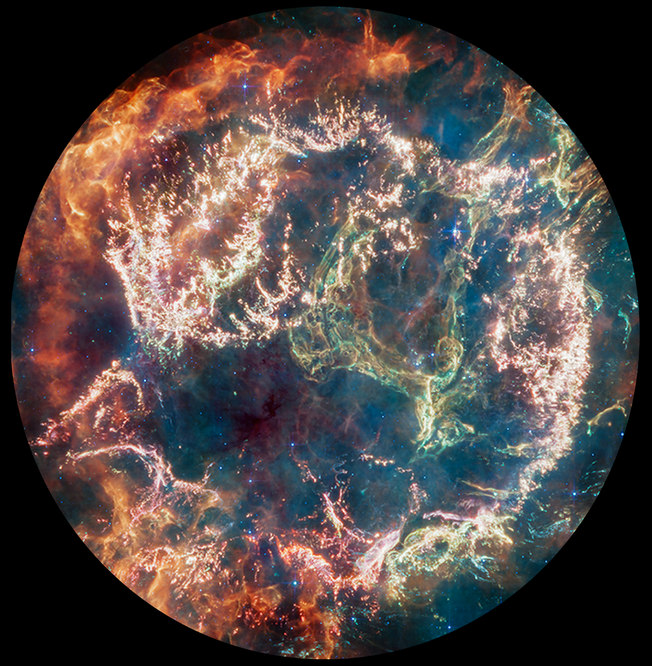


Supernovae

Esplosioni Cosmiche

Giorgio Valerin, 2026-10-27



I. Stelle: dalla nascita alla morte

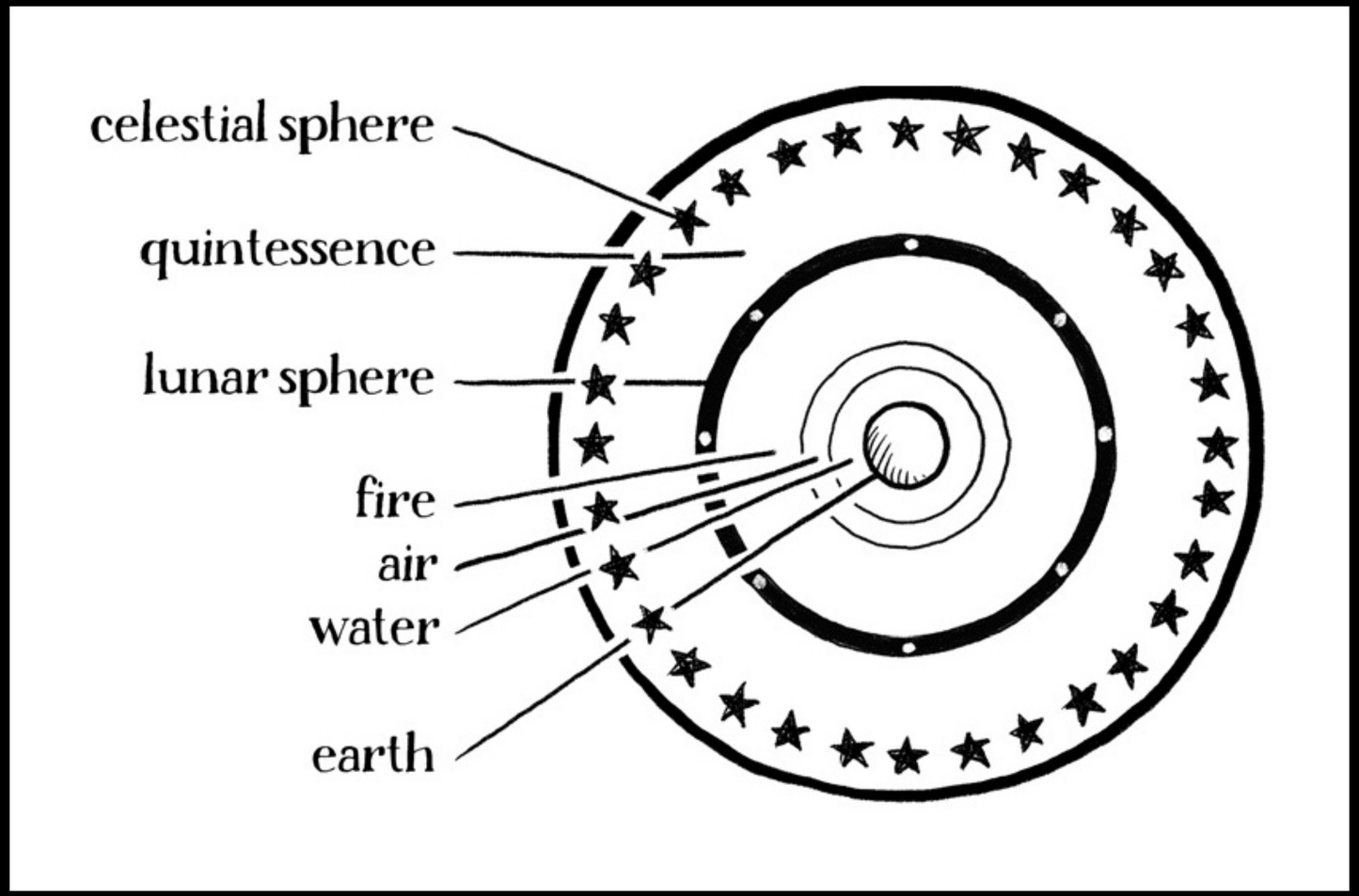
II. Come studiamo
le supernove





III. Consigli pratici per
un proposal

Un cielo immutabile

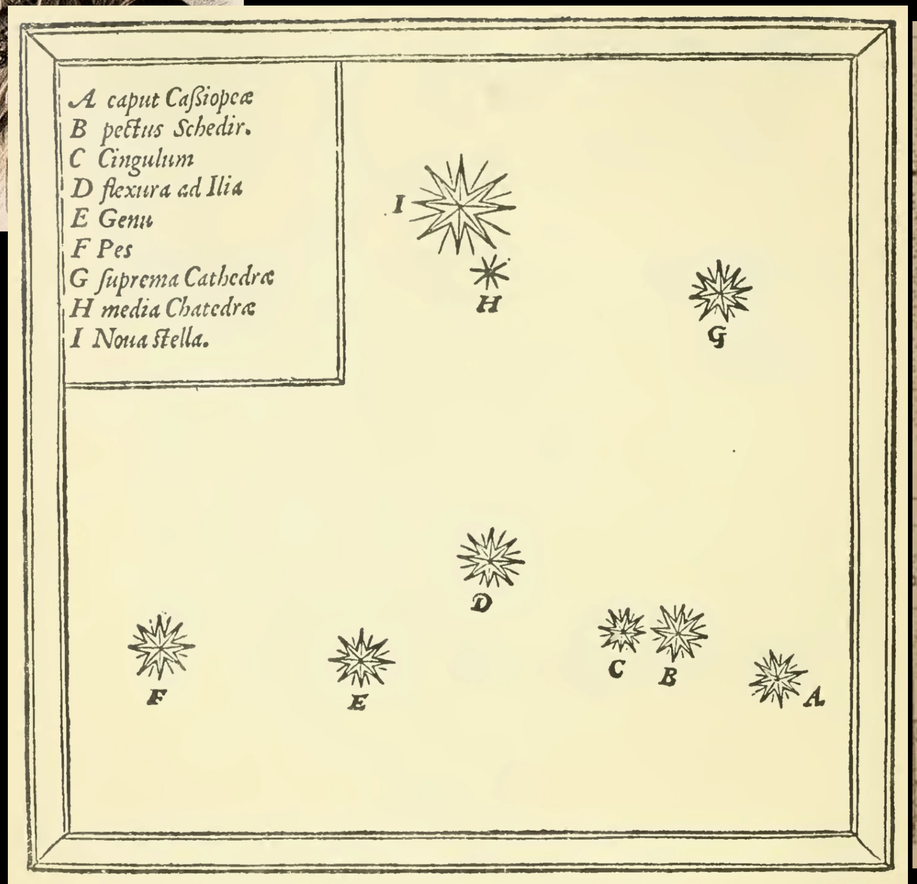


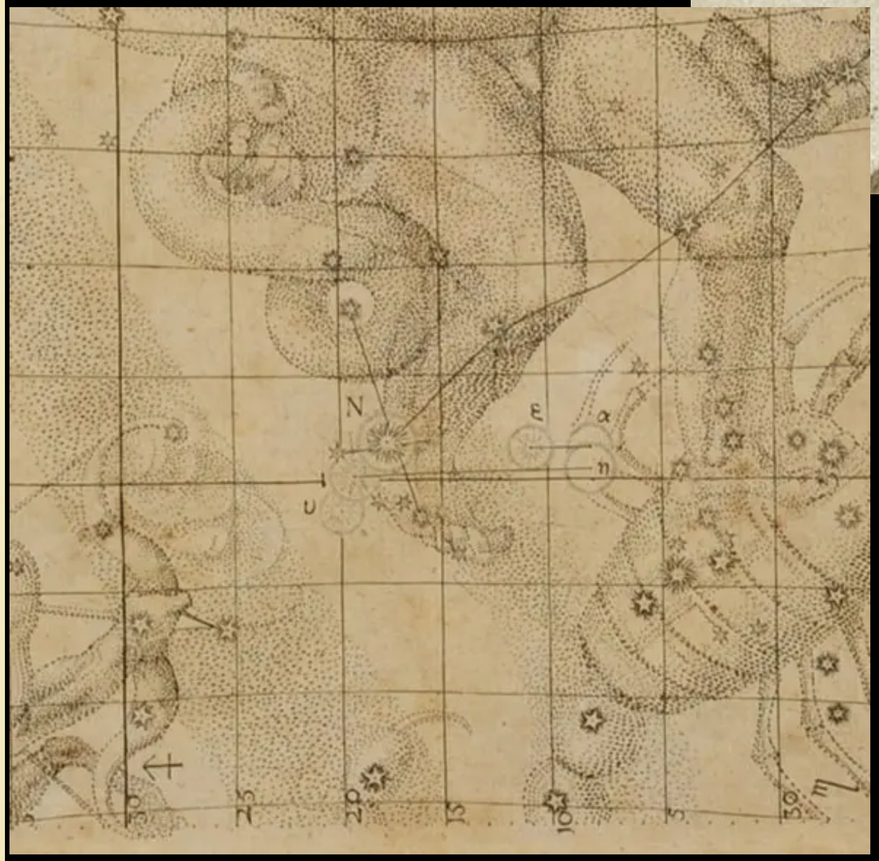


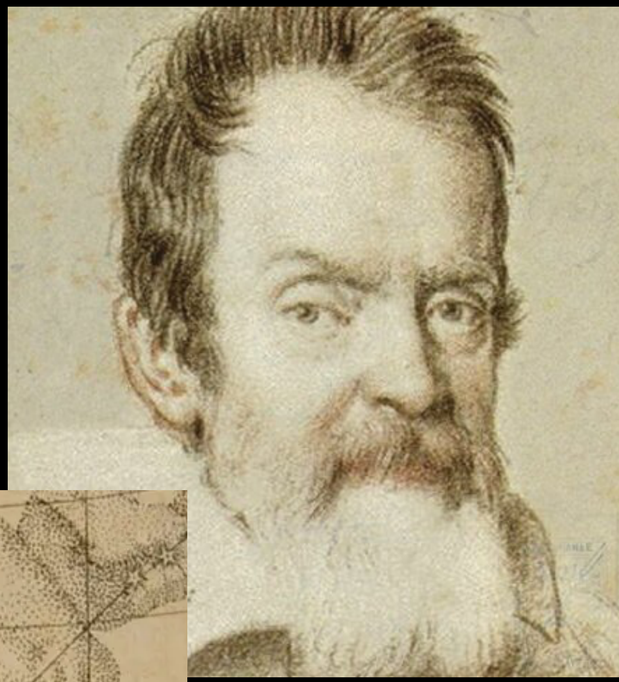
Un cielo immutabile…?



1572







1604

L'universo "appena" dopo il Big Bang

75%

25%

1 IA 1A	2 IIA 2A	3 IIIB 3B	4 IVB 4B	5 VB 5B	6 VIB 6B	7 VIIB 7B	8	9 VIII 8	10	11 IB 1B	12 IIB 2B	13 IIIA 3A	14 IVA 4A	15 VA 5A	16 VIA 6A	17 VIIA 7A	18 VIIIA 8A
1 **H** Hydrogen 1.008																	2 **He** Helium 4.003
3 **Li** Lithium 6.941	4 **Be** Beryllium 9.012											5 **B** Boron 10.811	6 **C** Carbon 12.011	7 **N** Nitrogen 14.007	8 **O** Oxygen 15.999	9 **F** Fluorine 18.998	10 **Ne** Neon 20.180
11 **Na** Sodium 22.990	12 **Mg** Magnesium 24.305											13 **Al** Aluminum 26.982	14 **Si** Silicon 28.086	15 **P** Phosphorus 30.974	16 **S** Sulfur 32.066	17 **Cl** Chlorine 35.453	18 **Ar** Argon 39.948
19 **K** Potassium 39.098	20 **Ca** Calcium 40.078	21 **Sc** Scandium 44.956	22 **Ti** Titanium 47.867	23 **V** Vanadium 50.942	24 **Cr** Chromium 51.996	25 **Mn** Manganese 54.938	26 **Fe** Iron 55.845	27 **Co** Cobalt 58.933	28 **Ni** Nickel 58.693	29 **Cu** Copper 63.546	30 **Zn** Zinc 65.38	31 **Ga** Gallium 69.723	32 **Ge** Germanium 72.631	33 **As** Arsenic 74.922	34 **Se** Selenium 78.971	35 **Br** Bromine 79.904	36 **Kr** Krypton 83.798
37 **Rb** Rubidium 85.468	38 **Sr** Strontium 87.62	39 **Y** Yttrium 88.906	40 **Zr** Zirconium 91.224	41 **Nb** Niobium 92.906	42 **Mo** Molybdenum 95.95	43 **Tc** Technetium 98.907	44 **Ru** Ruthenium 101.07	45 **Rh** Rhodium 102.906	46 **Pd** Palladium 106.42	47 **Ag** Silver 107.868	48 **Cd** Cadmium 112.414	49 **In** Indium 114.818	50 **Sn** Tin 118.711	51 **Sb** Antimony 121.760	52 **Te** Tellurium 127.6	53 **I** Iodine 126.904	54 **Xe** Xenon 131.294
55 **Cs** Cesium 132.905	56 **Ba** Barium 137.328	57-71	72 **Hf** Hafnium 178.49	73 **Ta** Tantalum 180.948	74 **W** Tungsten 183.84	75 **Re** Rhenium 186.207	76 **Os** Osmium 190.23	77 **Ir** Iridium 192.217	78 **Pt** Platinum 195.085	79 **Au** Gold 196.967	80 **Hg** Mercury 200.592	81 **Tl** Thallium 204.383	82 **Pb** Lead 207.2	83 **Bi** Bismuth 208.980	84 **Po** Polonium [208.982]	85 **At** Astatine 209.987	86 **Rn** Radon 222.018
87 **Fr** Francium 223.020	88 **Ra** Radium 226.025	89-103	104 **Rf** Rutherfordium [261]	105 **Db** Dubnium [262]	106 **Sg** Seaborgium [266]	107 **Bh** Bohrium [264]	108 **Hs** Hassium [269]	109 **Mt** Meitnerium [278]	110 **Ds** Darmstadtium [281]	111 **Rg** Roentgenium [280]	112 **Cn** Copernicium [285]	113 **Nh** Nihonium [286]	114 **Fl** Flerovium [289]	115 **Mc** Moscovium [289]	116 **Lv** Livermorium [293]	117 **Ts** Tennessine [294]	118 **Og** Oganesson [294]

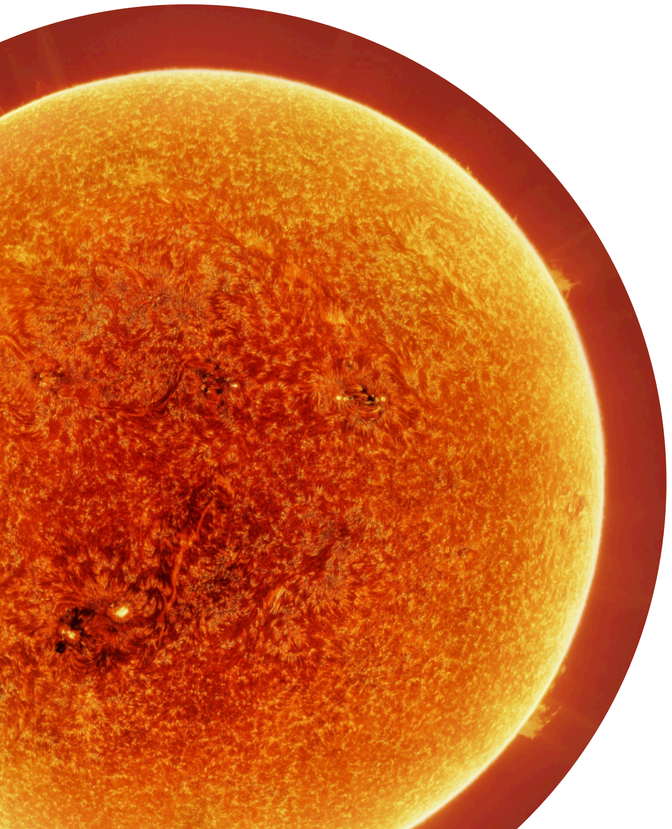
Lanthanide Series	57 **La** Lanthanum 138.905	58 **Ce** Cerium 140.116	59 **Pr** Praseodymium 140.908	60 **Nd** Neodymium 144.243	61 **Pm** Promethium 144.913	62 **Sm** Samarium 150.36	63 **Eu** Europium 151.964	64 **Gd** Gadolinium 157.25	65 **Tb** Terbium 158.925	66 **Dy** Dysprosium 162.500	67 **Ho** Holmium 164.930	68 **Er** Erbium 167.259	69 **Tm** Thulium 168.934	70 **Yb** Ytterbium 173.055	71 **Lu** Lutetium 174.967
Actinide Series	89 **Ac** Actinium 227.028	90 **Th** Thorium 232.038	91 **Pa** Protactinium 231.036	92 **U** Uranium 238.029	93 **Np** Neptunium 237.048	94 **Pu** Plutonium 244.064	95 **Am** Americium 243.061	96 **Cm** Curium 247.070	97 **Bk** Berkelium 247.070	98 **Cf** Californium 251.080	99 **Es** Einsteinium [254]	100 **Fm** Fermium 257.095	101 **Md** Mendelevium 258.1	102 **No** Nobelium 259.101	103 **Lr** Lawrencium [262]

© 2017 Todd Helmenstine
sciencenotes.org



Fusione nucleare nelle stelle





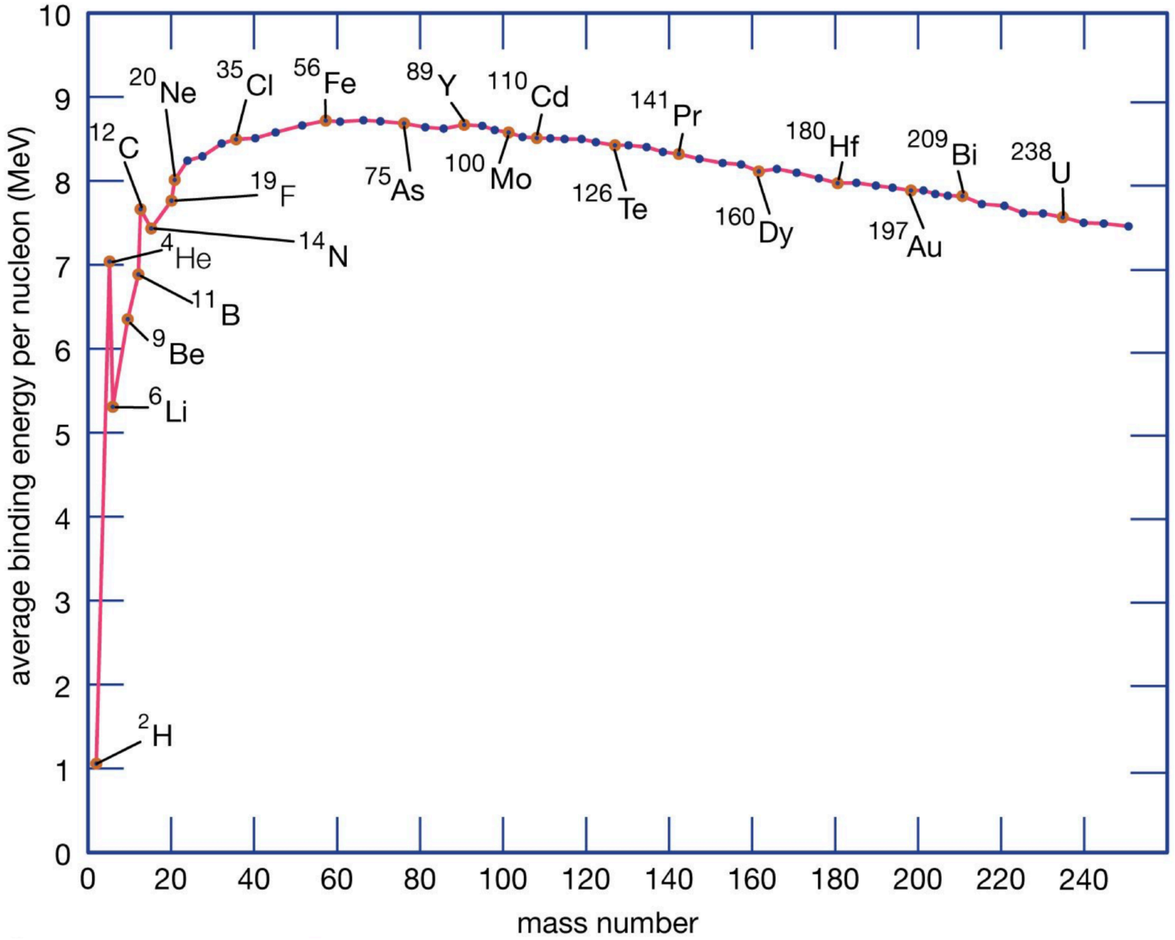
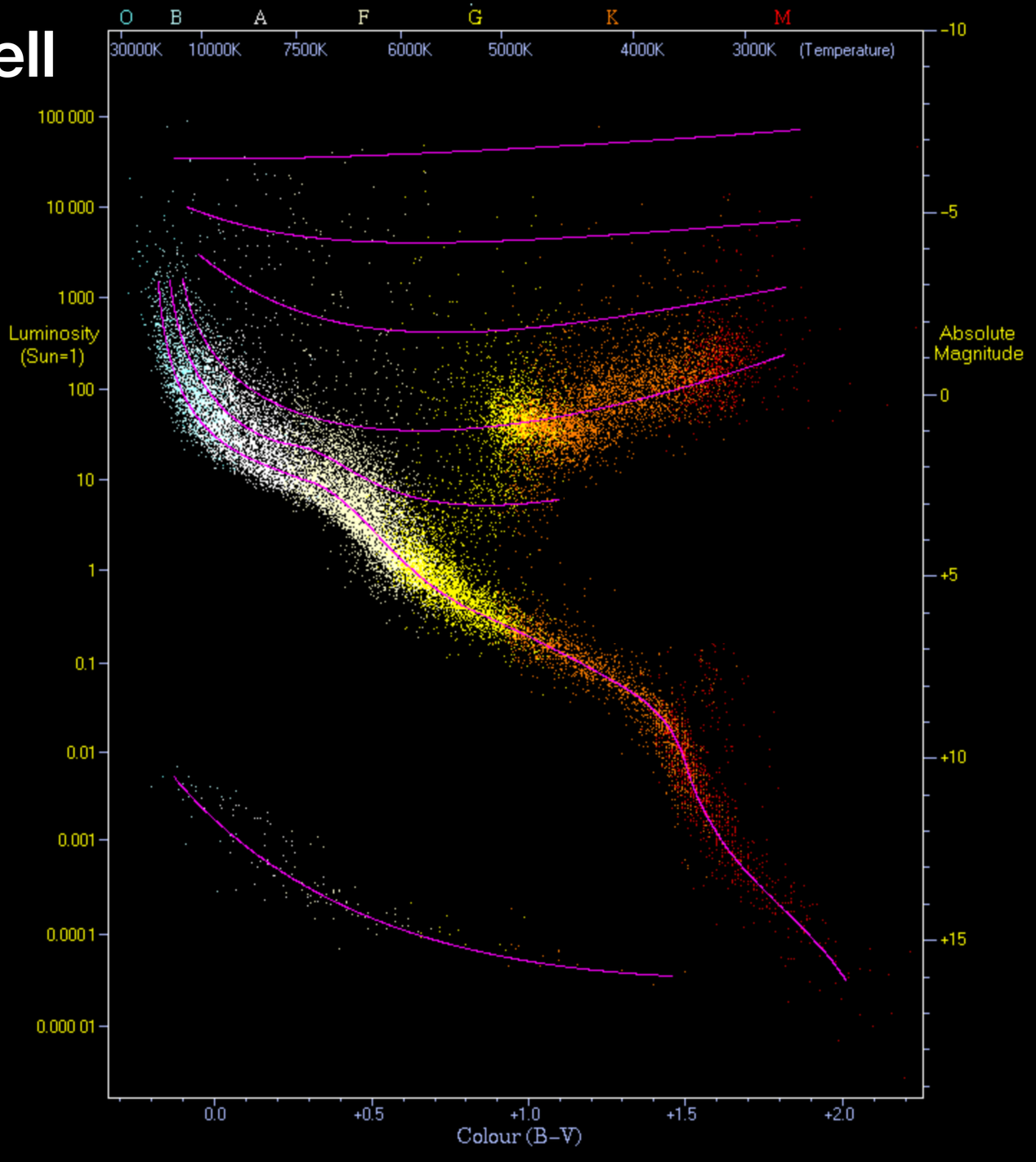
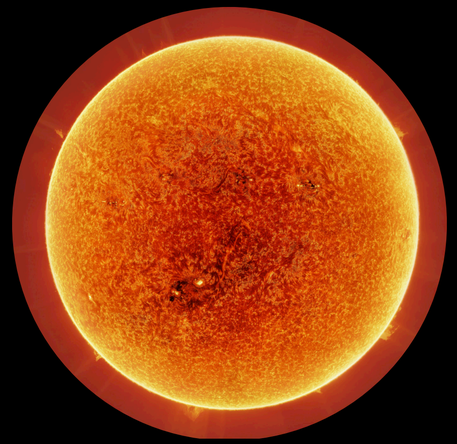


