



Cargèse Telescope Academy

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Albireo (β -Cygni)



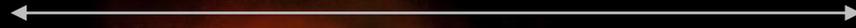
Albireo A/B = red/blue doublet

Dist. ~ 380 ly

- Two stars moving on different paths, probably not gravitationally bound
- Albireo A itself is a double star

M57 – Ring Nebula of Lyra

HST



1 arcmin



Discov. 1779 by Charles Messier

Mag. +8.8

Ø 1-1.5 arcmin (+1 arcsec/century)

Dist 2 567 ly

Radius 1.3 ly

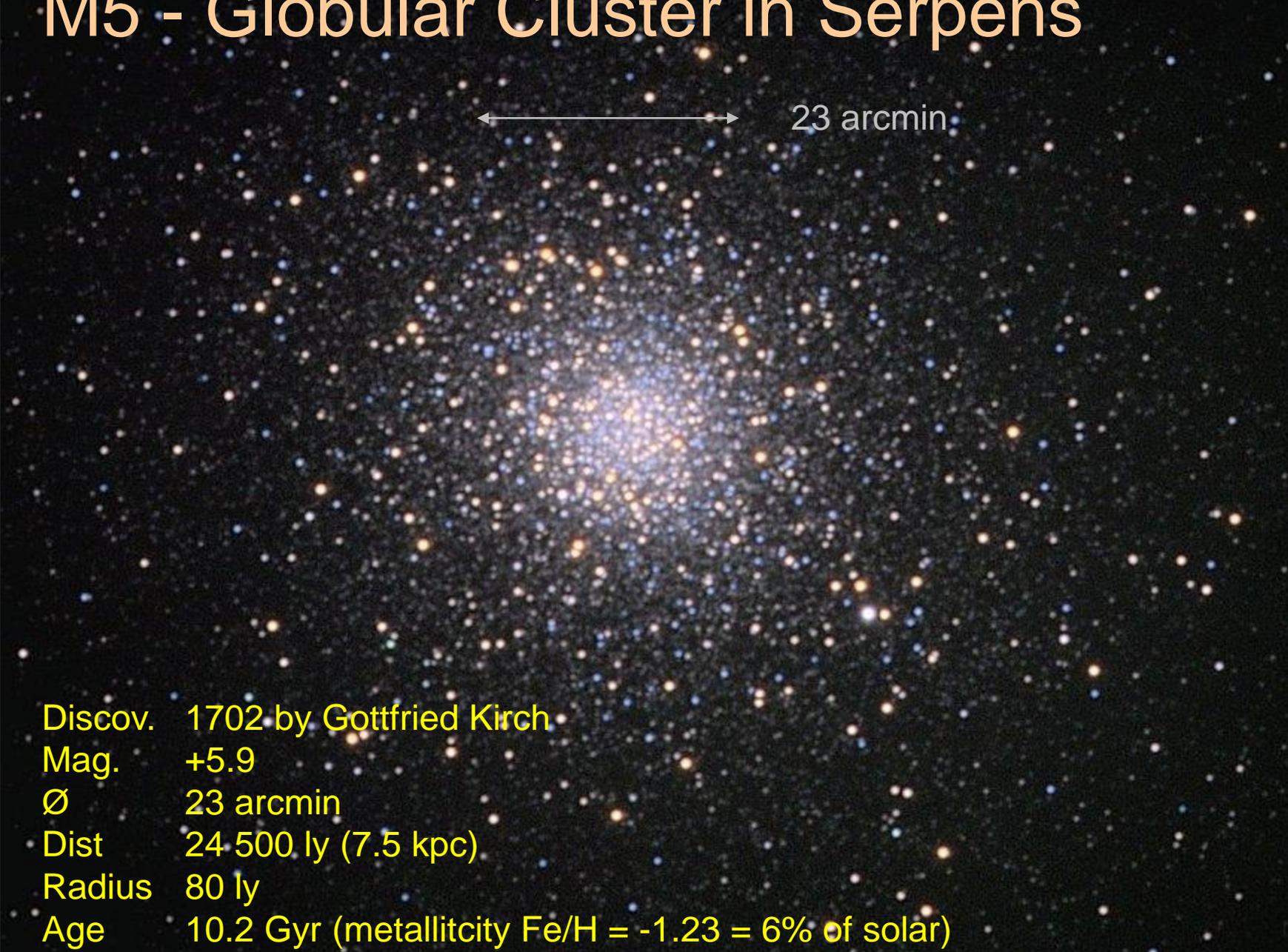
Velocity ~25 km/s

Age ~ 3000-6000 yr

White Dwarf (0.6 Msol, 200 Lsol, 125 000 K)

