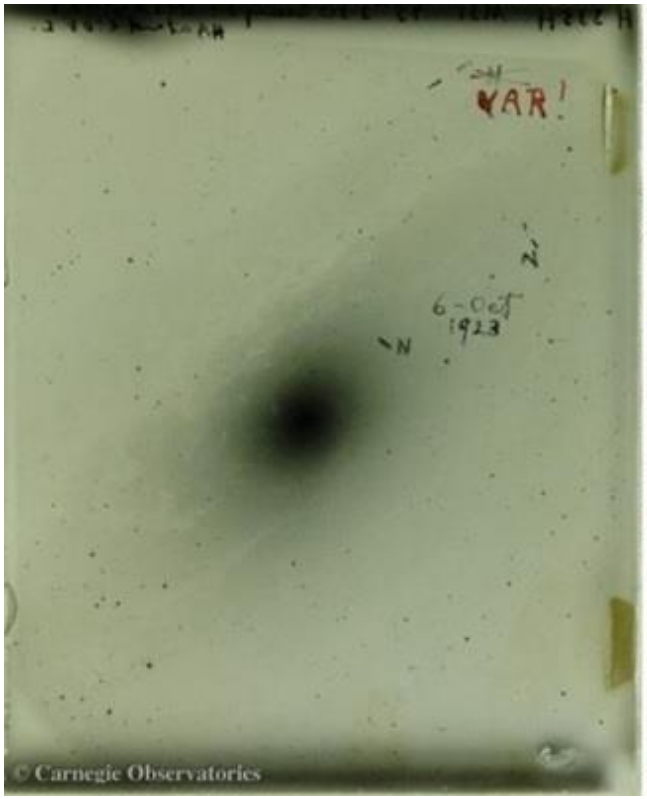
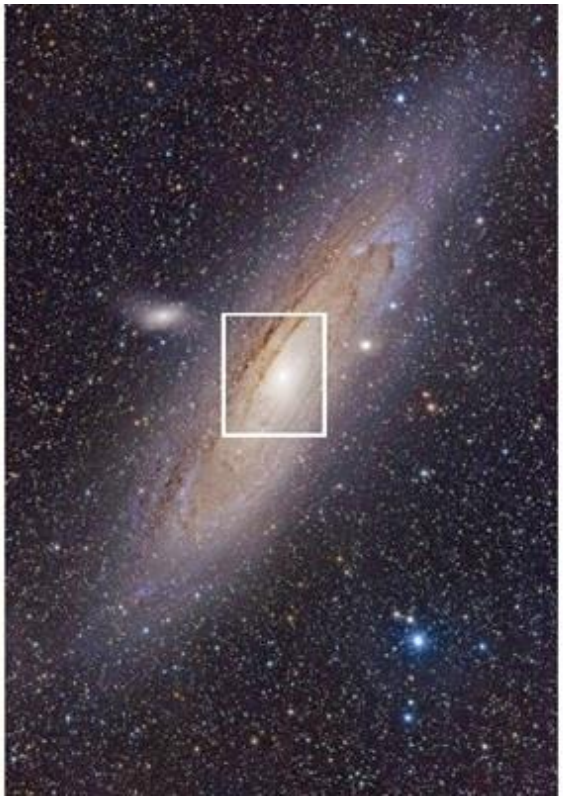