Diagramma di Hertzsprung–Russell



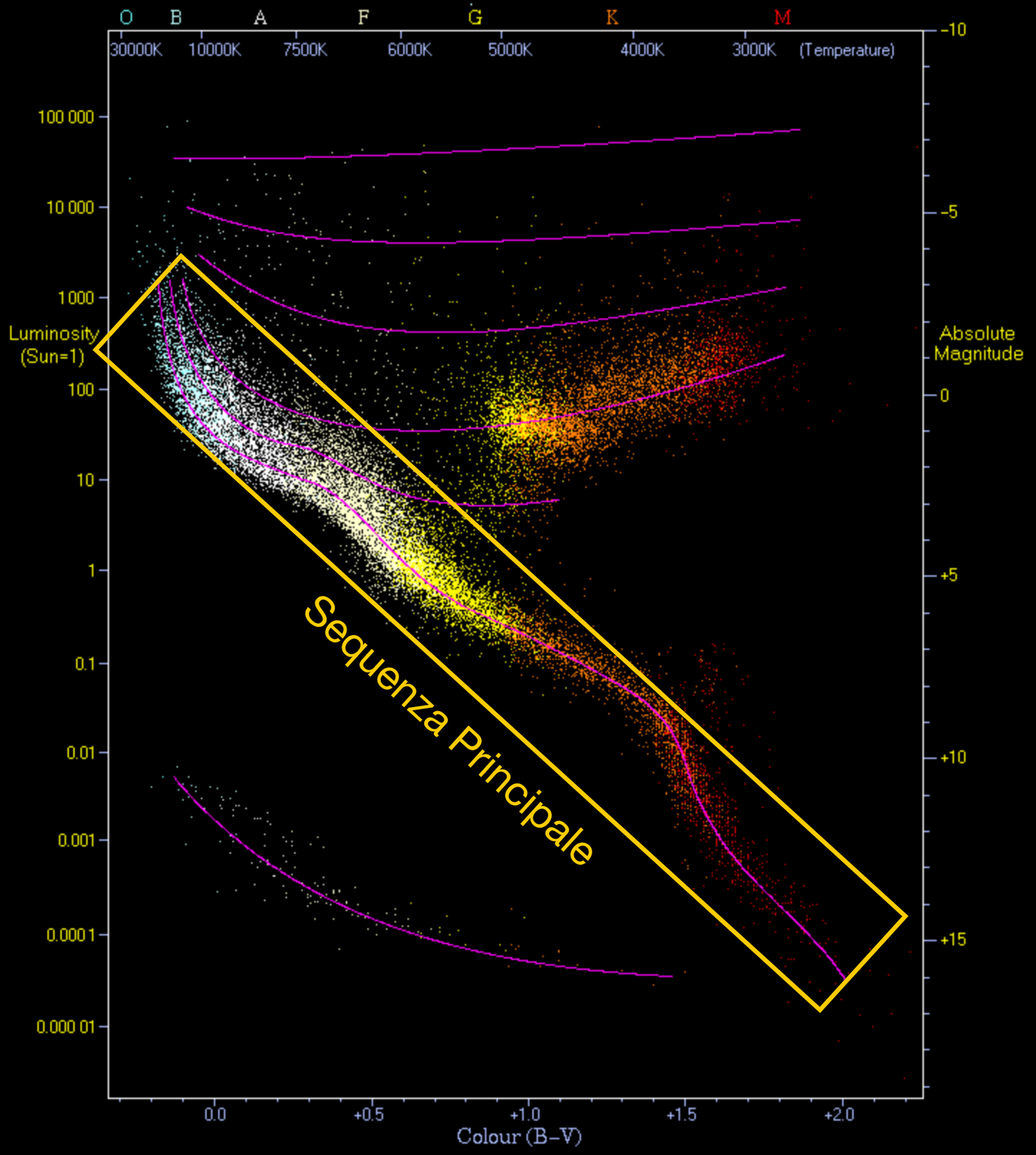
La Sequenza Principale



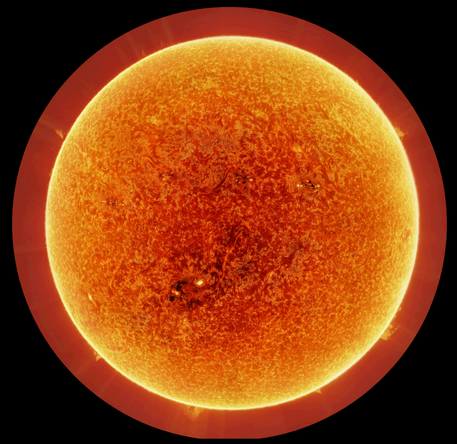
H

↓

He



La Sequenza Principale



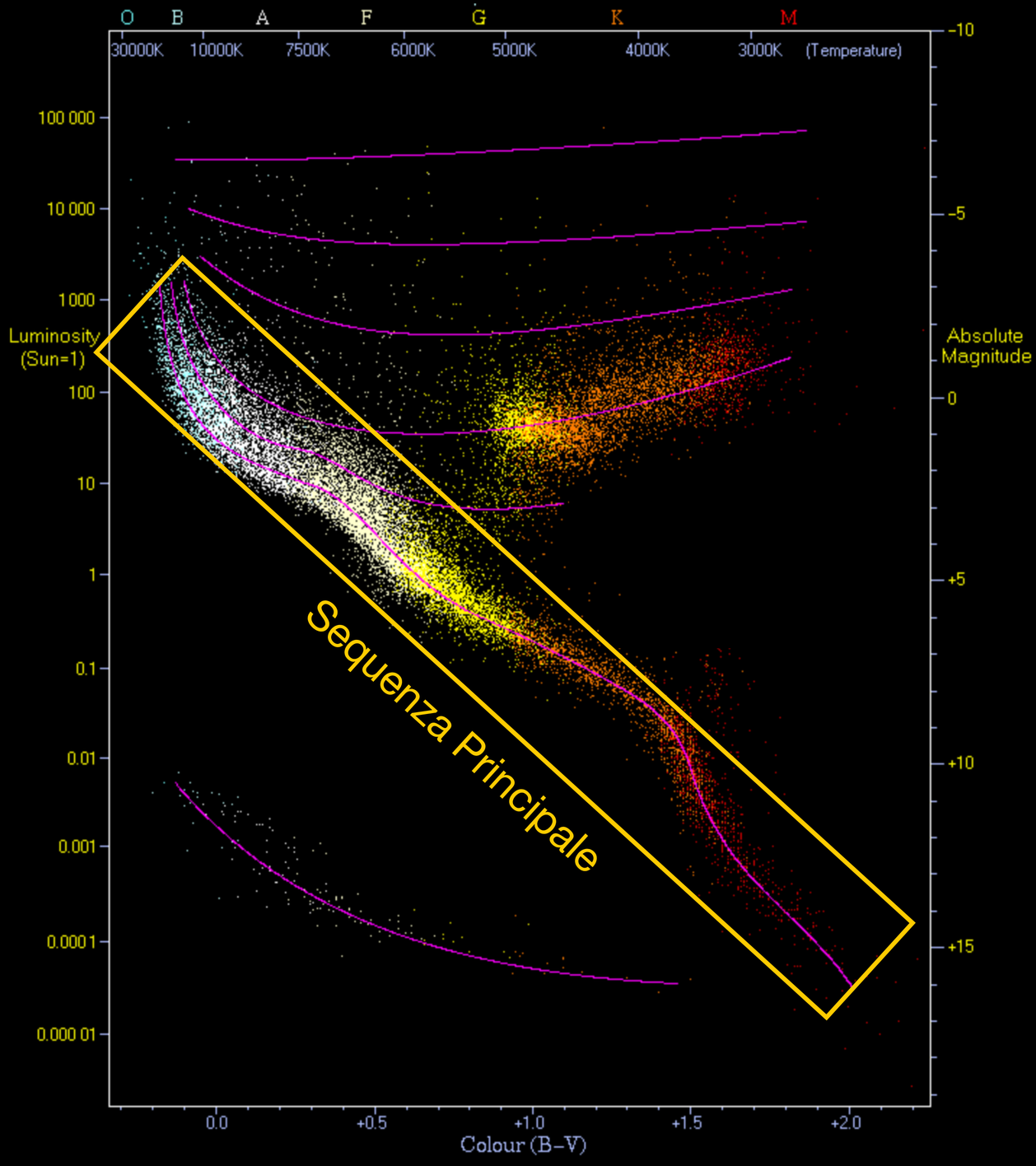
H

↓

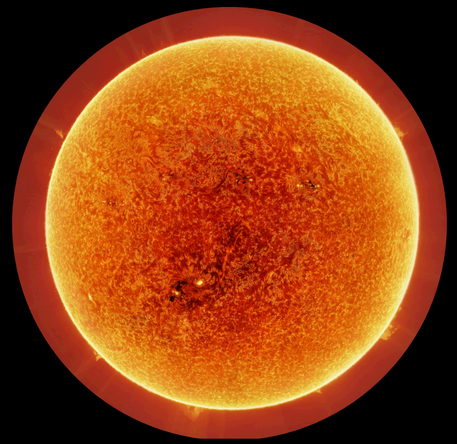
He

$$L = 4\pi\sigma T^4 R^2$$

L : Luminosità
T : Temperatura
R : Raggio



La Sequenza Principale



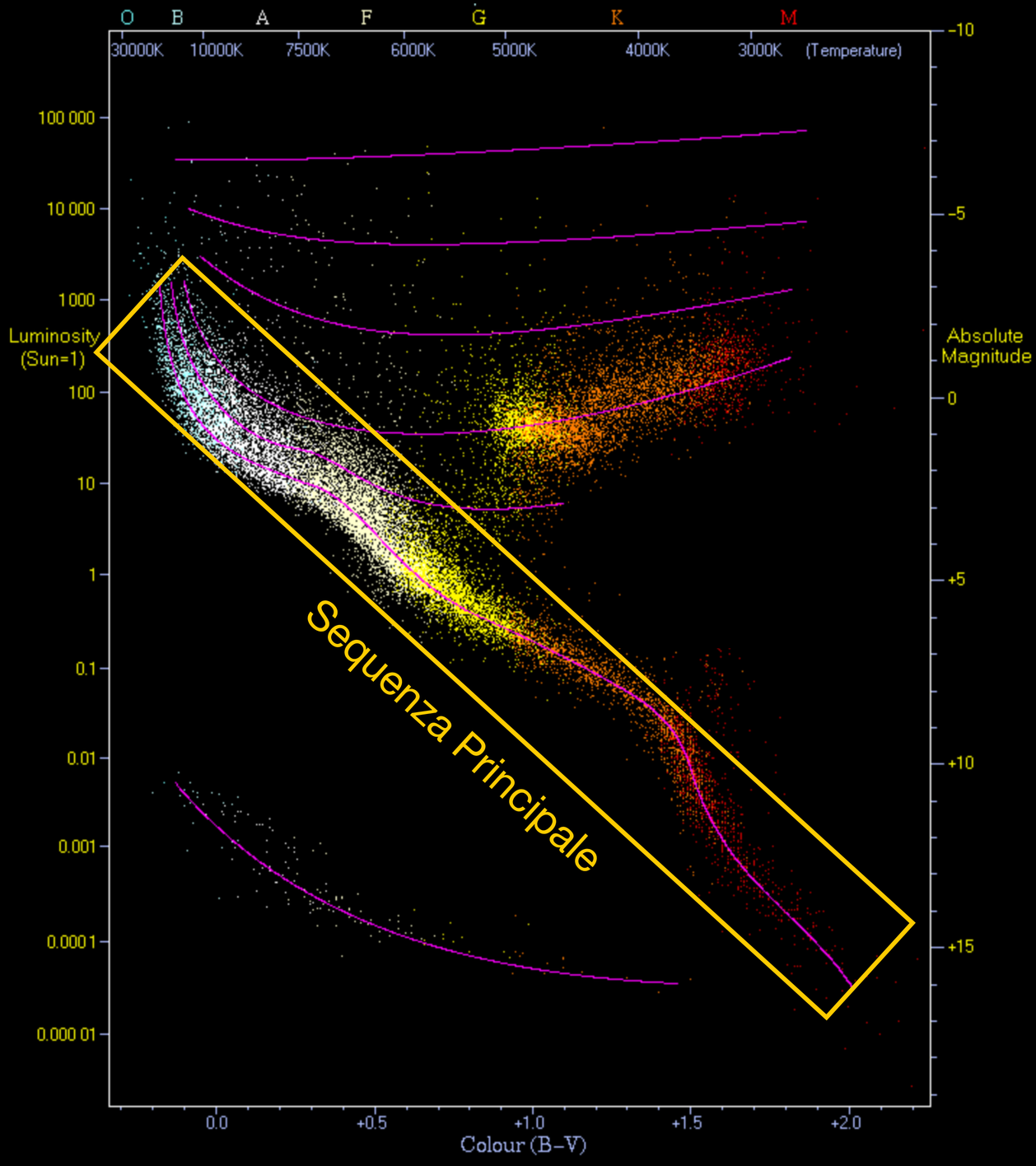
H

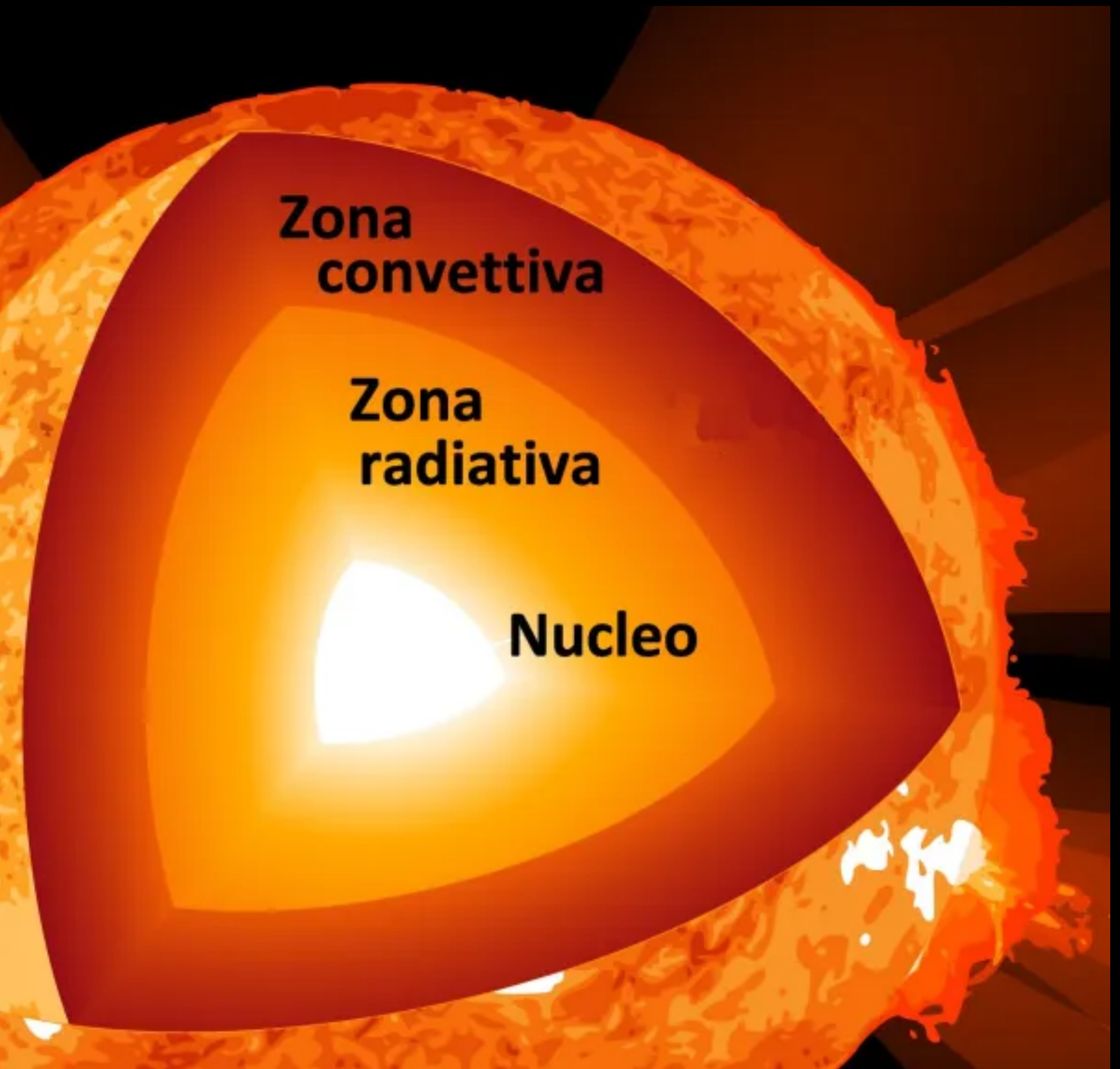
↓

He

$$PV = nRT$$

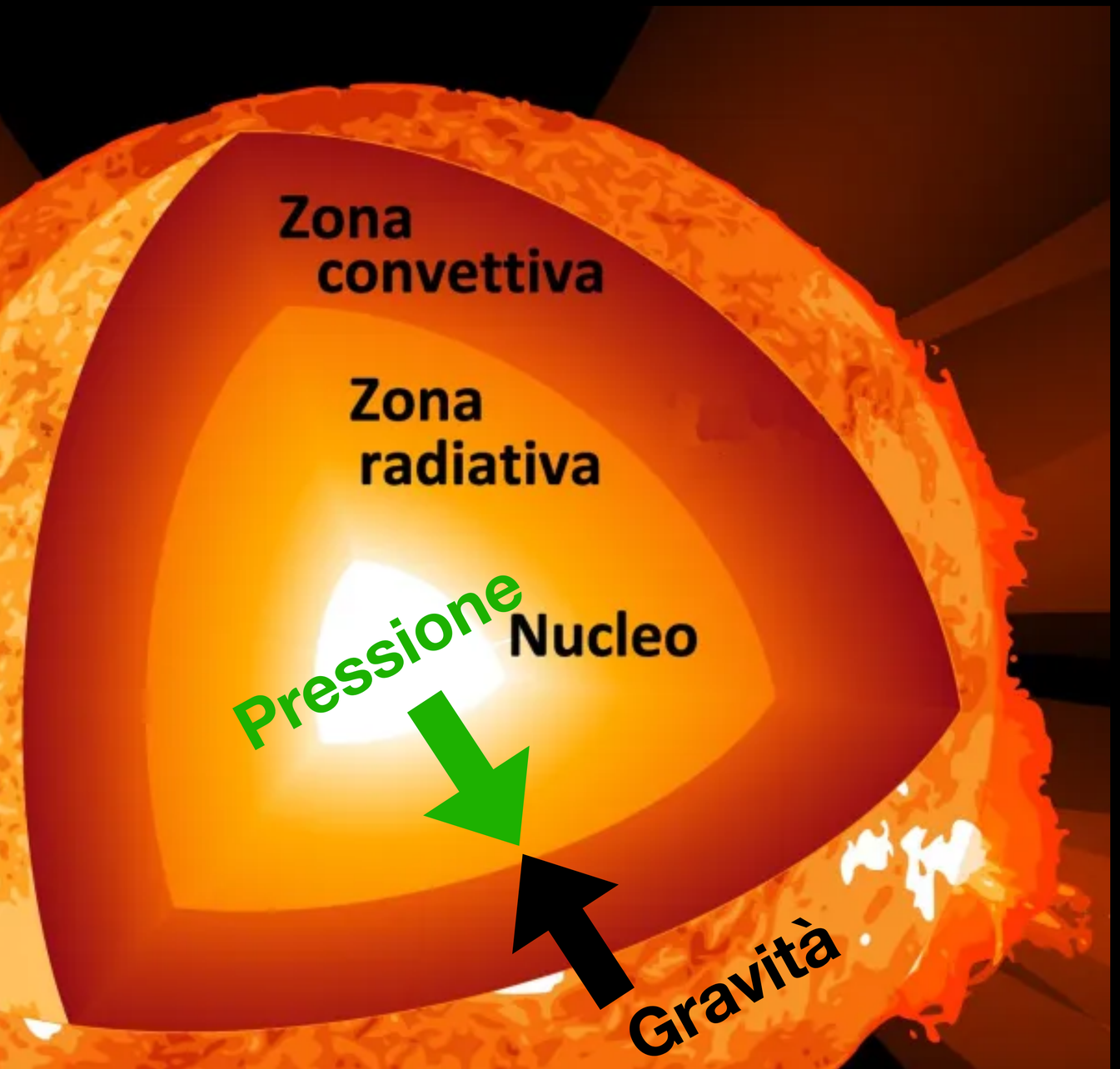
P : Pressione
V : Volume
n : Numero di moli
T : Temperatura