M5 - Globular Cluster in Serpens

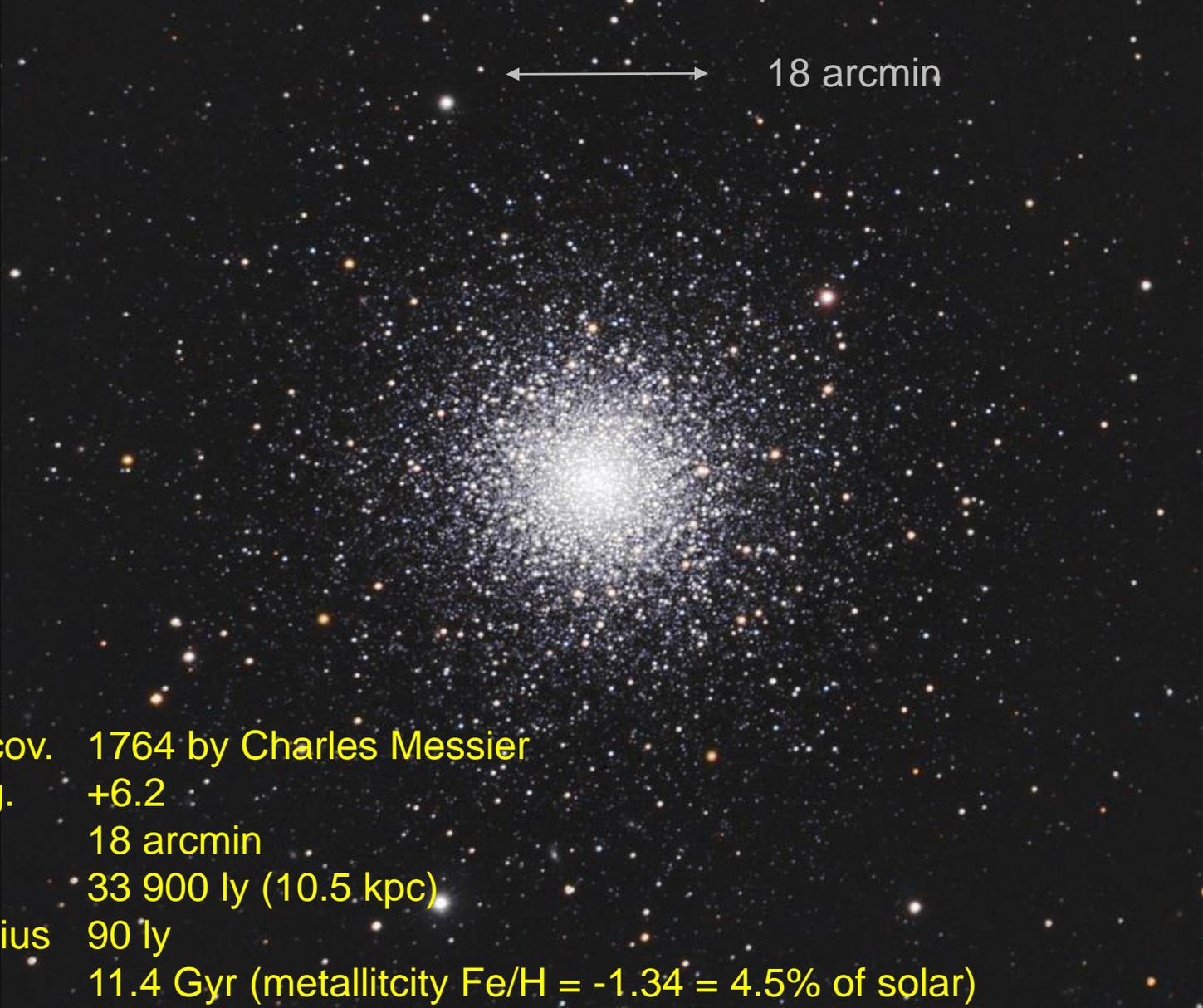
←→ 23 arcmin



Discov. 1702 by Gottfried Kirch
Mag. +5.9
Ø 23 arcmin
Dist 24 500 ly (7.5 kpc)
Radius 80 ly
Age 10.2 Gyr (metallitcity Fe/H = -1.23 = 6% of solar)
Mass 86 000 Msol

M3 - Globular Cluster in Serpens

←→ 18 arcmin



Discov. 1764 by Charles Messier

Mag. +6.2

Ø 18 arcmin

Dist 33 900 ly (10.5 kpc)

Radius 90 ly

Age 11.4 Gyr (metalliticity $\text{Fe}/\text{H} = -1.34 = 4.5\%$ of solar)

Mass 45 000 M_{sol}

M51 – Whirlpool Galaxy in Canes V.