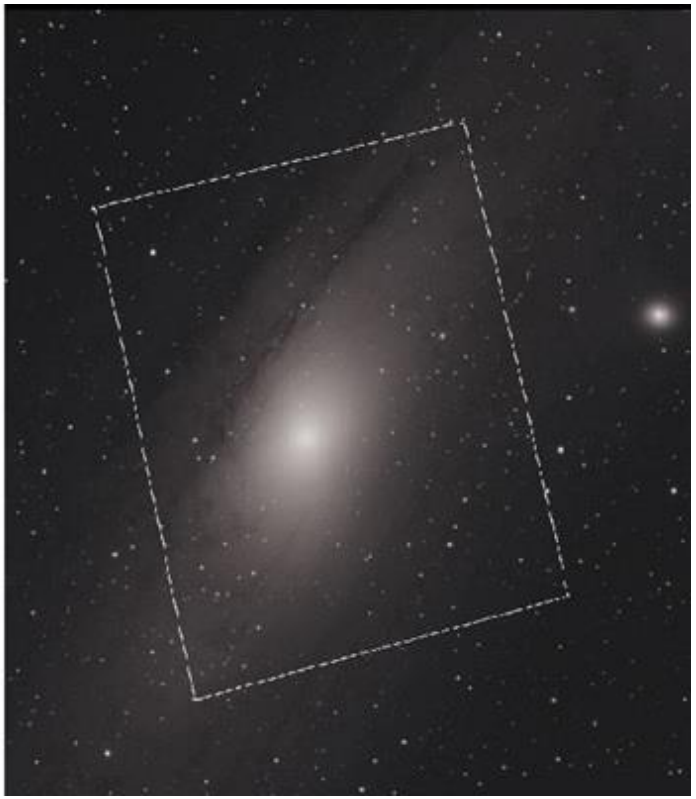
FIG. 1

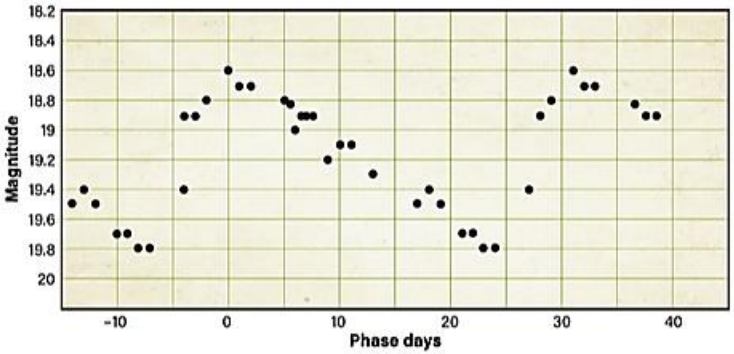


Cepheïde in M31

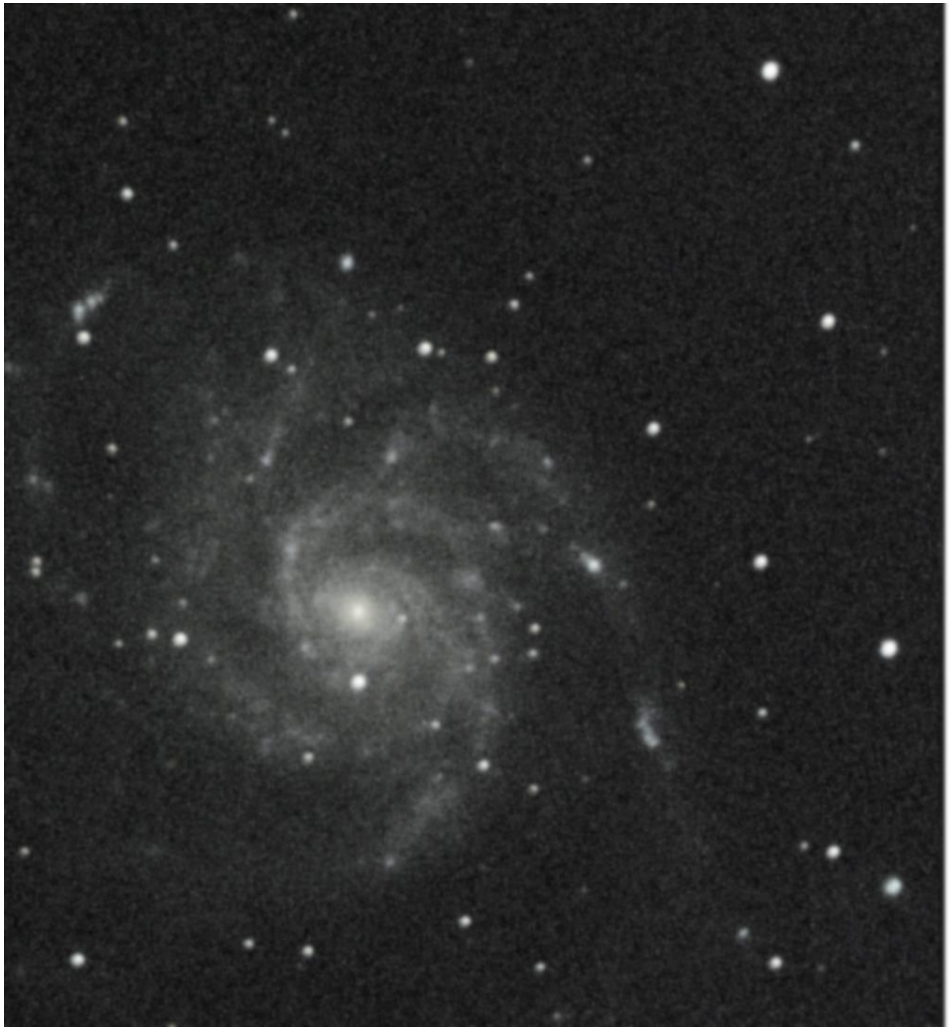