La fusione nucleare avviene nel nucleo delle stelle (1.5×10^7 K)

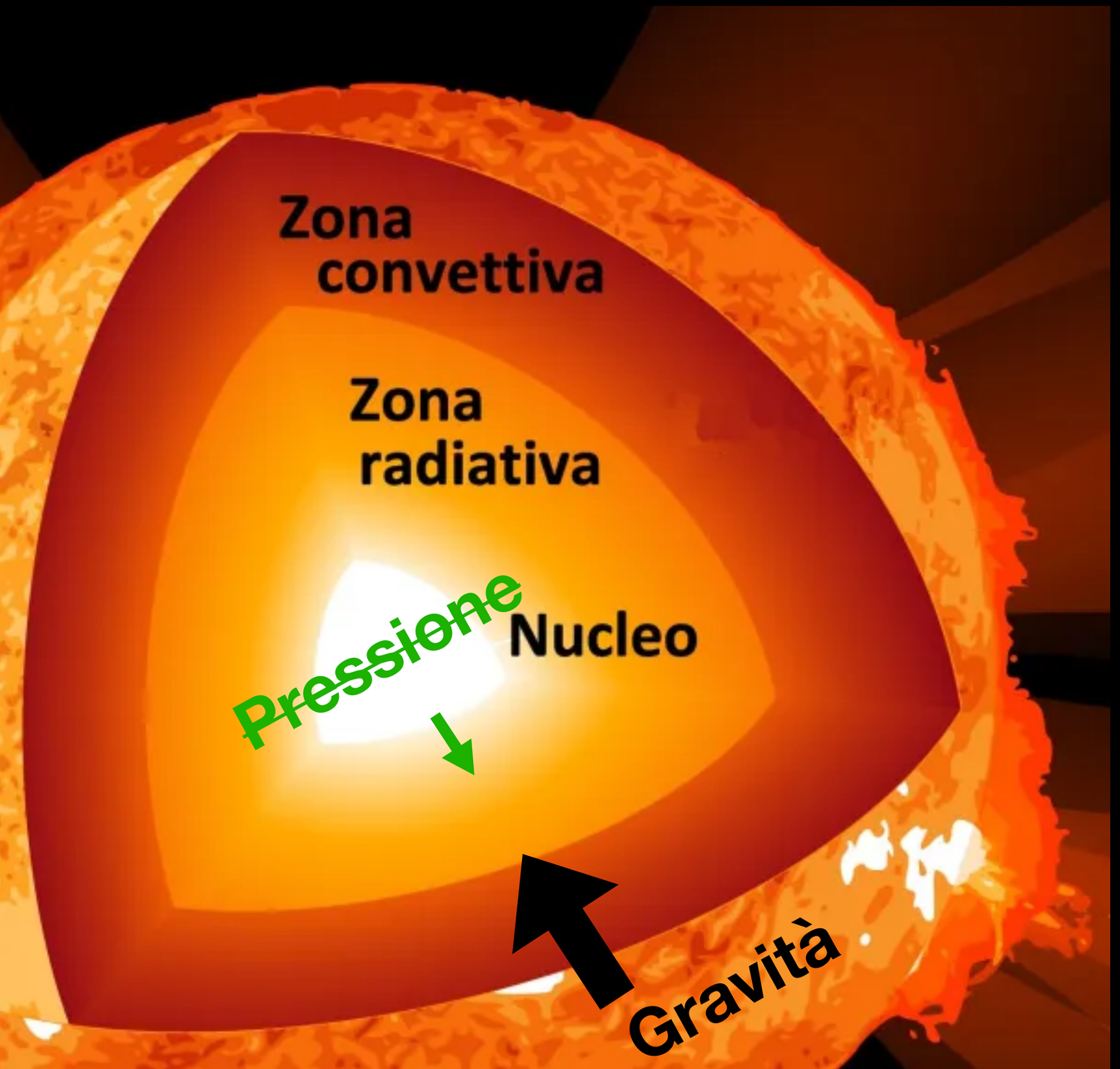
H → He



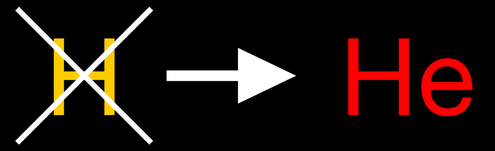
La fusione nucleare avviene nel nucleo delle stelle (1.5×10^7 K)

H → He

L’energia prodotta contribuisce a sostenere la stella contro la gravità

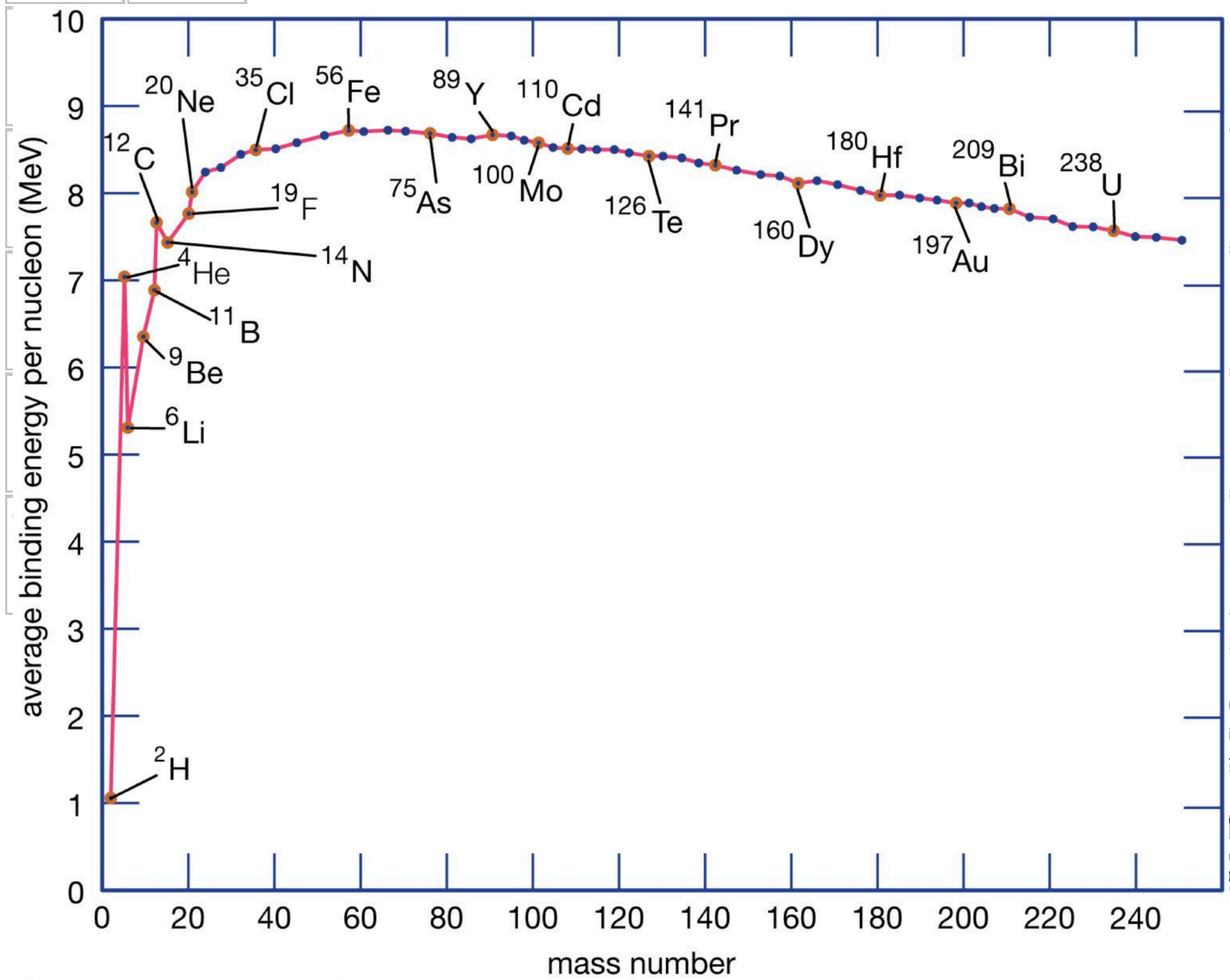


La fusione nucleare avviene nel nucleo delle stelle (1.5×10^7 K)



Quando finisce l'idrogeno nel nucleo, la stella inizia a contrarsi

Fusione dell’Elio

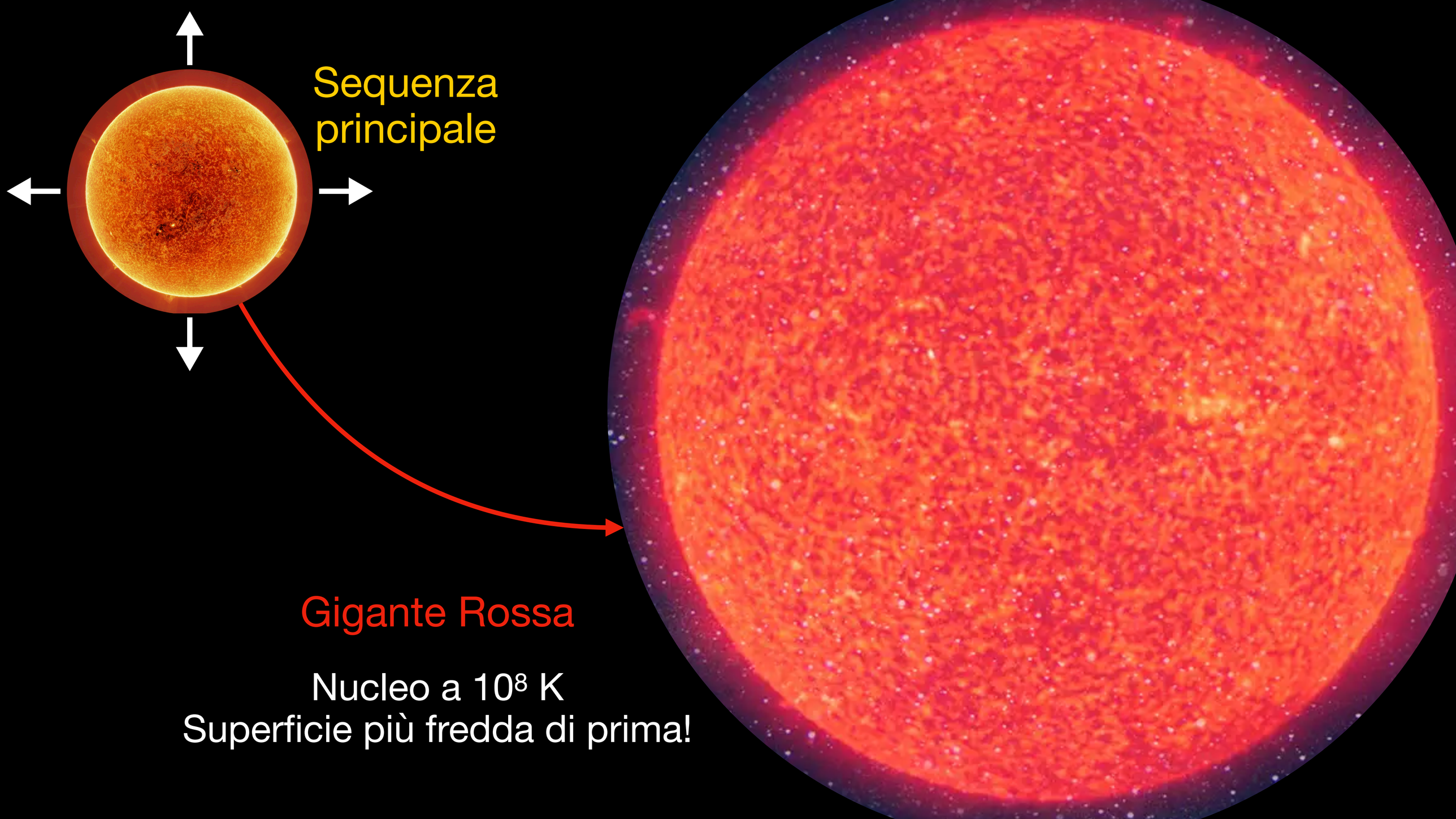


1 IA 1A												18 VIIIA 8A
1 H Hydrogen 1.008	2 IIA 2A											2 He Helium 4.003
3 Li Lithium 6.941	4 Be Beryllium 9.012											

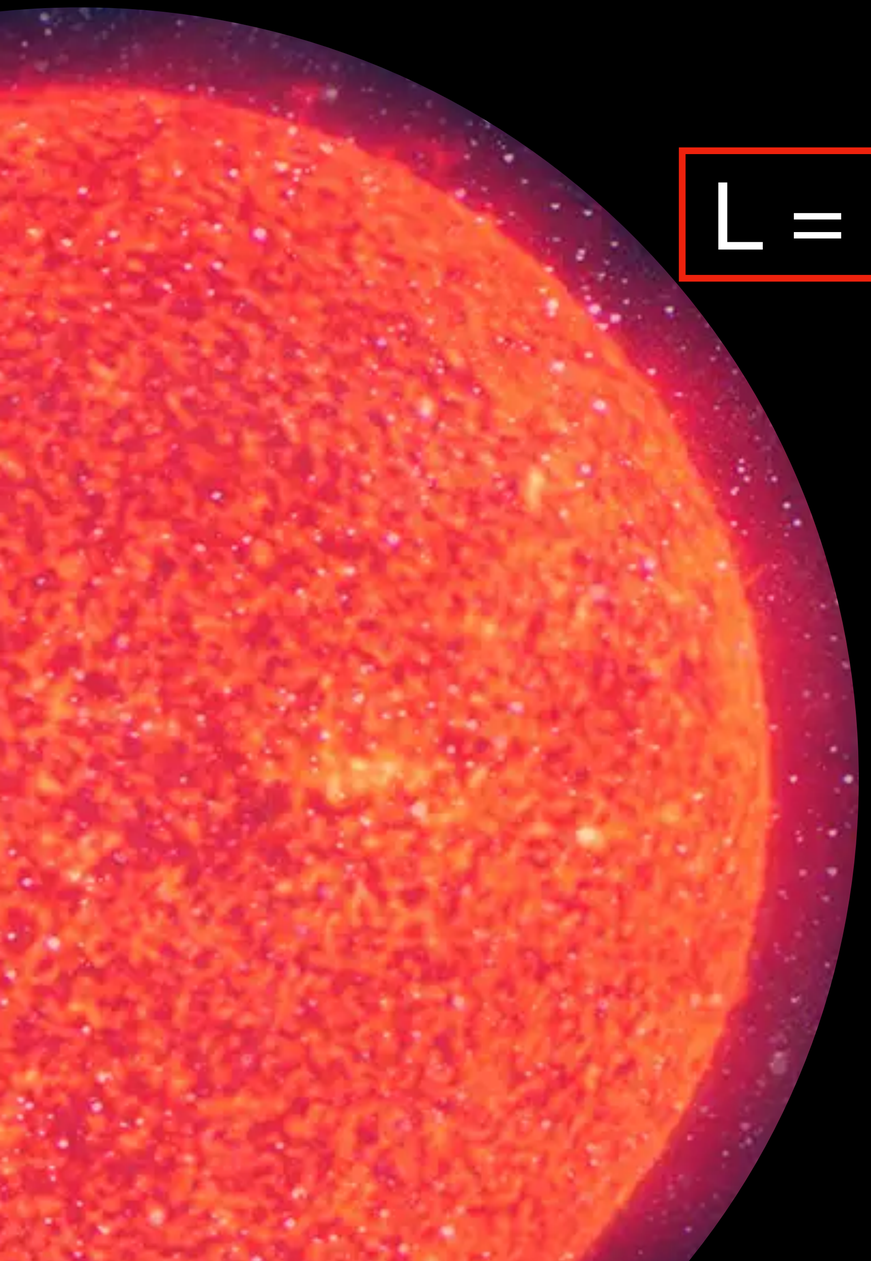
11 IB 1B	12 IIB 2B	13 IIIA 3A	14 IVA 4A	15 VA 5A	16 VIA 6A	17 VIIA 7A
		5 B Boron 10.811	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Fluorine 18.998
		13 Al Aluminum 26.982	14 Si Silicon 28.086	15 P Phosphorus 30.974	16 S Sulfur 32.066	17 Cl Chlorine 35.453
29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.723	32 Ge Germanium 72.631	33 As Arsenic 74.922	34 Se Selenium 78.971	35 Br Bromine 79.904
47 Ag Silver 107.868	48 Cd Cadmium 112.414	49 In Indium 114.818	50 Sn Tin 118.711	51 Sb Antimony 121.760	52 Te Tellurium 127.6	53 I Iodine 126.904
79 Au Gold 196.967	80 Hg Mercury 200.592	81 Tl Thallium 204.383	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium [208.982]	85 At Astatine 209.987
111 Rg Roentgenium [280]	112 Cn Copernicium [285]	113 Nh Nihonium [286]	114 Fl Flerovium [289]	115 Mc Moscovium [289]	116 Lv Livermorium [293]	117 Ts Tennessine [294]

d nium .25	65 Tb Terbium 158.925	66 Dy Dysprosium 162.500	67 Ho Holmium 164.930	68 Er Erbium 167.259	69 Tm Thulium 168.934	70 Yb Ytterbium 173.055	71 Lu Lutetium 174.967
m um 070	97 Bk Berkelium 247.070	98 Cf Californium 251.080	99 Es Einsteinium [254]	100 Fm Fermium 257.095	101 Md Mendelevium 258.1	102 No Nobelium 259.101	103 Lr Lawrencium [262]

© 2017 Todd Helmenstine
sciencenotes.org


Sequenza
principale
Gigante Rossa
Nucleo a 10^8 K
Superficie più fredda di prima!