HST



Discov. 1773 by Charles Messier

Mag. +8.4

Size 11 x 7 arcmin

Dist 23 000 000 ly (7.1 Mpc)

Size 76 000 ly (0.8 x Milky-Way)

Interacting Spiral Galaxy with Seifert 2 AGN (collisions ~500 and ~100 Myr ago)

M81 & M82 – Galaxies in Ursa Major

← 25 arcmin →

← Separation 2D~130 000 ly (3D~300 000 ly) →

Discov. 1774 by Johann Elert Bode
Mag. +7.0
Ø 25 arcmin
Dist 12 000 000 ly (3.5 Mpc)
Size 87 000 ly
BH Mass $60 \cdot 10^6 \text{ Msol}$

Discov. 1774 by Johann Elert Bode
Mag. +8.4
Ø 11 arcmin
Dist 11 500 000 ly (3.5 Mpc)
Size 37 000 ly
BH Mass $30 \cdot 10^6 \text{ Msol}$

SN2014J in M82

SN Ia at distance 11.5 Mly

- discovered by amateur astronomers (35 cm telescope, London, undergrad teaching)
- closest supernova since SN2004dg (11 Mly, type IIp),
- closest SN Ia since SN1972e (10.9 Mly)

Intense follow-up observations

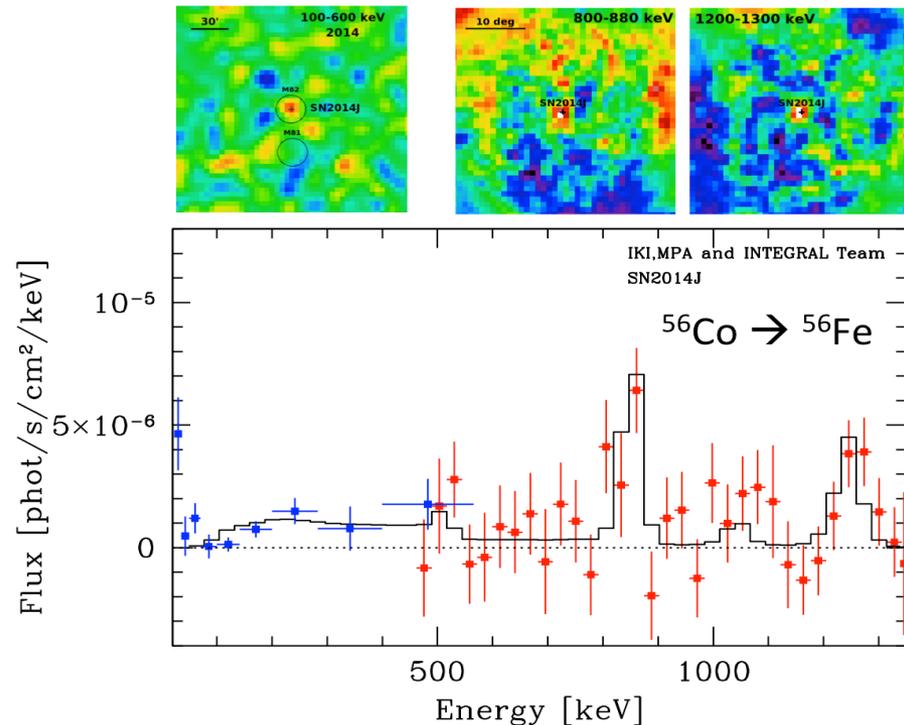
INTEGRAL satellite (SPI) → first time direct detection $^{56}\text{Ni} \rightarrow ^{56}\text{Co} \rightarrow ^{56}\text{Fe}$ decay chain

SN2014J in M82

INTEGRAL/SPI : Gamma-ray lines from radioactive decay of ^{56}Co at 847 and 1238 keV

- Line fluxes \rightarrow more than 0.5 Msol of ^{56}Ni produced by explosion.
- Doppler broadening \rightarrow radioactive ejecta propagate $> 10\,000$ km/s.
- $^{56}\text{Ni} \rightarrow ^{56}\text{Co}$ (decay 9 days) gamma-rays trapped in the dense ejecta, heat the ejecta.
- $^{56}\text{Co} \rightarrow ^{56}\text{Fe}$ (decay 111 days) powers the late light curve
- more and more gamma-rays escape ejecta \rightarrow nucleosynth in SN Ia detected for 1st time by SPI !

The spectrum of the type Ia supernova SN2014J observed by *INTEGRAL* 50 to 100 days after the explosion. Red and blue spots are data from the two instruments SPI and ISGRI/IBIS. The black curve depicts a comparison model for a supernova spectrum on day 75 after the explosion. The top row shows images in the three high-energy spectral bands of *INTEGRAL*. In all images, it is possible to clearly see a gamma-ray source at the (optical) position of SN2014J. © Nature / Churazov et al.



Next CTA

Saturday night (tomorrow) >23:00
on the “private” street