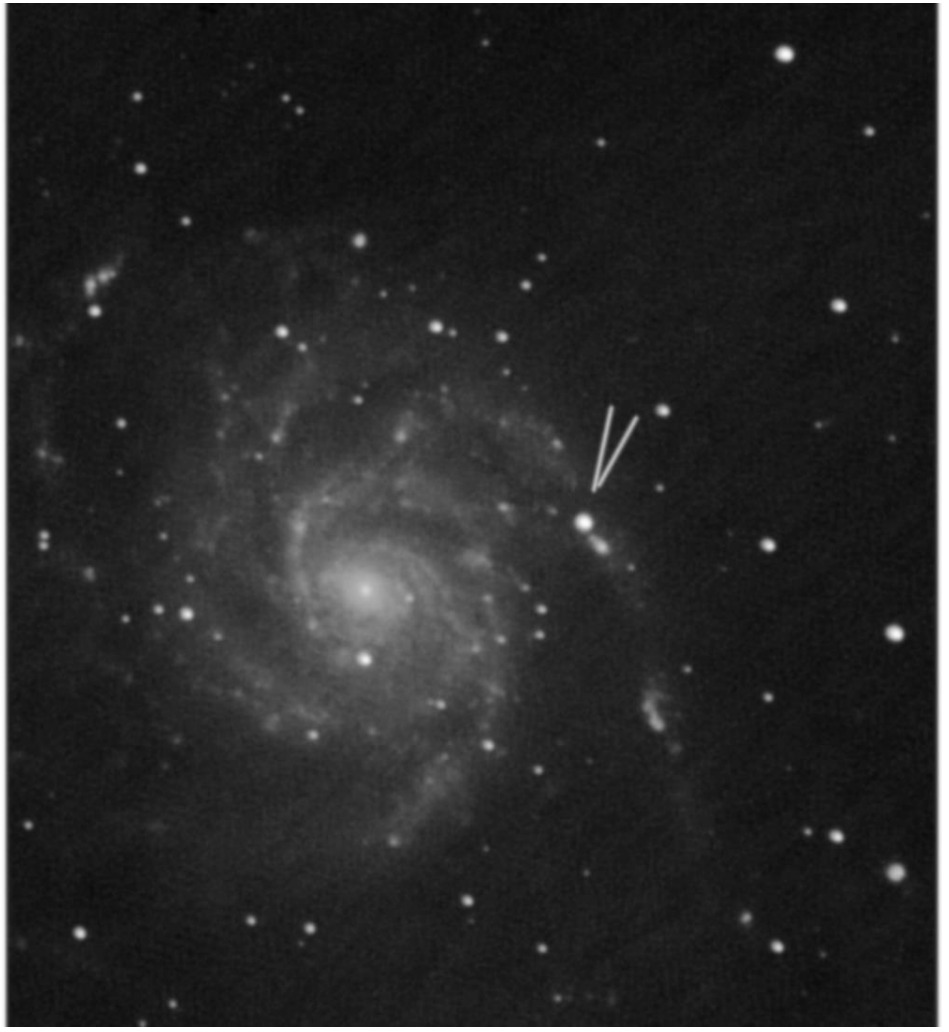




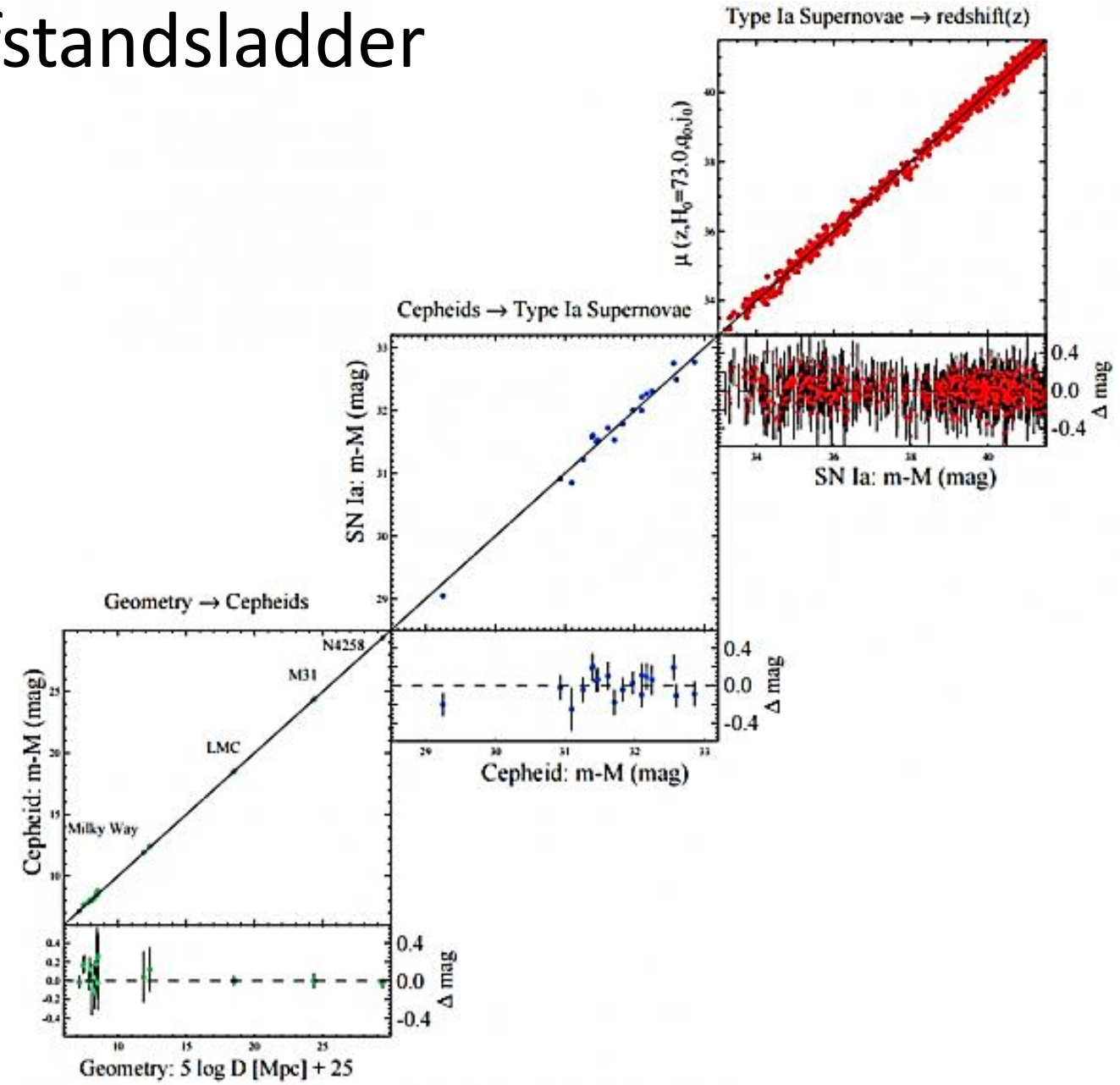


M101 super nova 2023ixf