Giganti Rosse

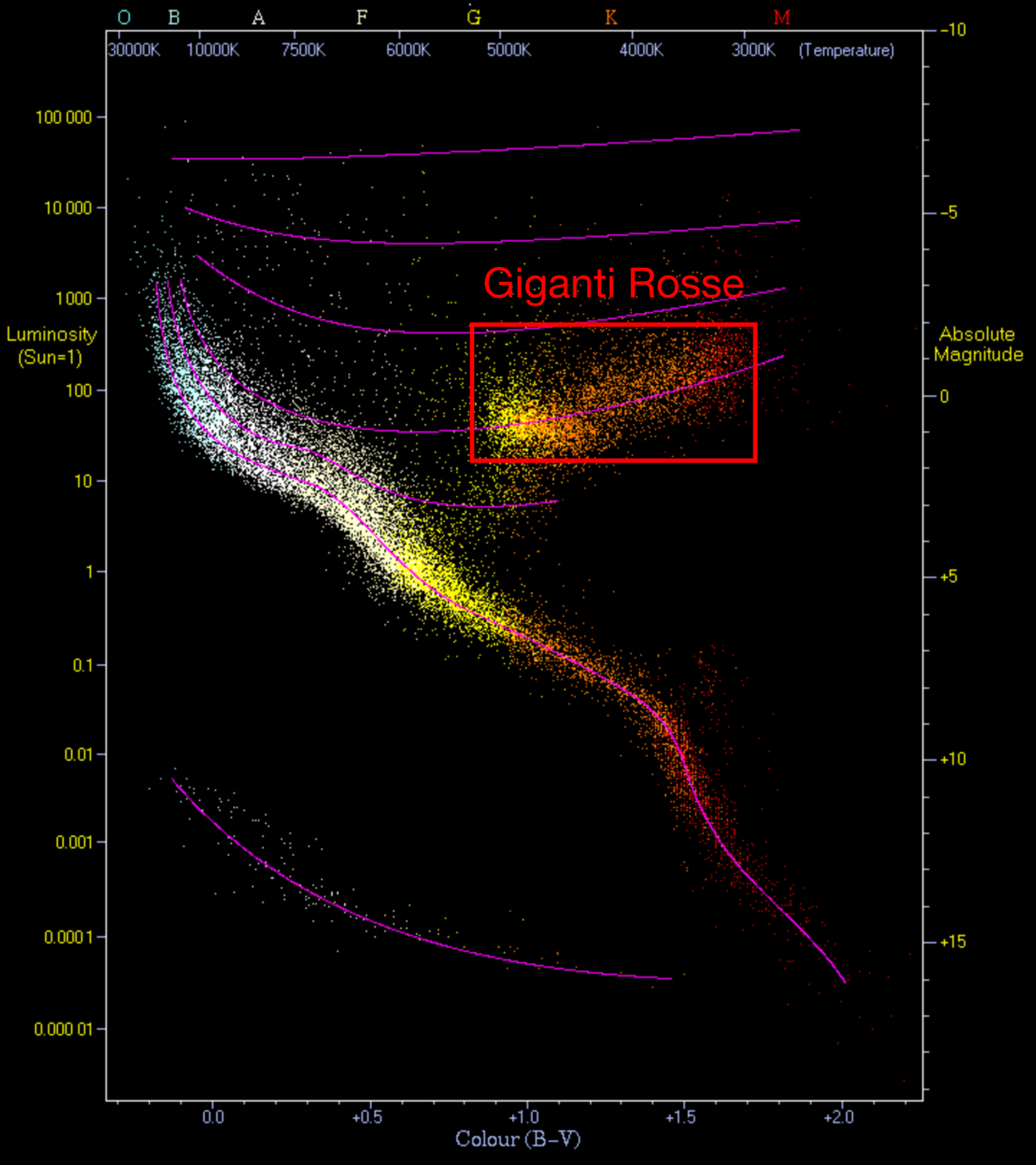


$$L = 4\pi\sigma T^4 R^2$$

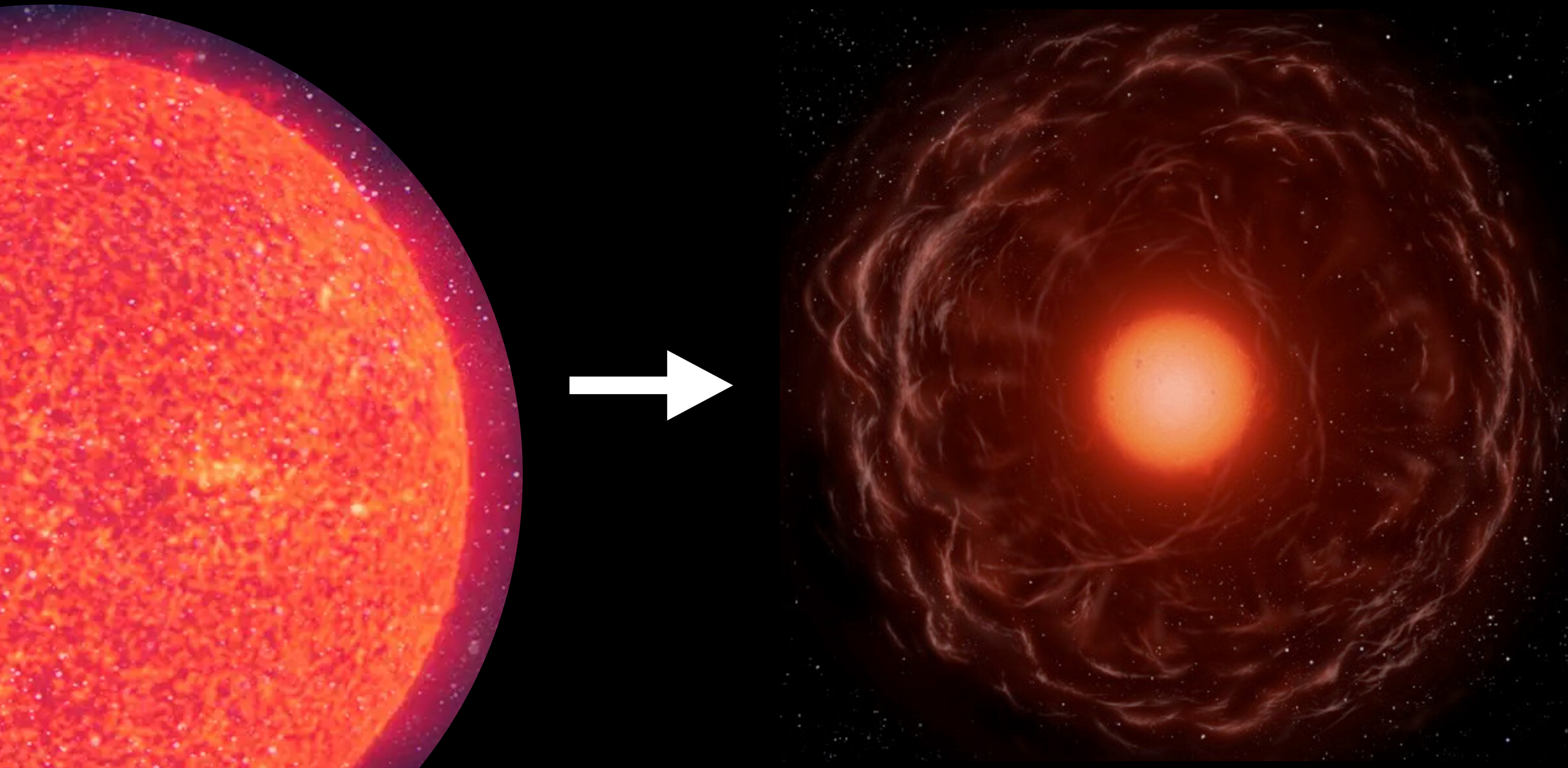
He

↓

C O

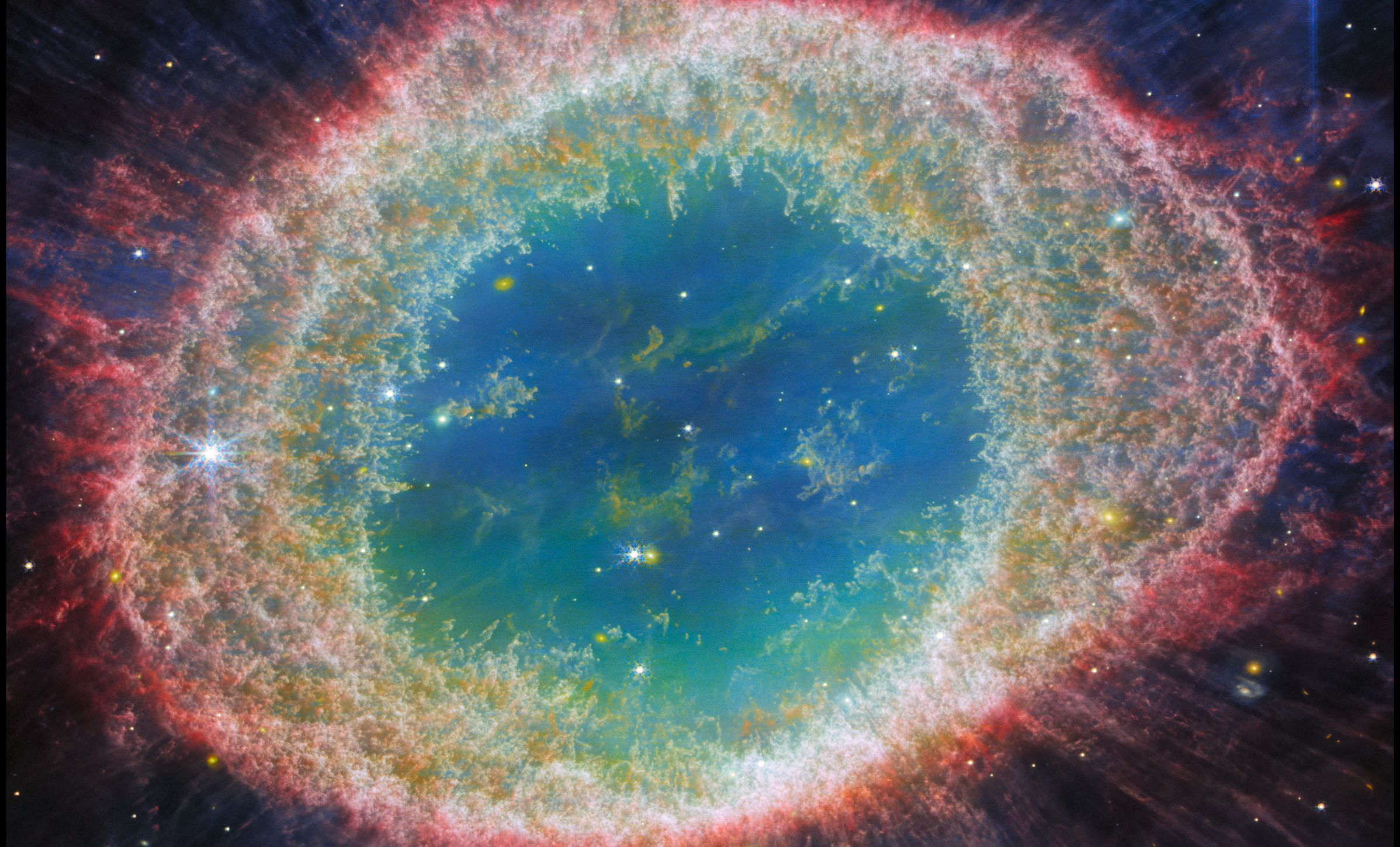


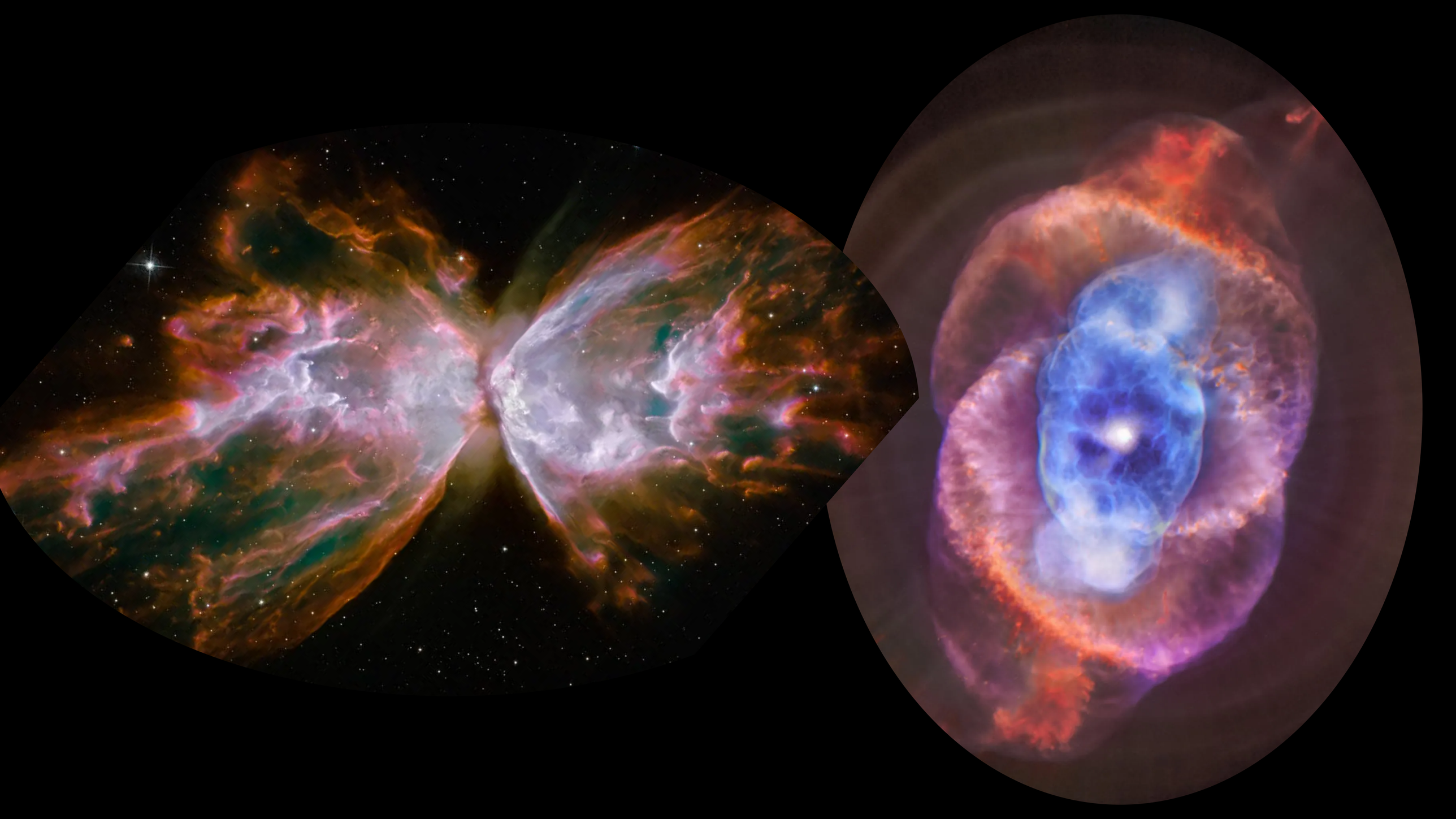
Dalle Giganti Rosse alle Nebulose Planetarie



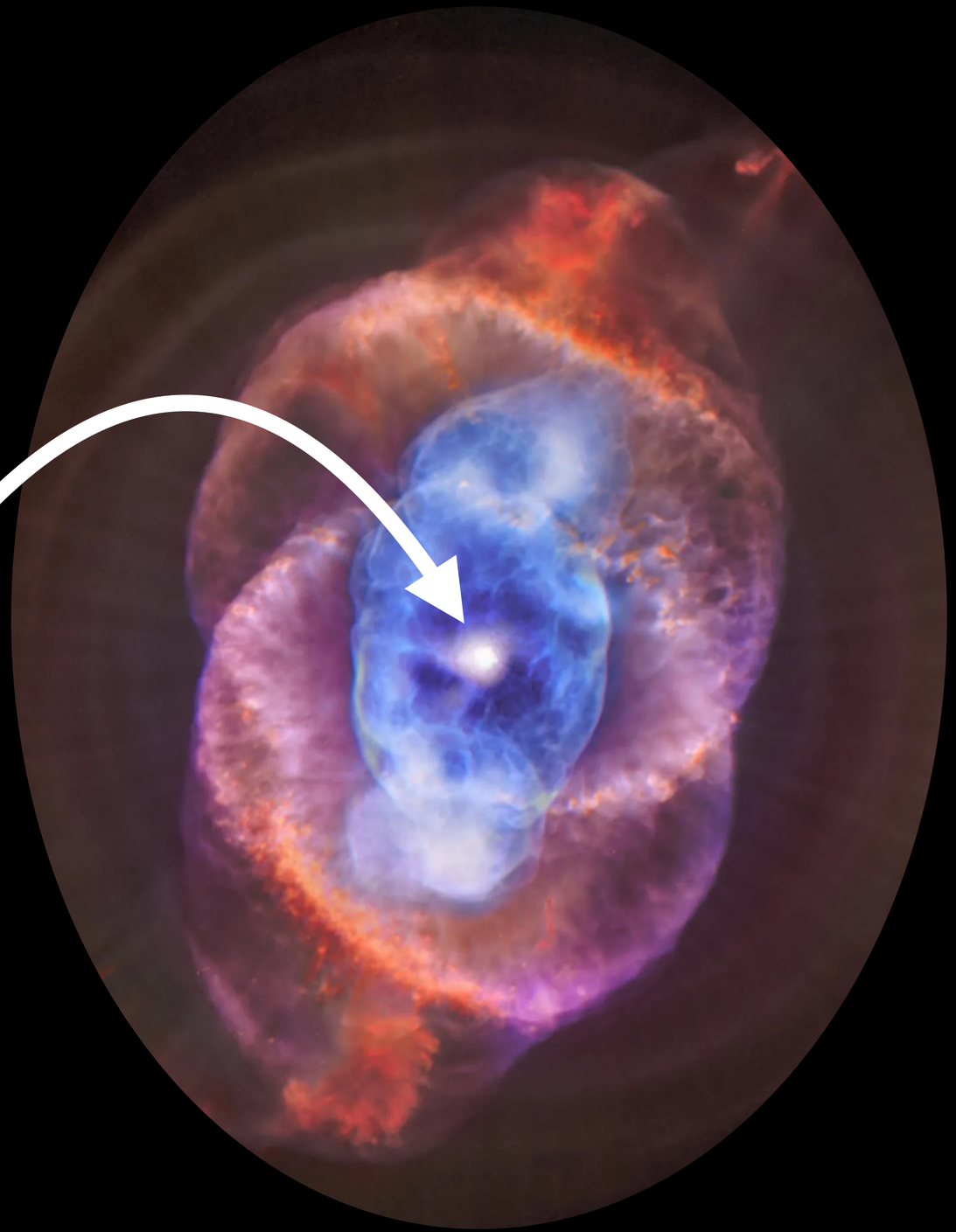
Dalle Giganti Rosse alle Nebulose Planetarie

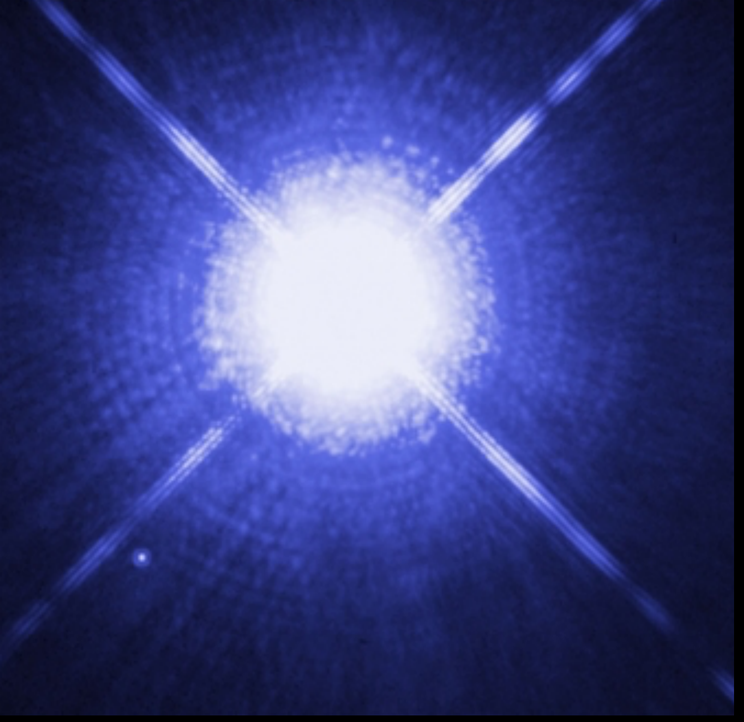




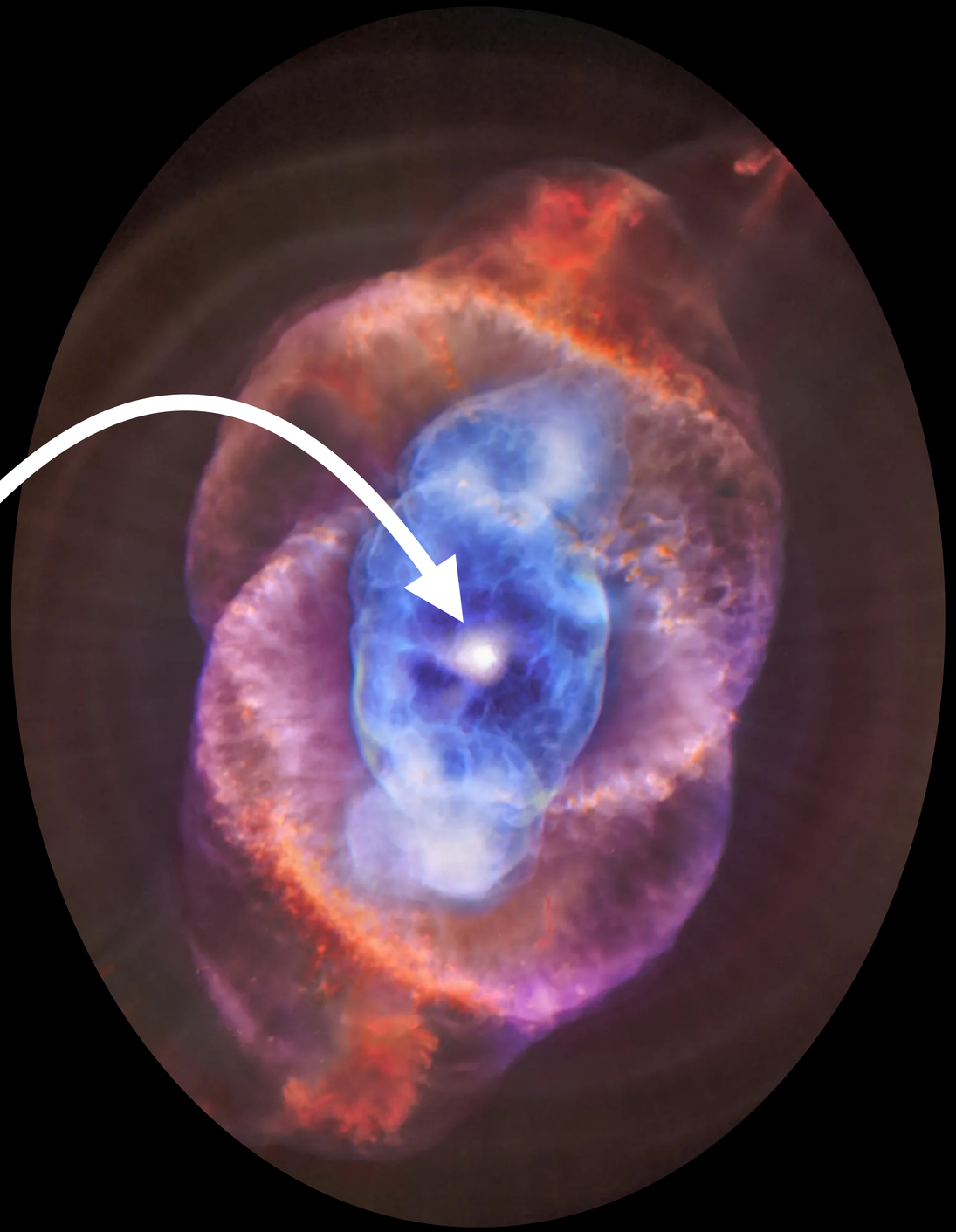


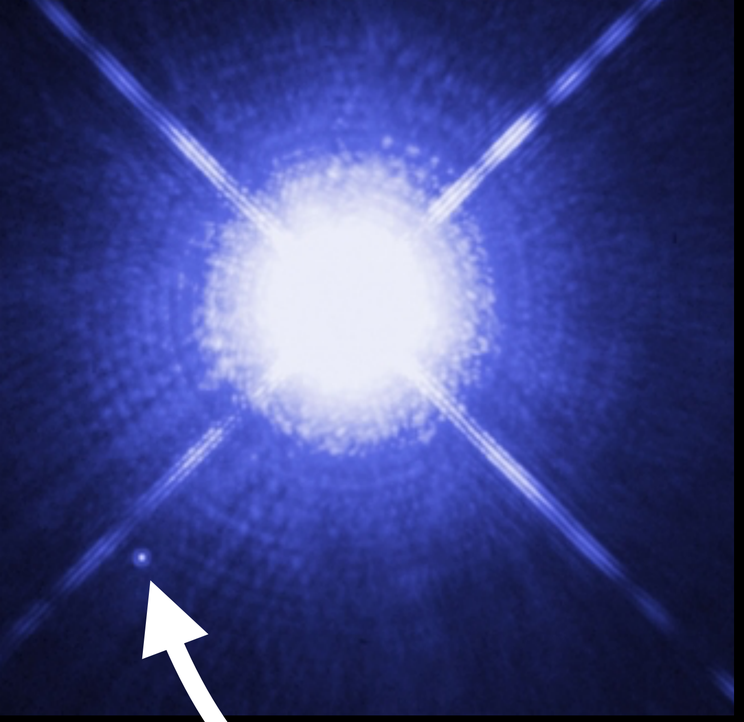
Nana Bianca



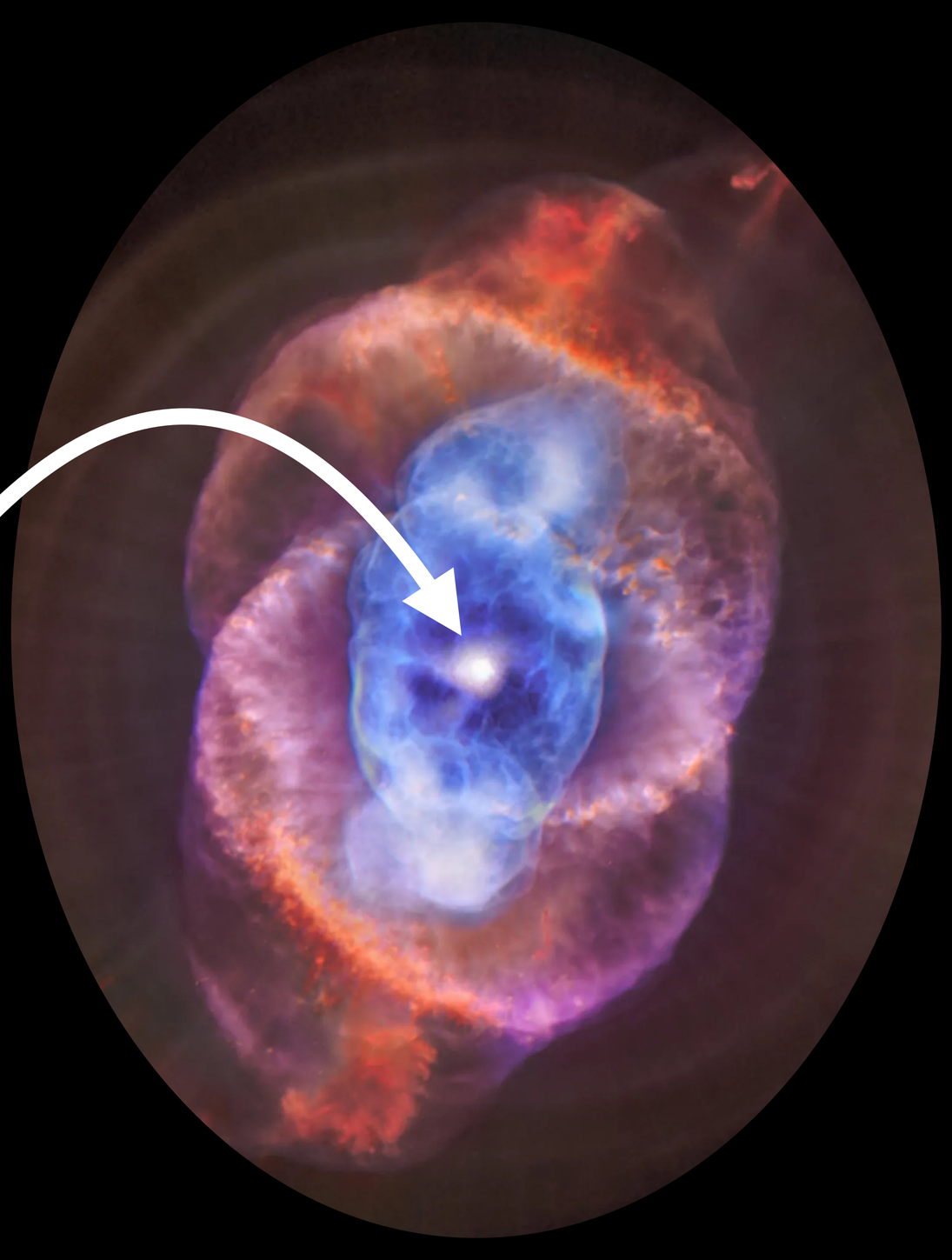


Nana Bianca

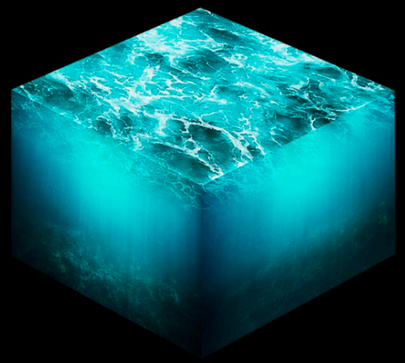




Nana Bianca

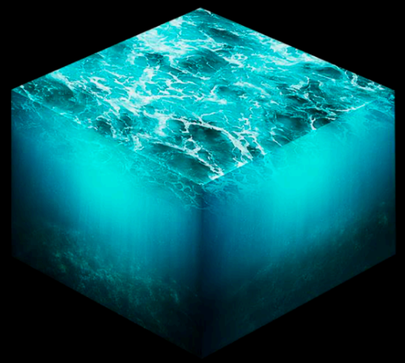


Acqua



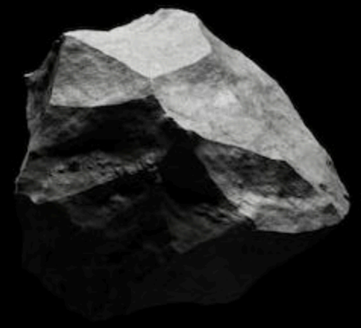
1 g cm^{-3}

Acqua

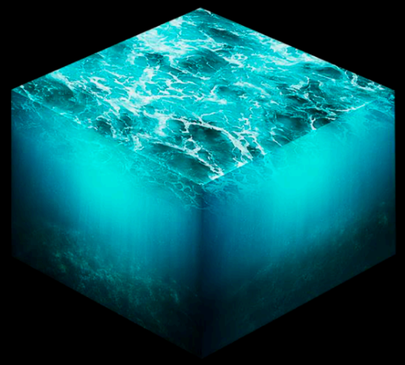


1 g cm^{-3}

Roccia

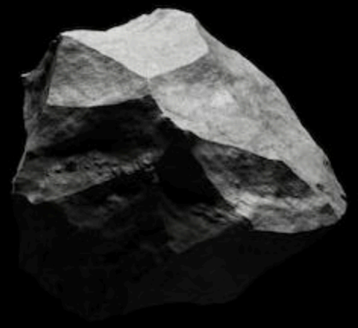


Acqua



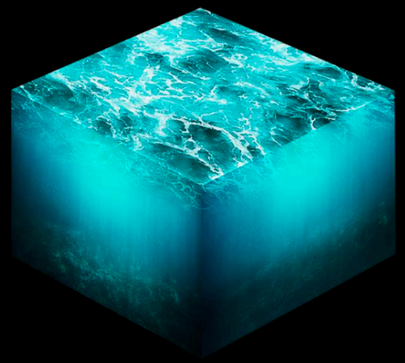
1 g cm^{-3}

Roccia



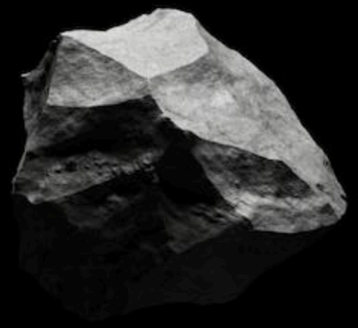
3 g cm^{-3}

Acqua



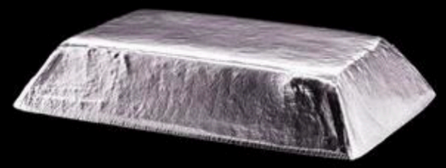
1 g cm^{-3}

Roccia

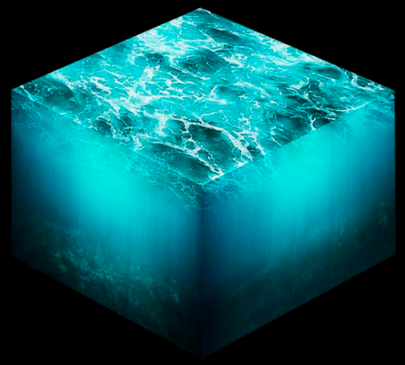


3 g cm^{-3}

Ferro

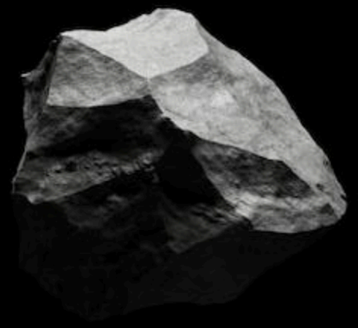


Acqua



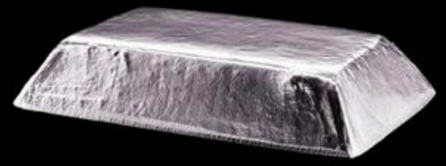
1 g cm^{-3}

Roccia



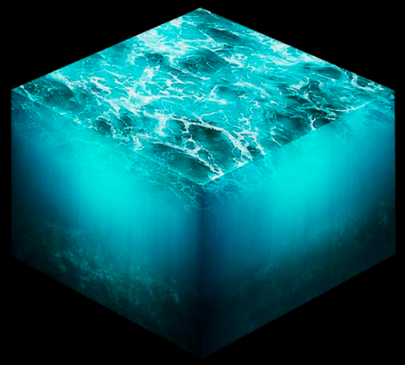
3 g cm^{-3}

Ferro



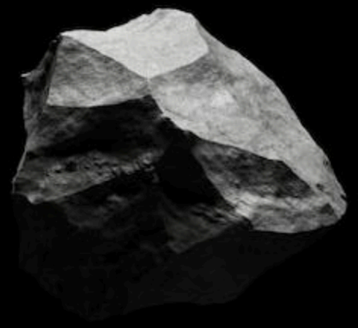
8 g cm^{-3}

Acqua



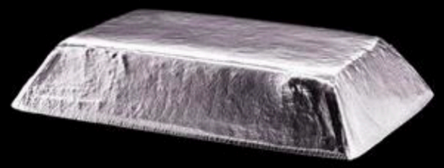
1 g cm^{-3}

Roccia



3 g cm^{-3}

Ferro

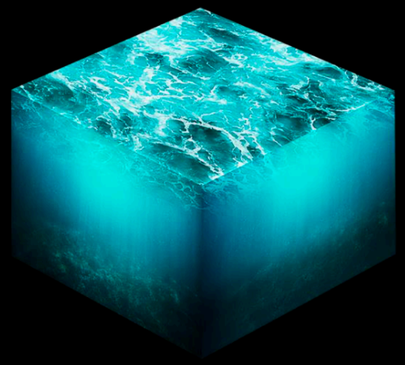


8 g cm^{-3}

Oro

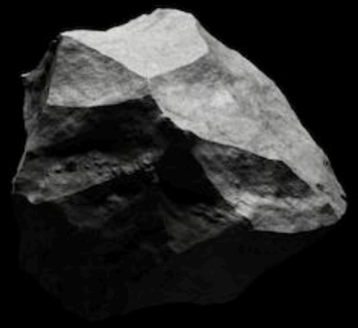


Acqua



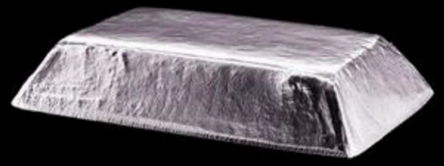
1 g cm^{-3}

Roccia



3 g cm^{-3}

Ferro



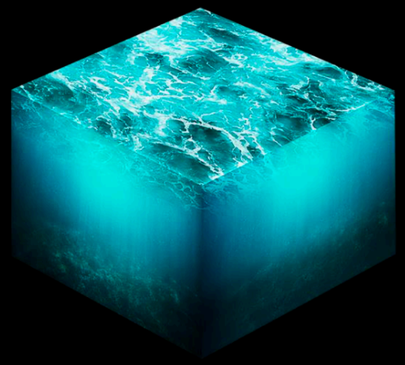
8 g cm^{-3}

Oro



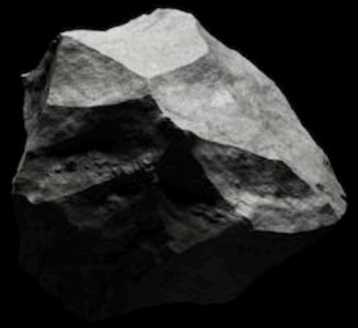
19 g cm^{-3}

Acqua



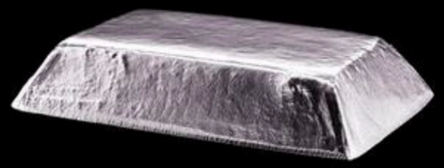
1 g cm^{-3}