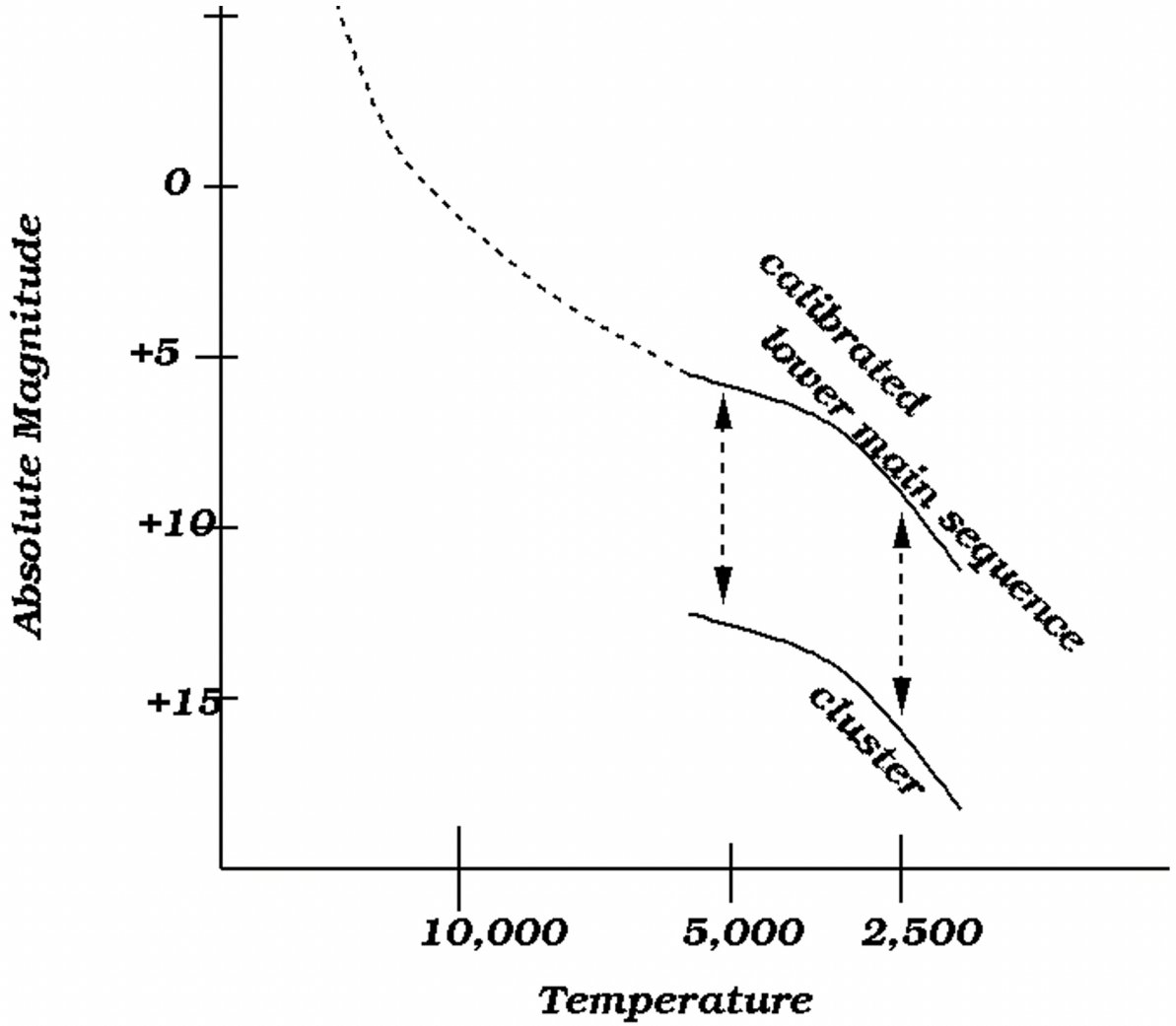


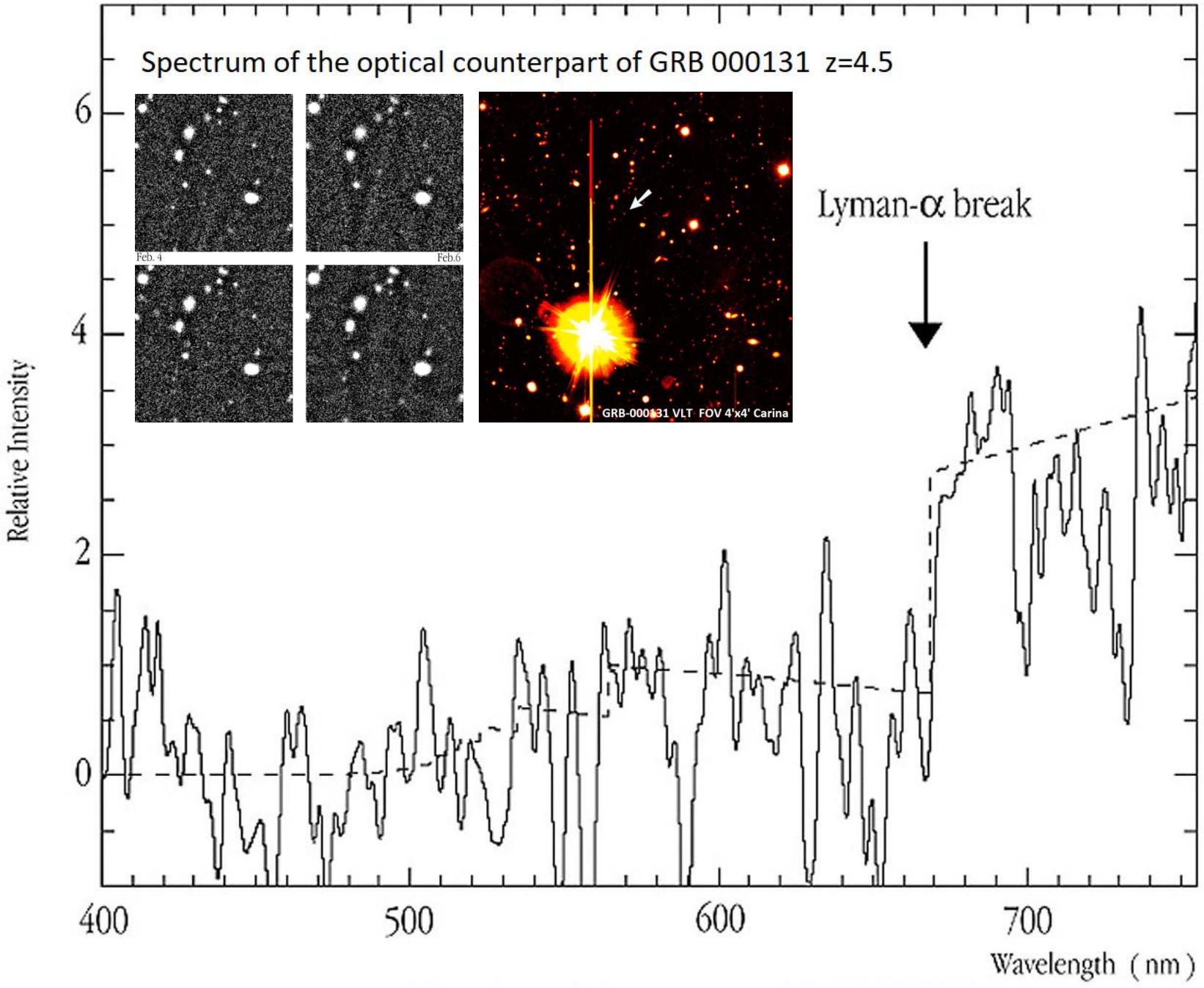


Afstandsladder



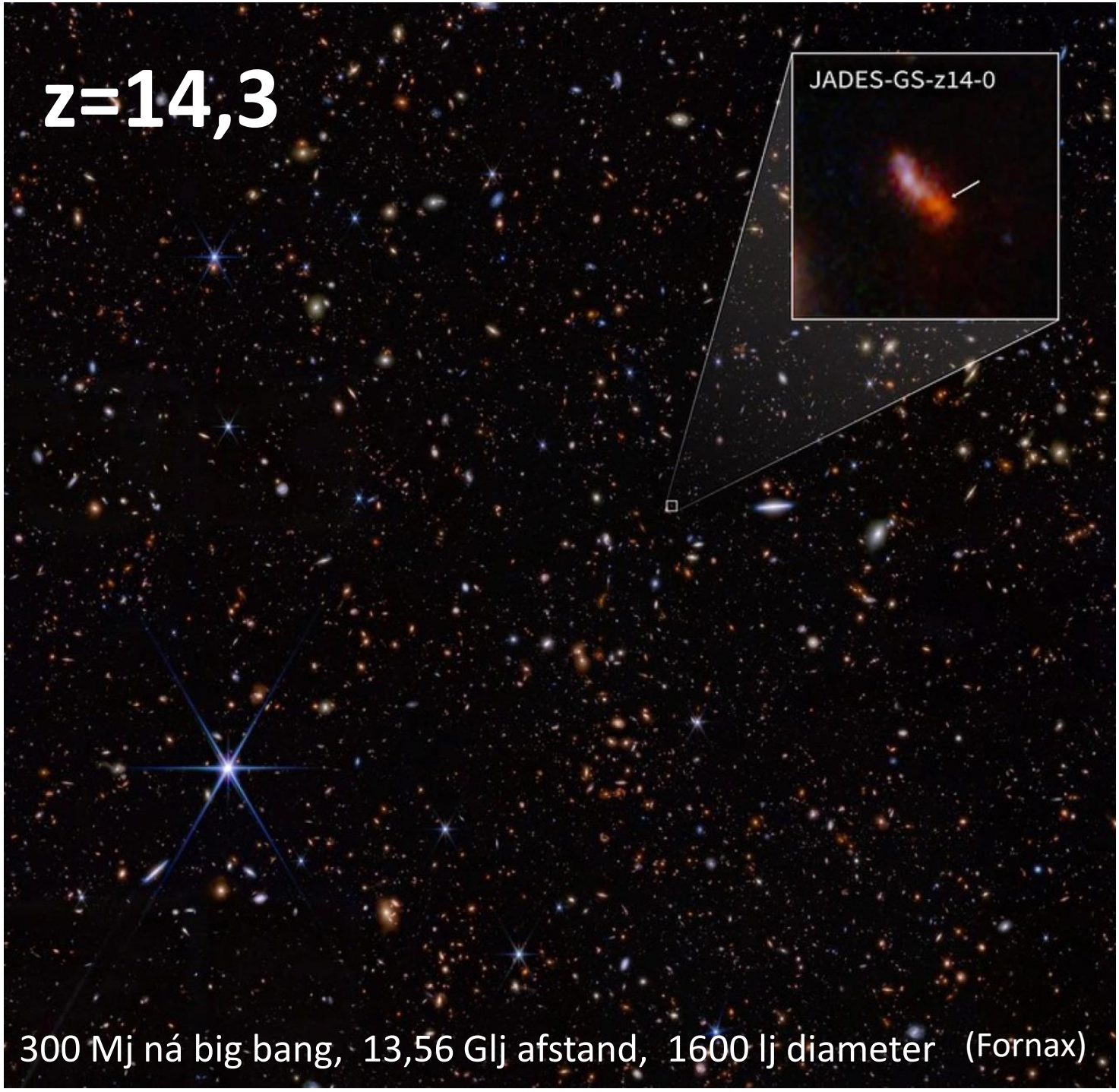
Hertzsprung-Russel diagram als meetlat




Spectrum of the optical counterpart of GRB 000131 z=4.5
Feb. 4
Feb.6
GRB-000131 VLT FOV 4'x4' Carina
Lyman-α break
Relative Intensity
0
2
4
6
400
500
600
700
Wavelength (nm)

Zwaartekracht lenzen

Super Nova Refsdal, MACS J1149.6+2223 cluster (Leo)


z=14,3
JADES-GS-z14-0
300 Mj ná big bang, 13,56 Glj afstand, 1600 lj diameter (Fornax)