Roccia



3 g cm^{-3}

Ferro



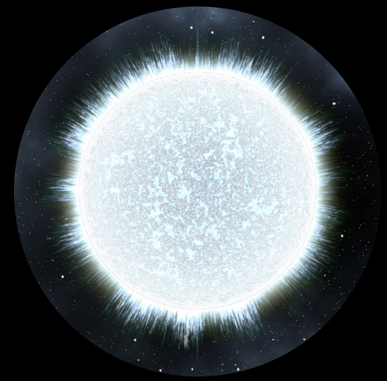
8 g cm^{-3}

Oro

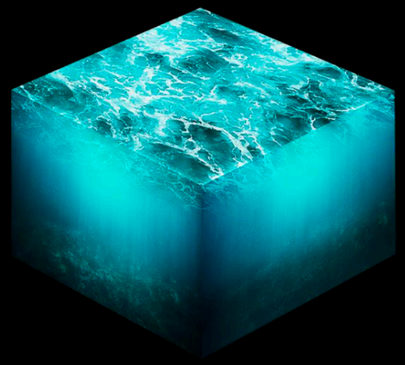


19 g cm^{-3}

Nana Bianca

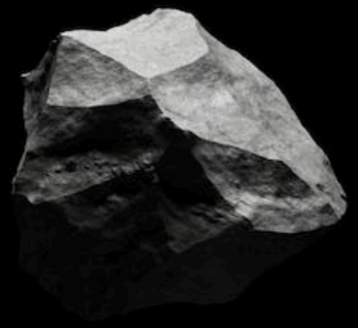


Acqua



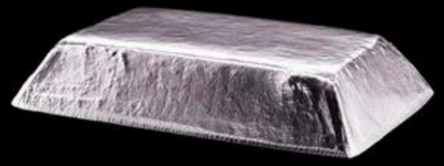
1 g cm^{-3}

Roccia



3 g cm^{-3}

Ferro



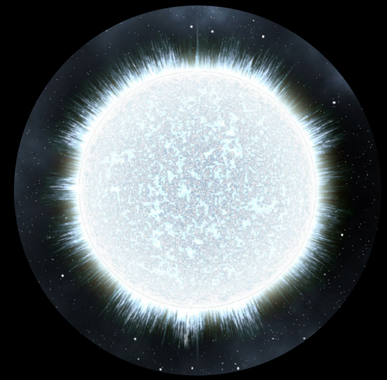
8 g cm^{-3}

Oro



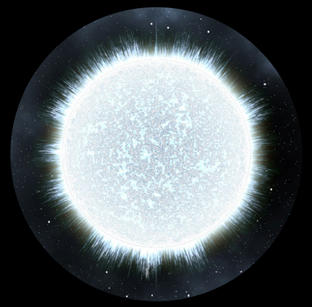
19 g cm^{-3}

Nana Bianca



1 000 000 g cm^{-3}

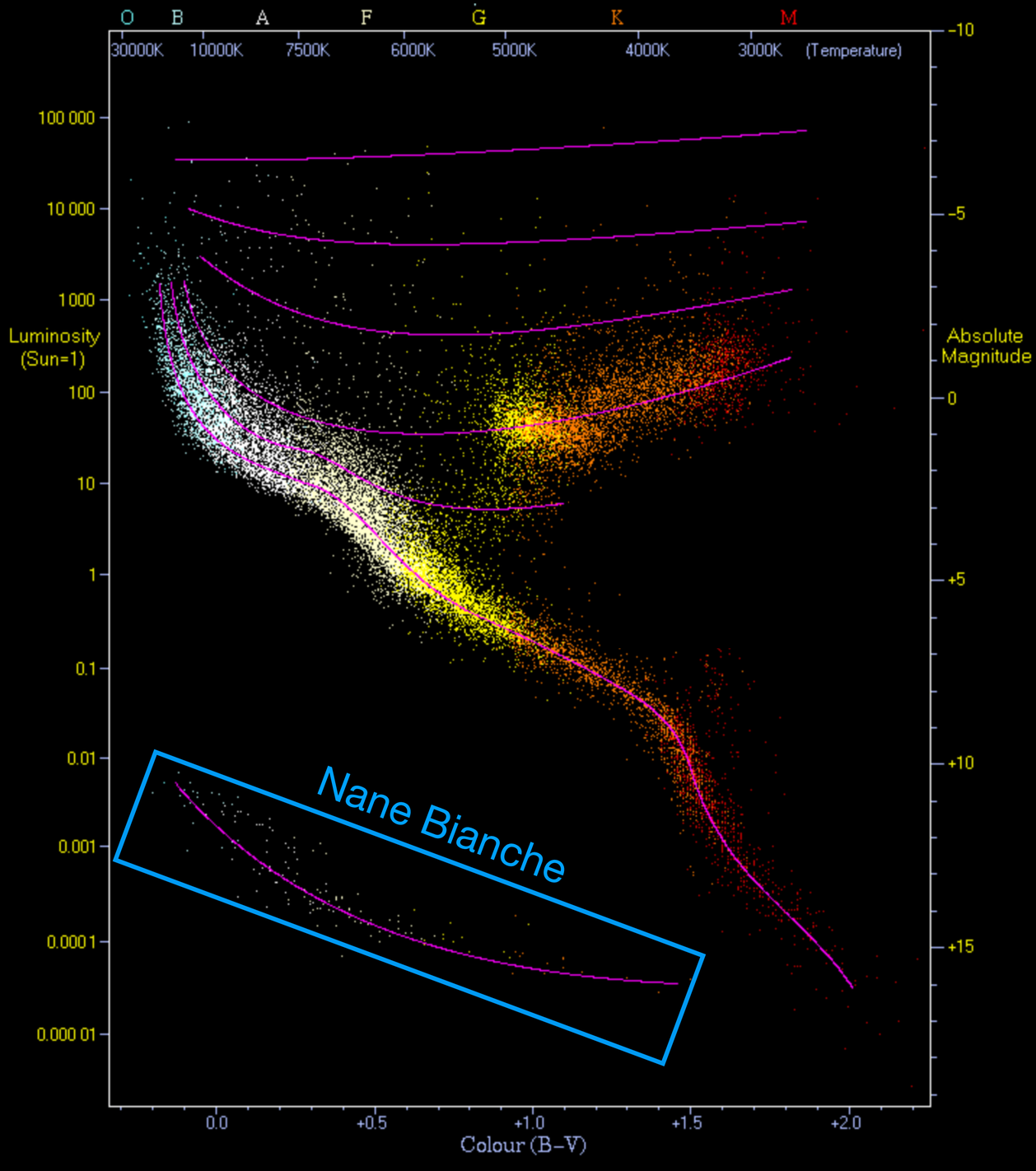
Nane Bianche



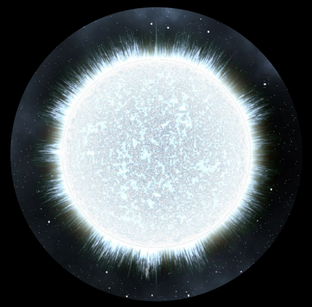
$$L = 4\pi\sigma T^4 R^2$$

Nessuna reazione di fusione nucleare

La stella è supportata dalla pressione di degenerazione degli elettroni



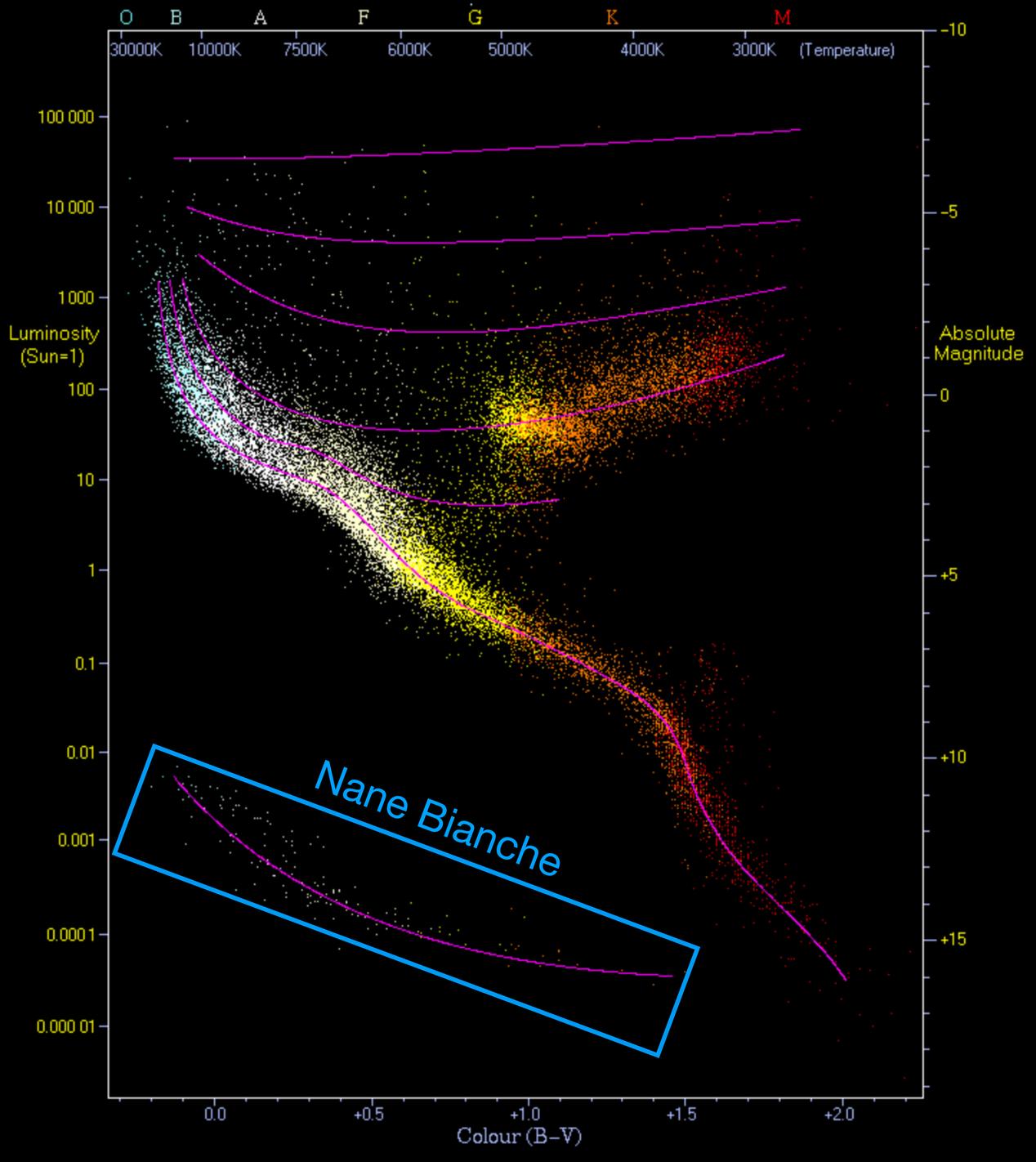
Nane Bianche



$$P = K \rho^{5/3}$$

Nessuna reazione di fusione nucleare

La stella è supportata dalla pressione di degenerazione degli elettroni



C O → Ne Mg Si



C O → Ne Mg Si

PV = nRT



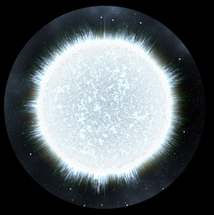
La fusione nucleare
rilascia energia

↓

La temperatura aumenta

↓

La stella si espande,
trova un nuovo equilibrio



C O → Ne Mg Si

$P = K \rho^{5/3}$



La fusione nucleare rilascia energia

↓

La temperatura aumenta

↓

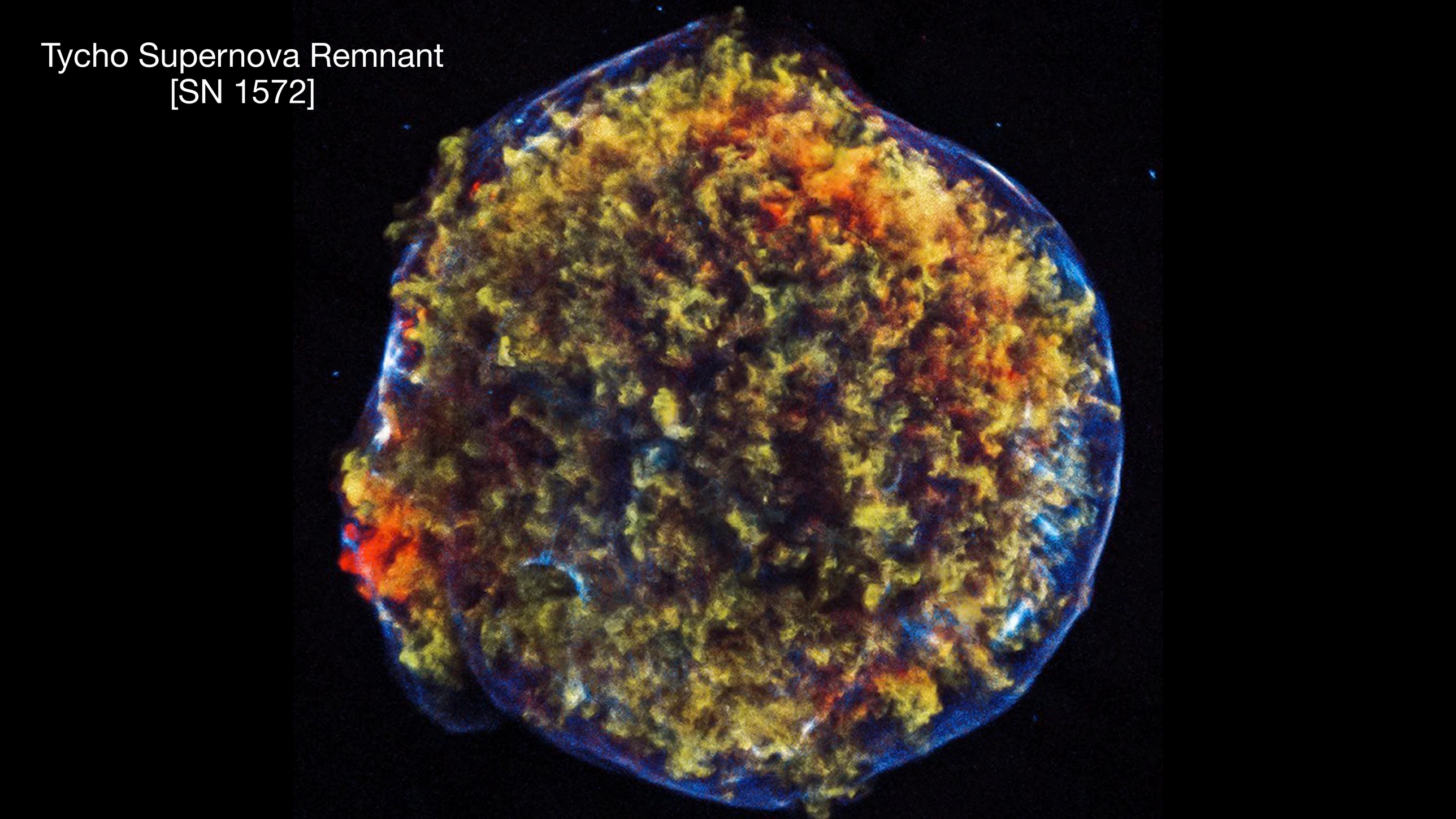
La stella non reagisce



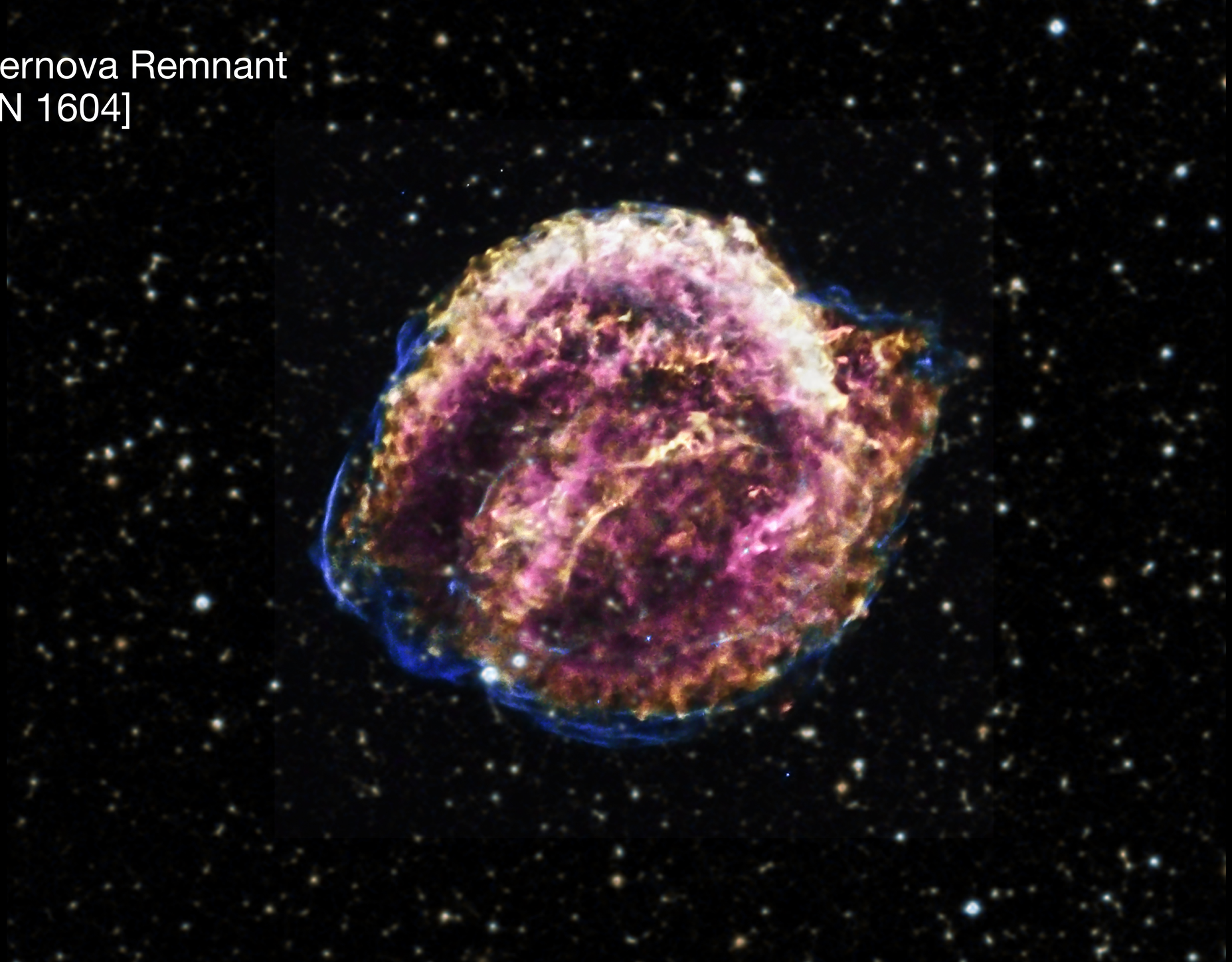
Supernove Termonucleari [SNe Ia]



Tycho Supernova Remnant
[SN 1572]



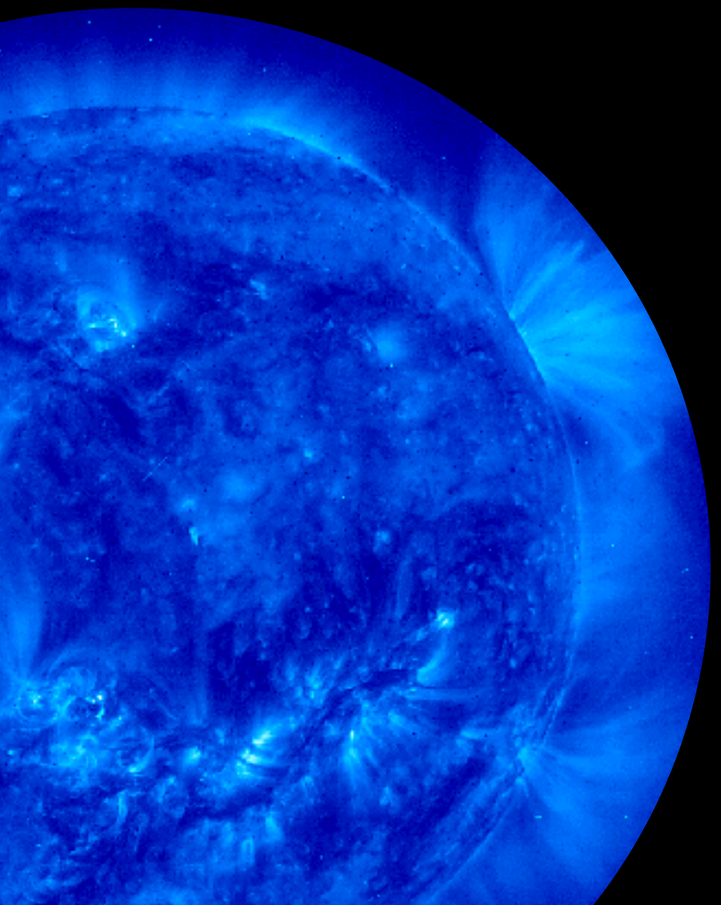
Kepler Supernova Remnant
[SN 1604]

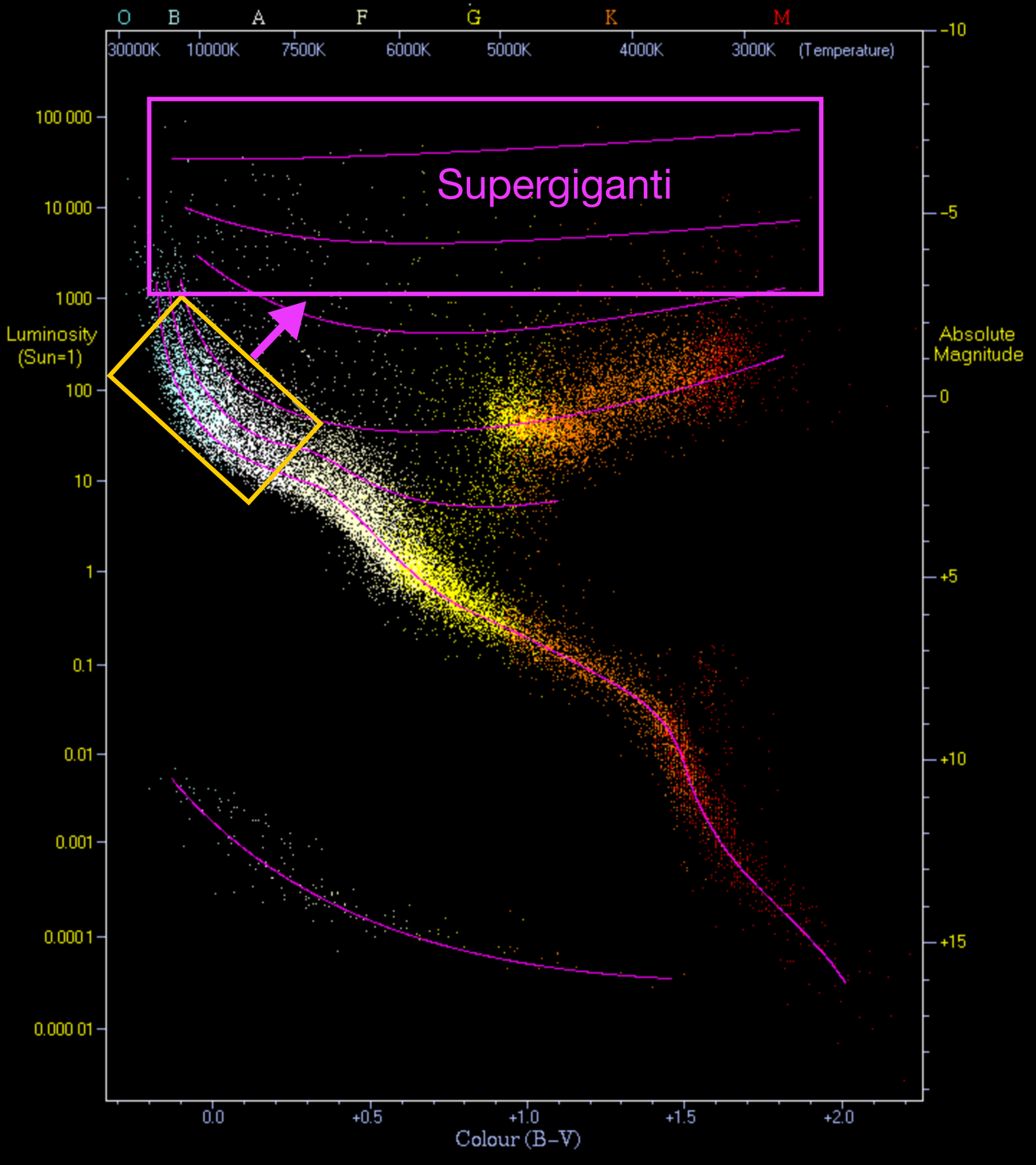


Stelle Supergiganti

H → He → C O → Ne Mg Si → Fe

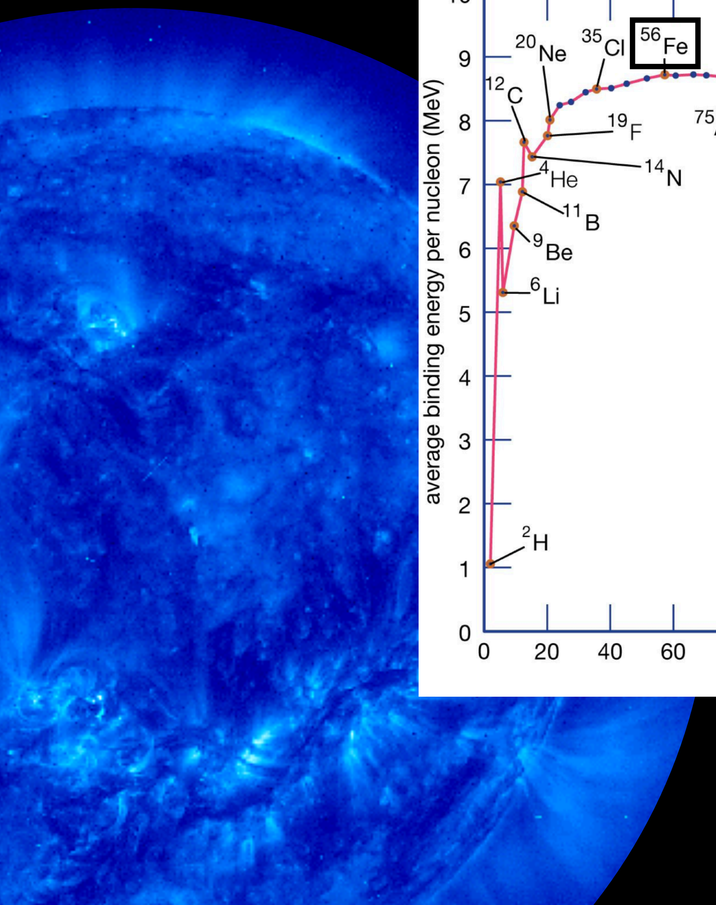
$L = 4\pi\sigma T^4 R^2$

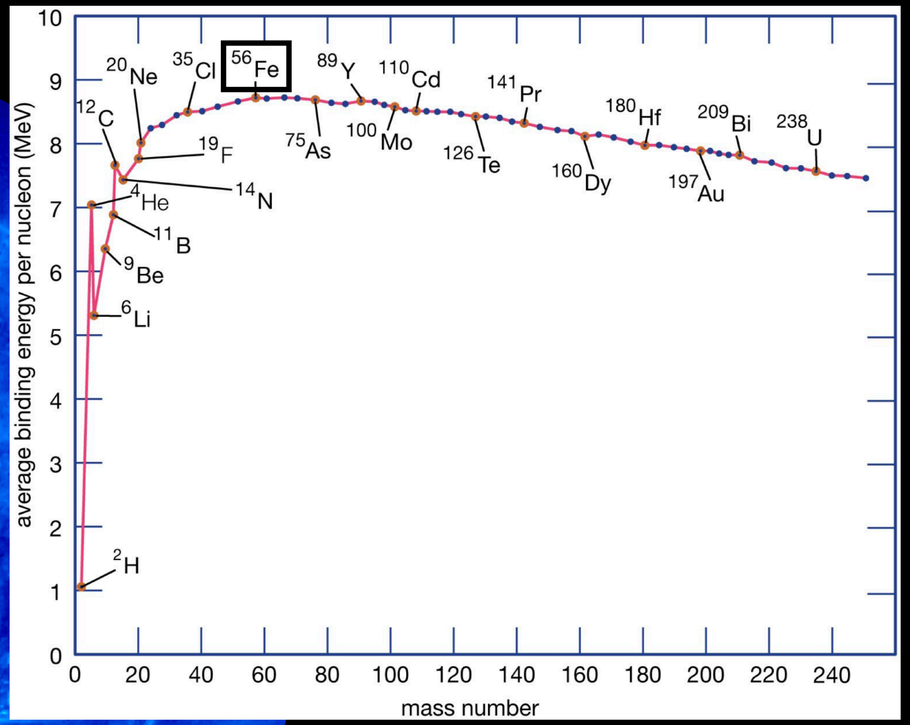


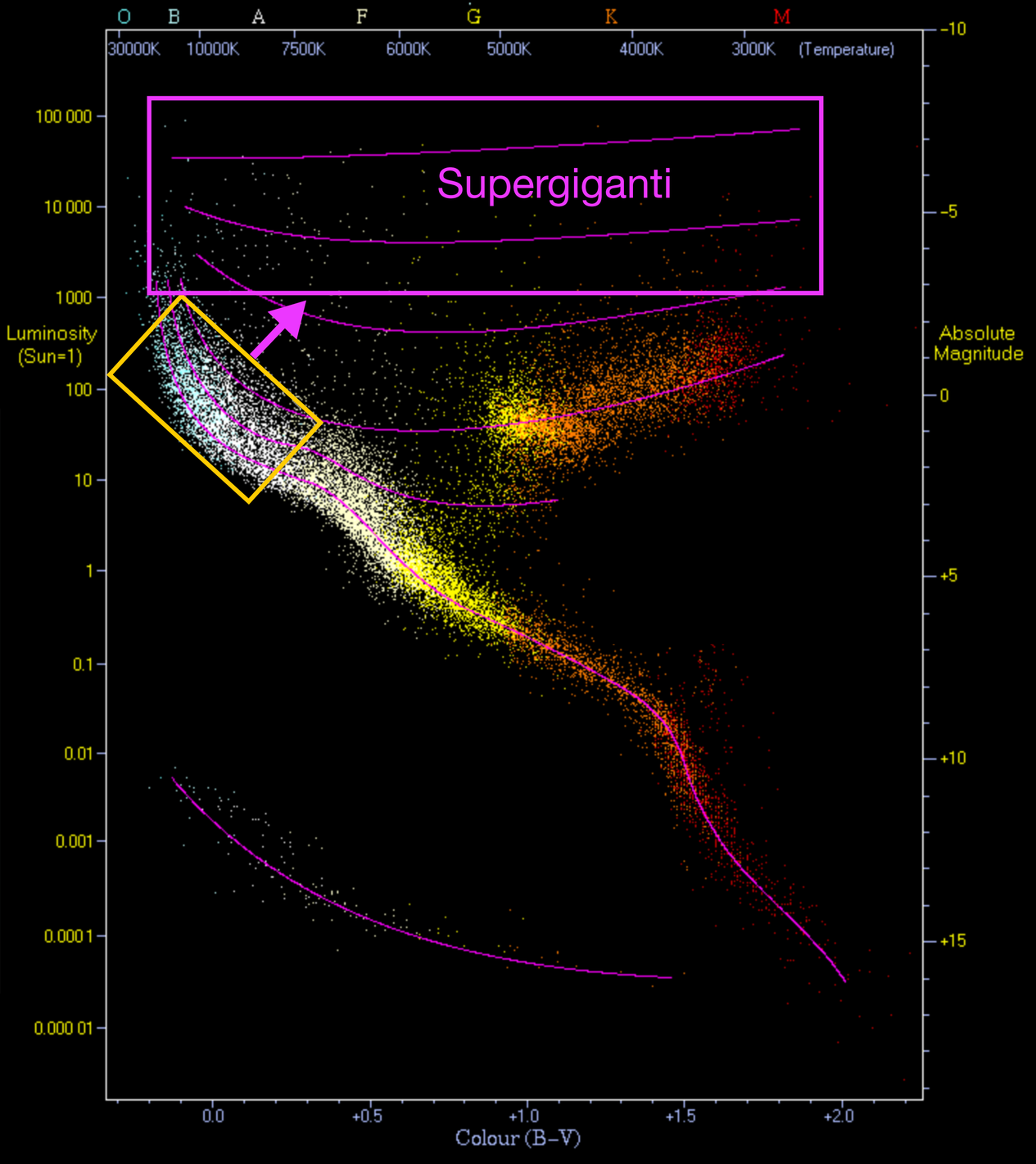


Stelle Supergiganti

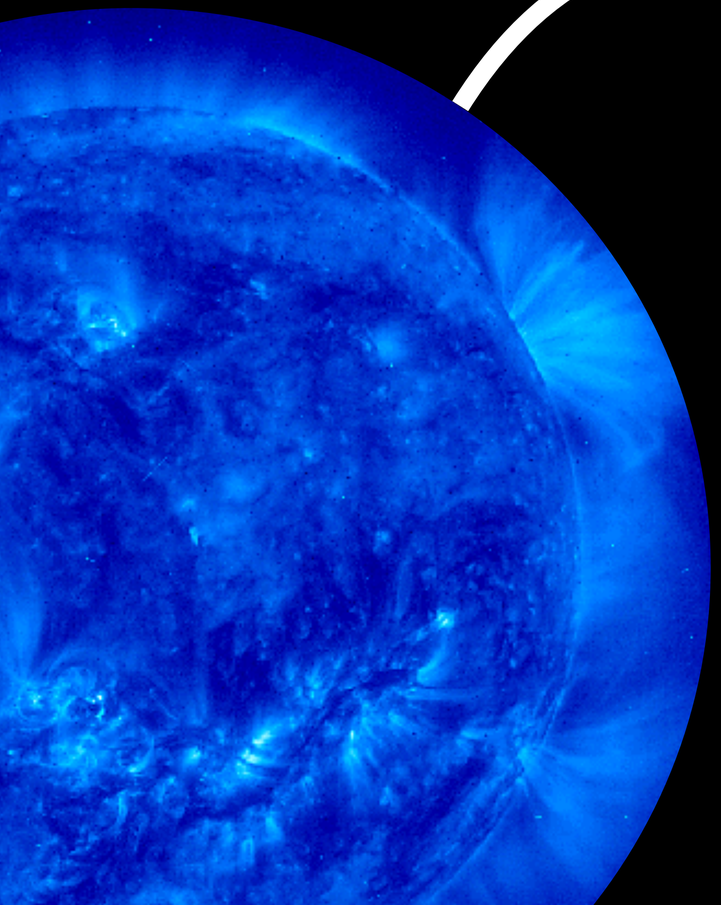
H → He → C O → Ne Mg Si → Fe

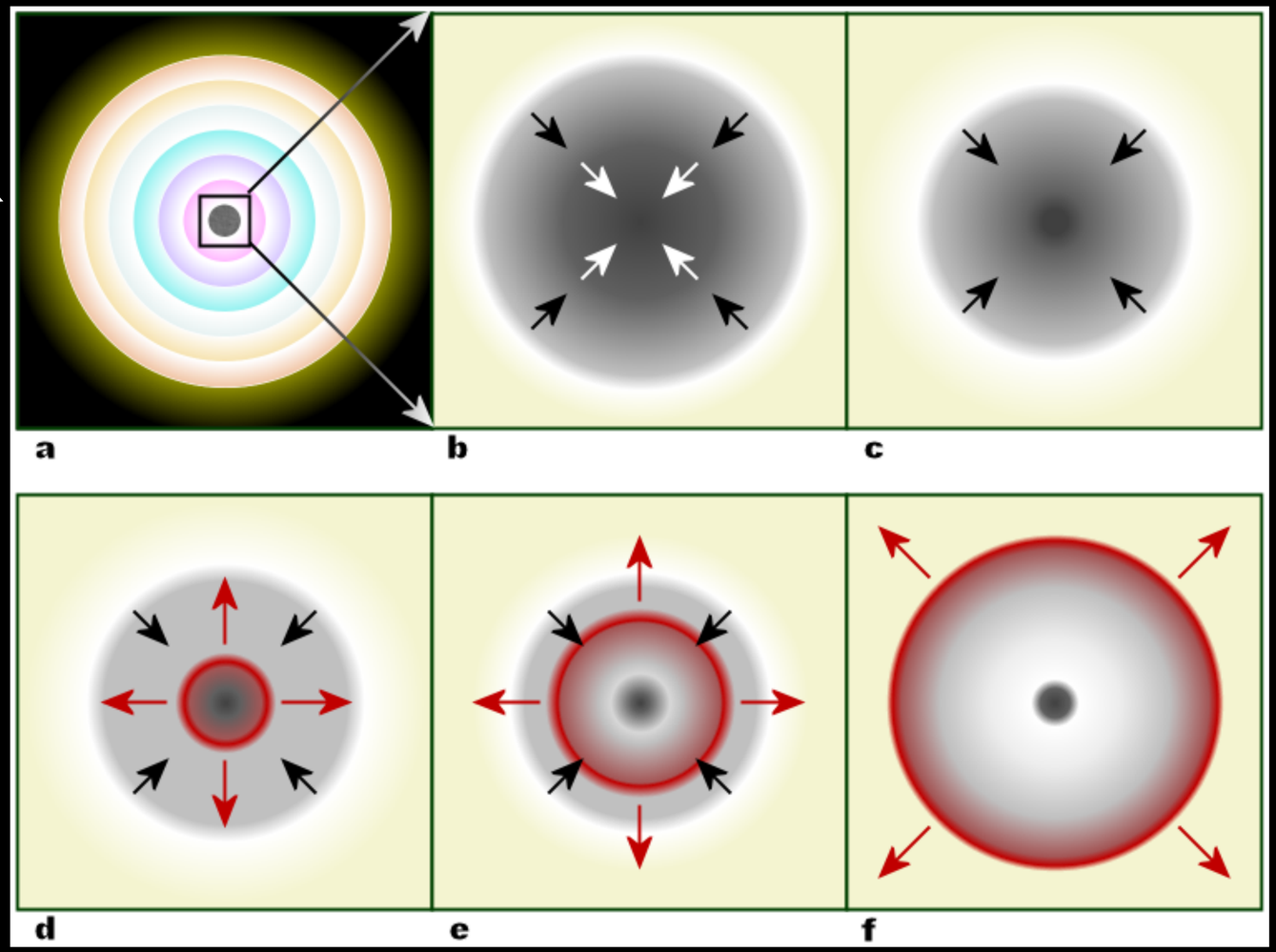






Collasso del nucleo stellare

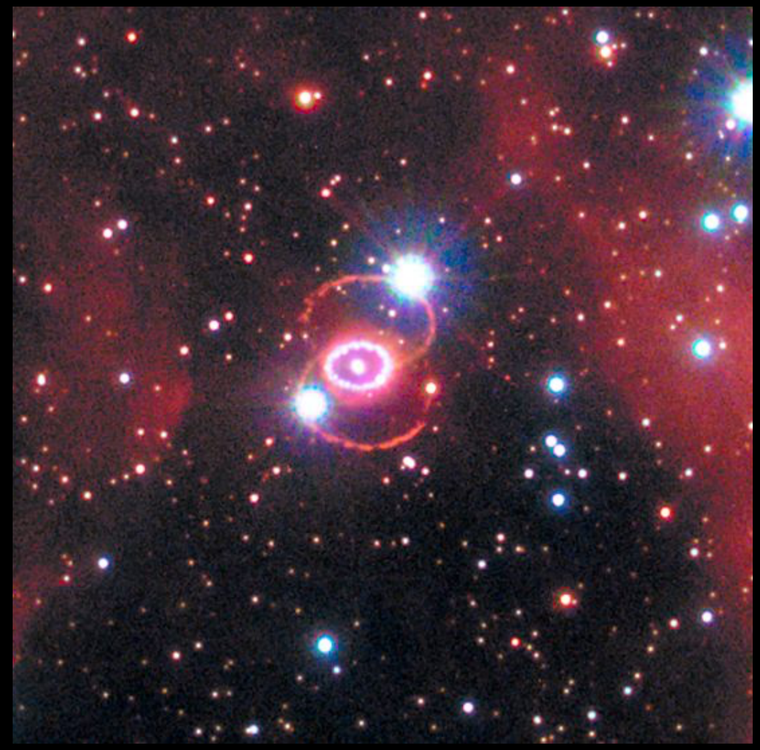




Supernove da collasso del nucleo
SN 1987A



February 1987



2017

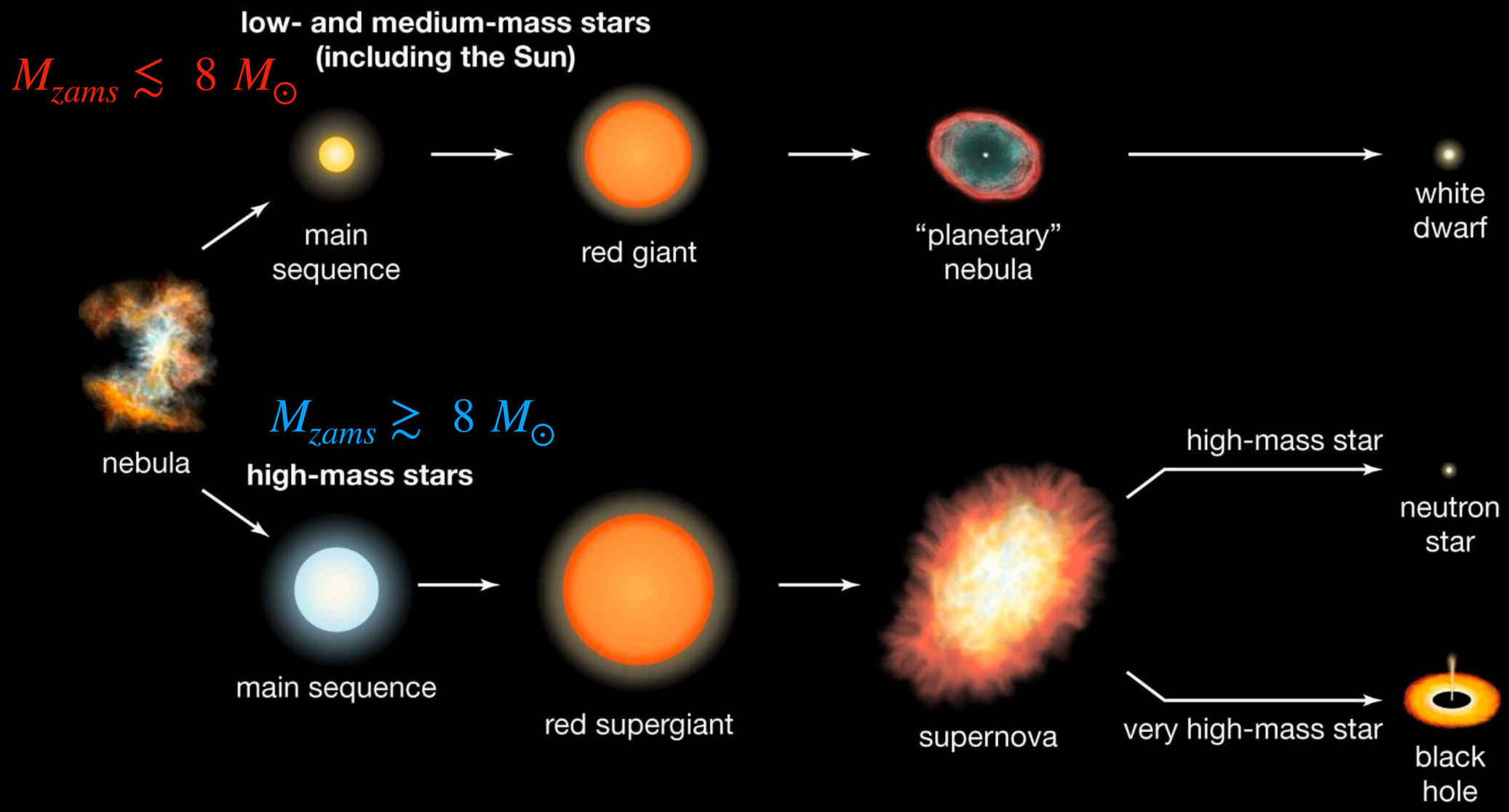
Cassiopeia A

$SN \approx 1670$




Crab Nebula
SN 1054

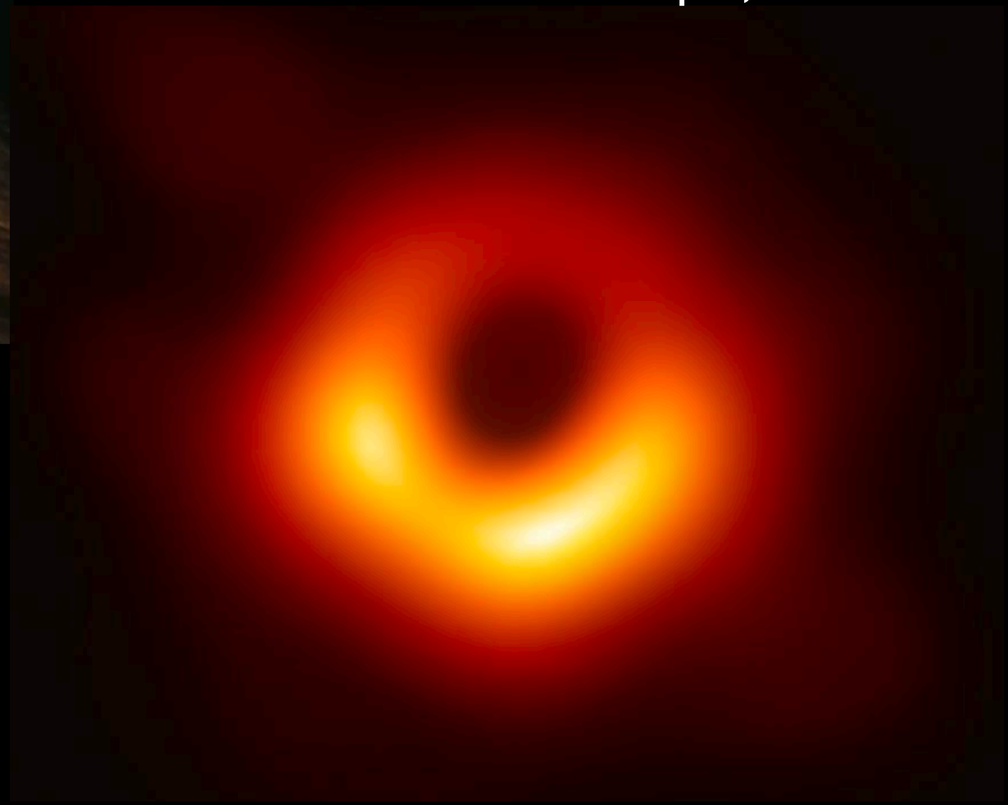
Evoluzione stellare

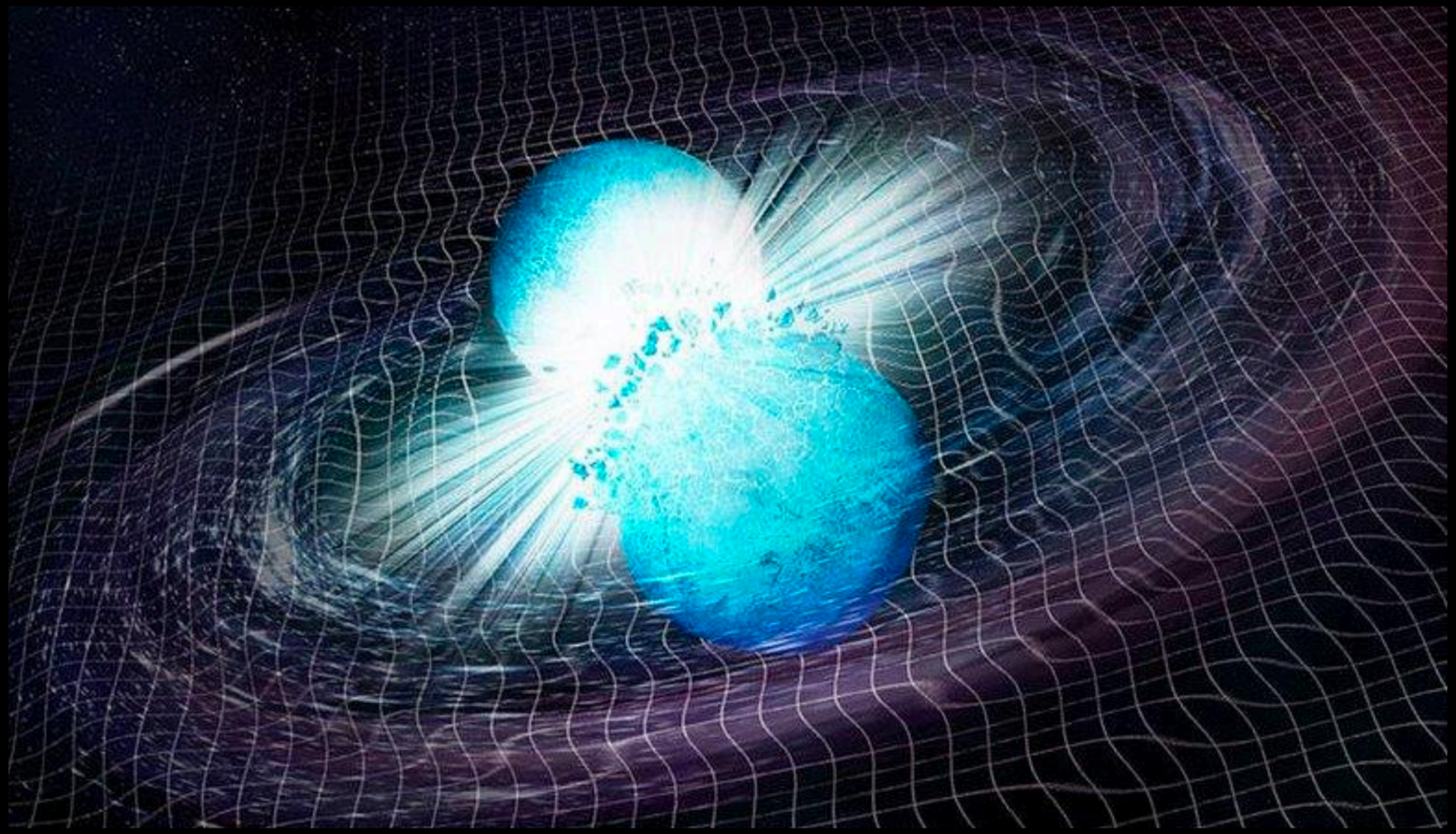




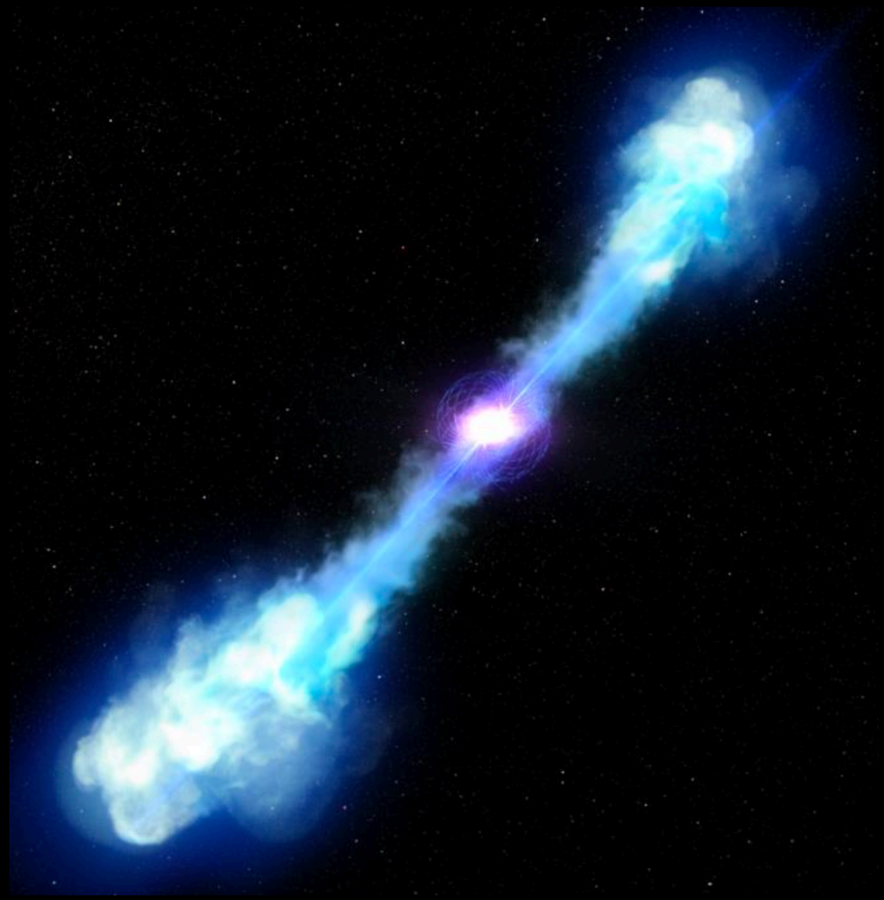
Interstellar, 2014

Prima immagine di un buco nero
Event Horizon Telescope, 2017

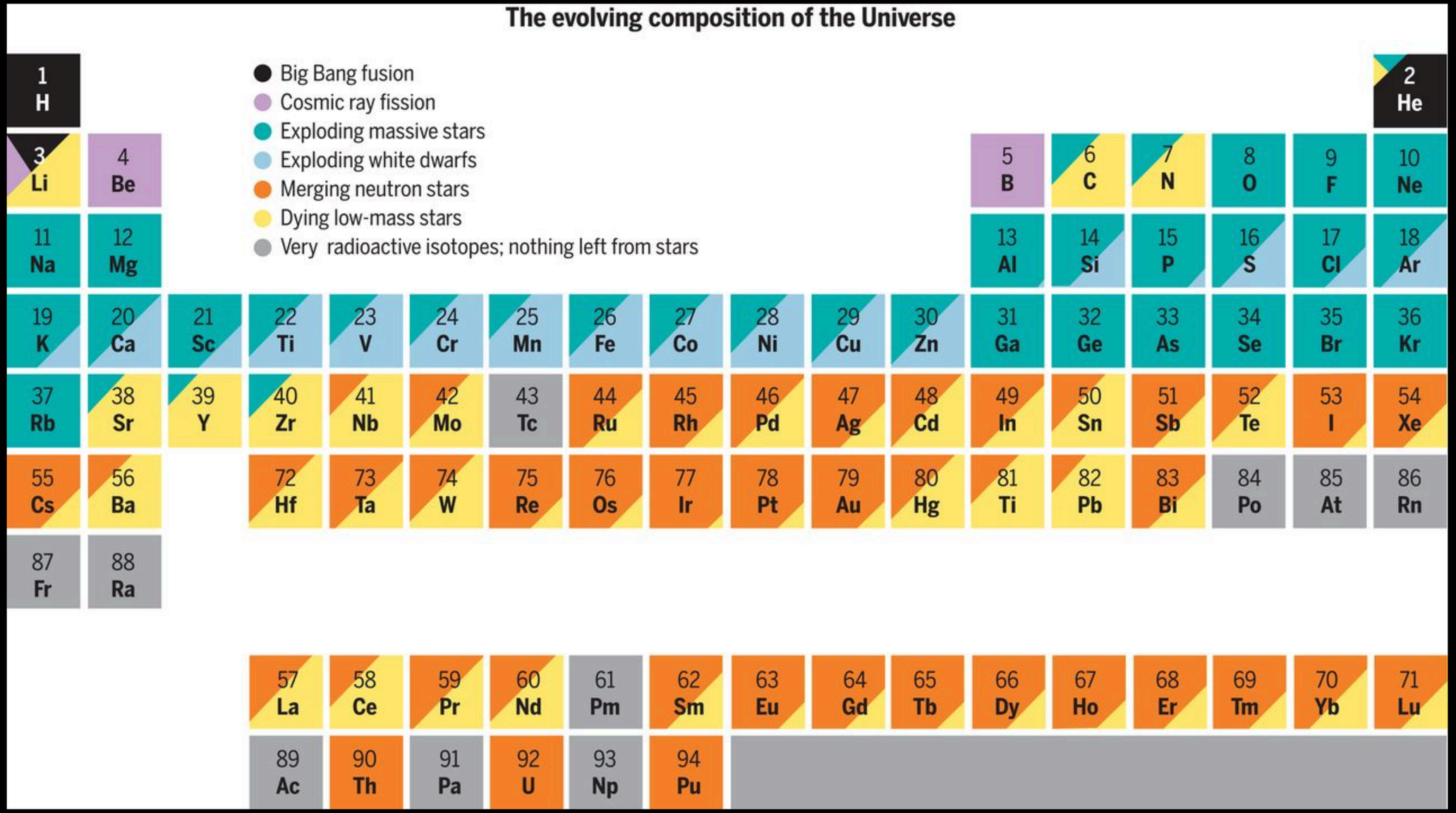




Kilonova:
Violento scontro e fusione
tra due stelle di neutroni



L’origine degli elementi



Johnson (2019)




2
1
3



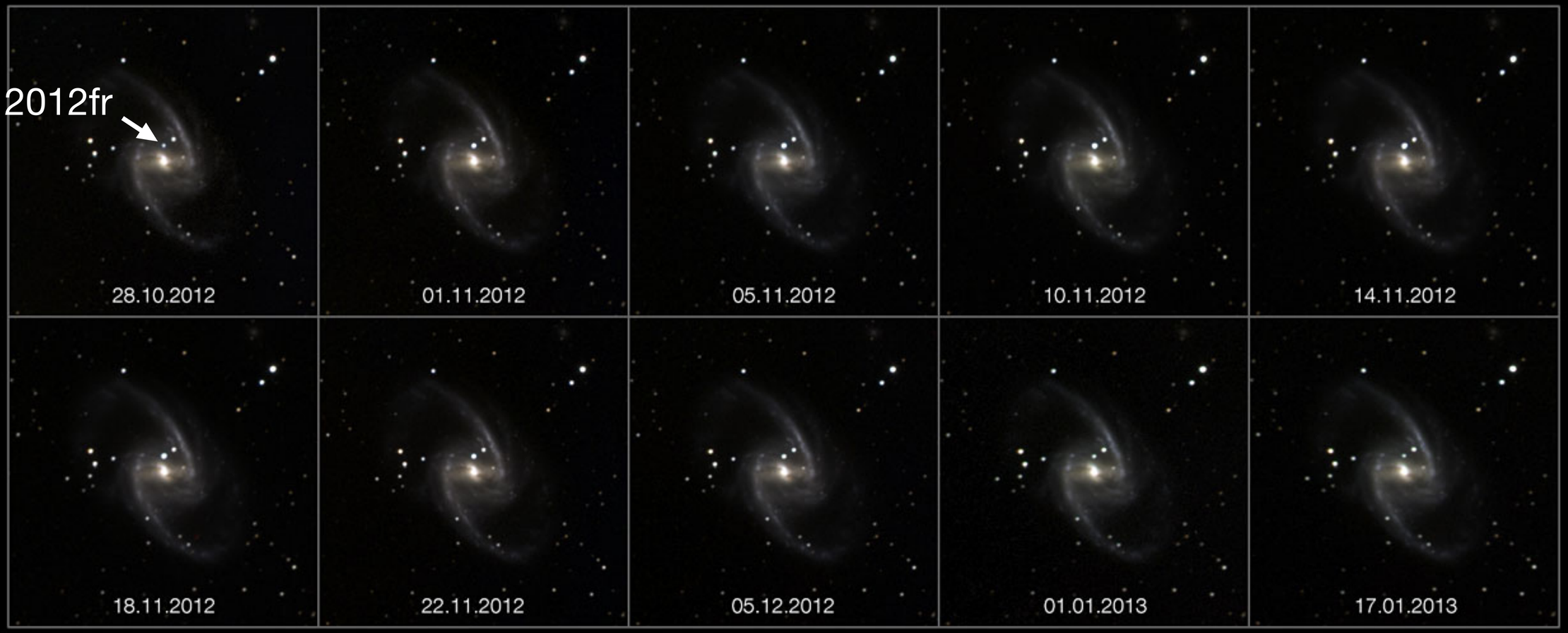

cytosine
thymine
deoxyribo
guanine
adenine

I nostri occhi sul cosmo:
I telescopi



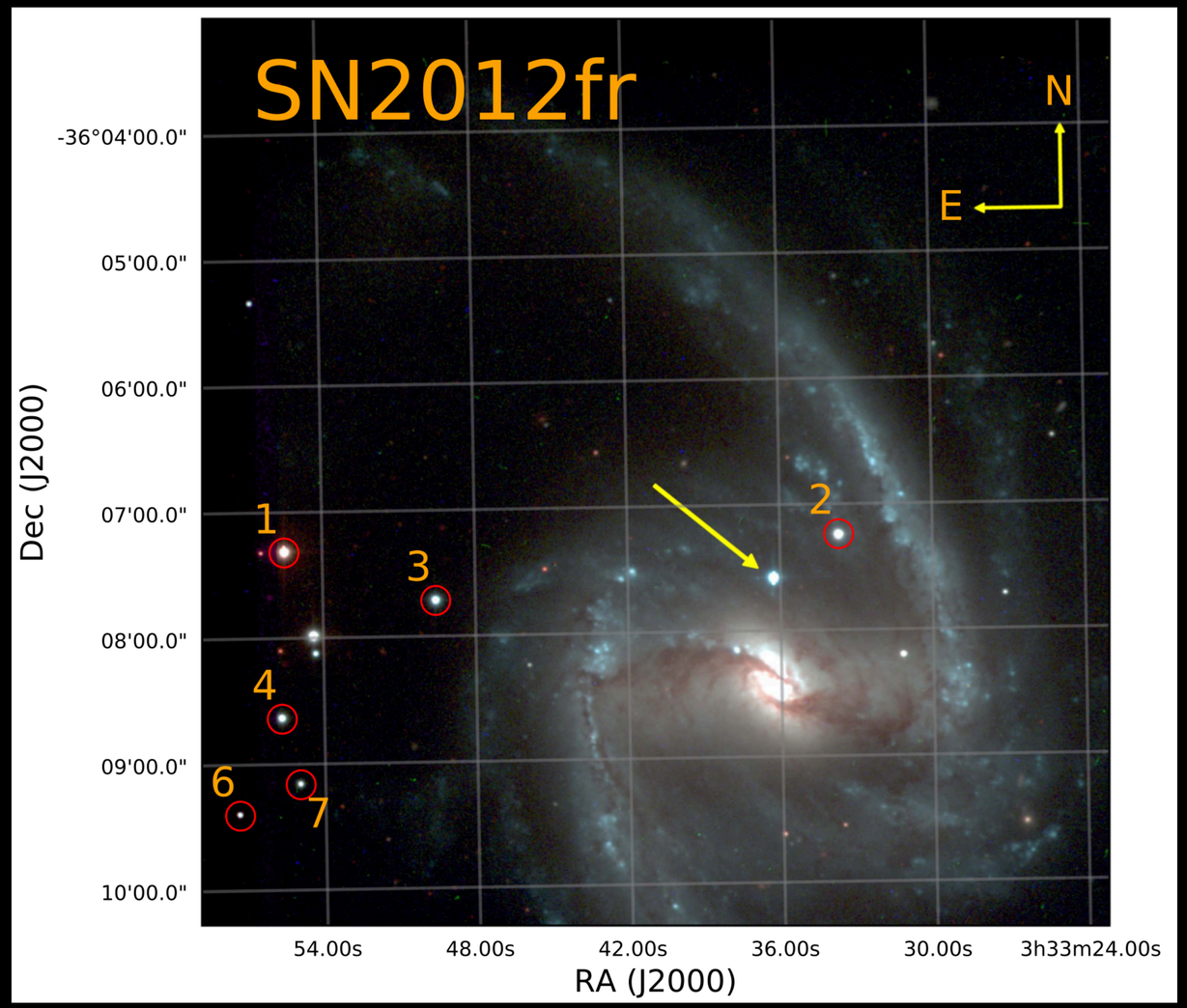


Fotometria



Immagini: ESO - European Southern Observatory, Picture of the week (A. Klotz & R. Hook)

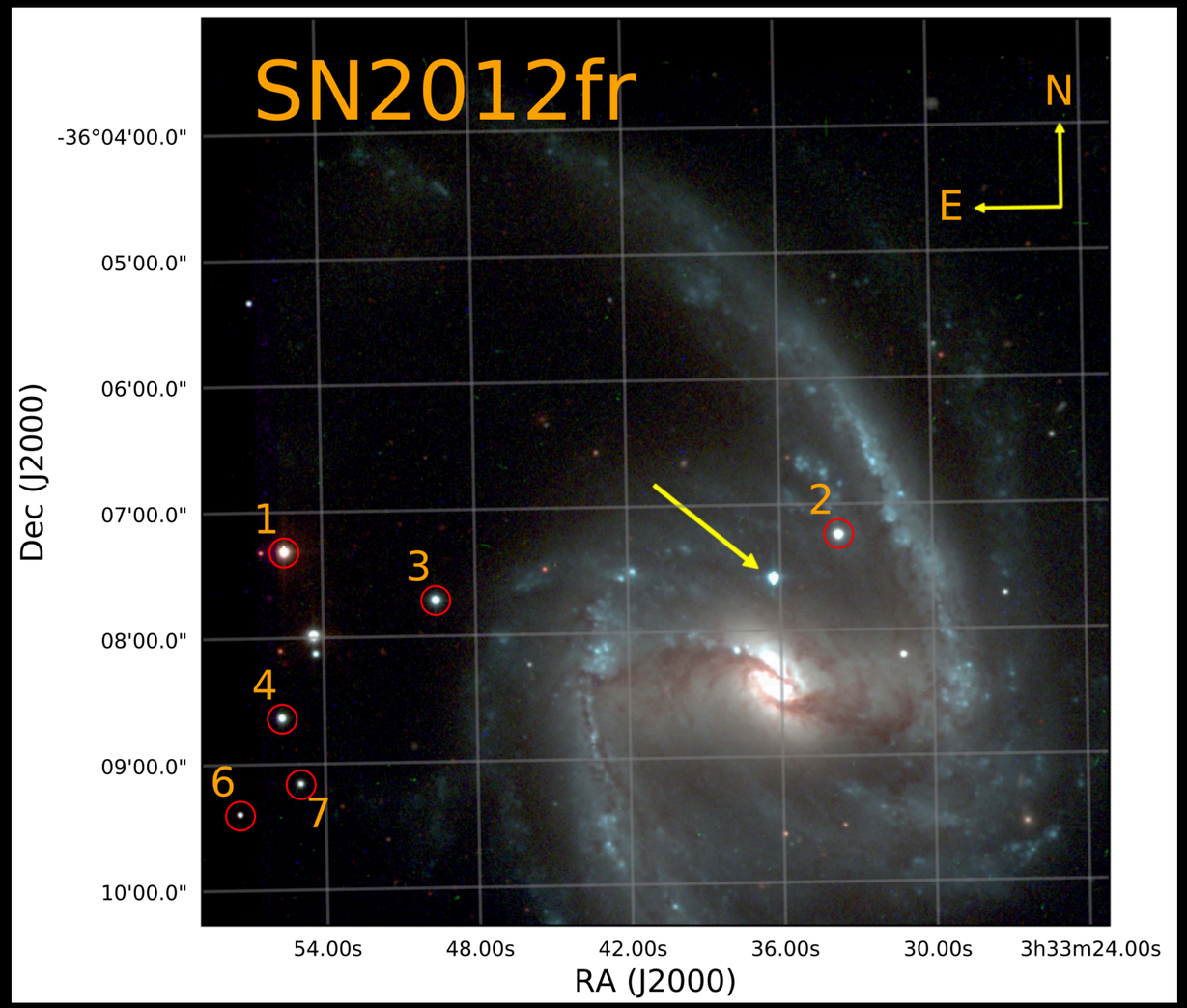
Fotometria





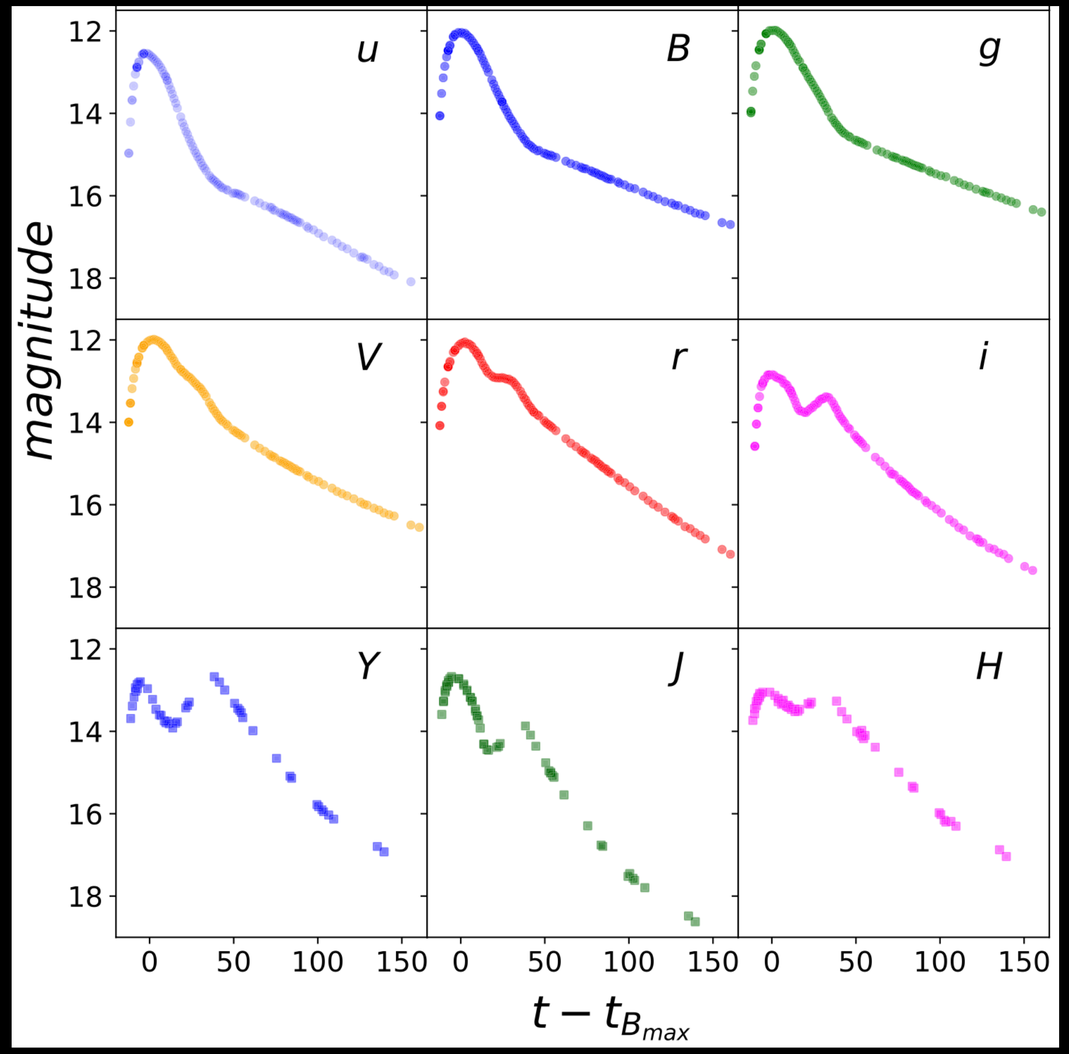
Contreras et al. (2018)

Fotometria

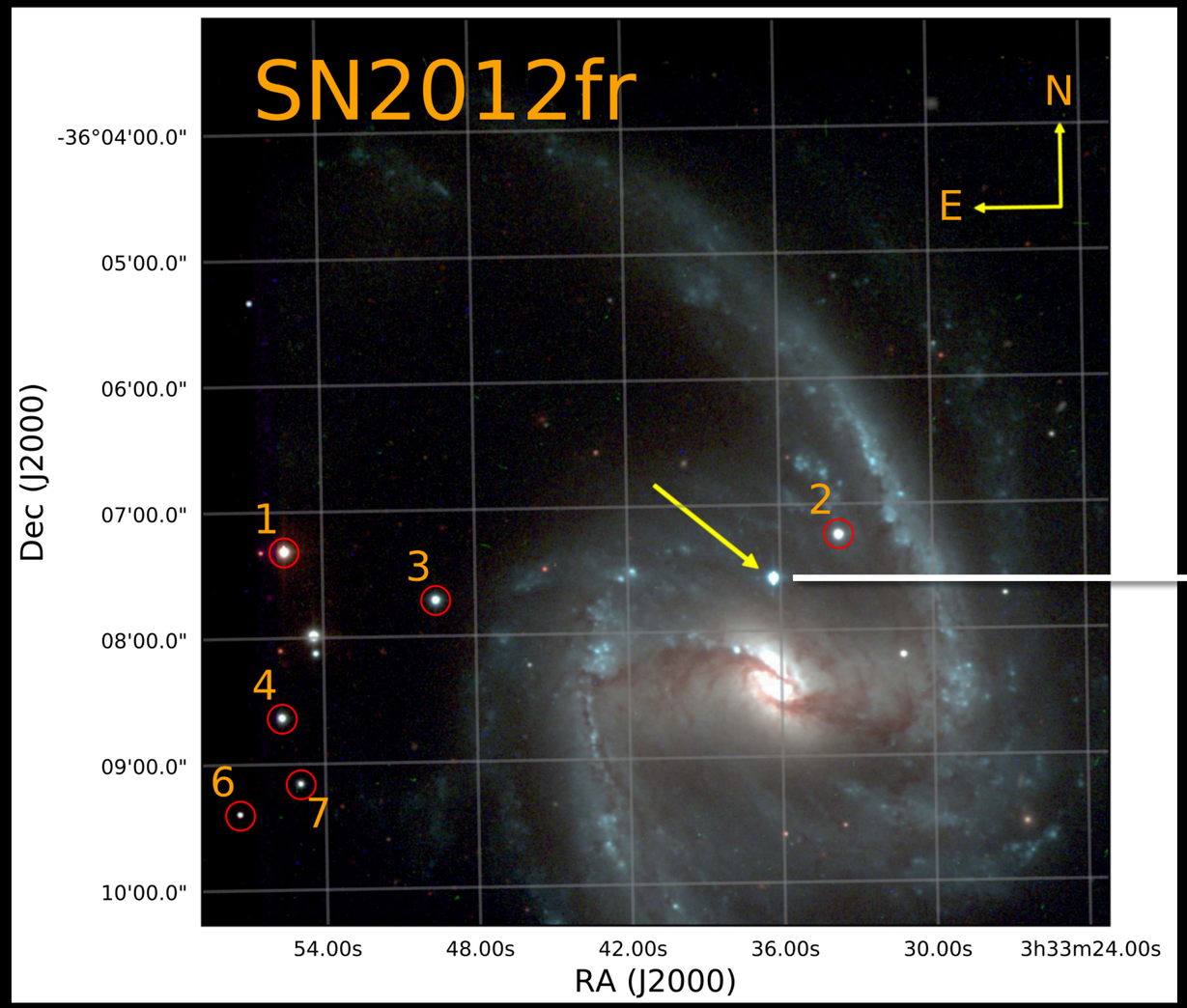


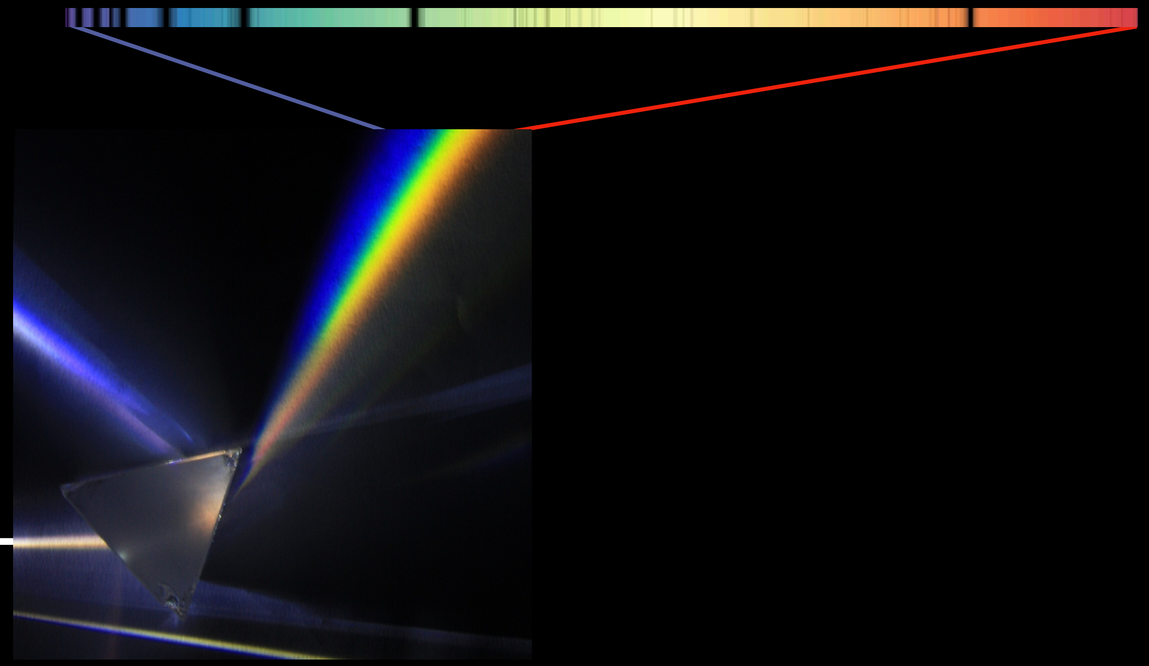
Contreras et al. (2018)

Curve di luce



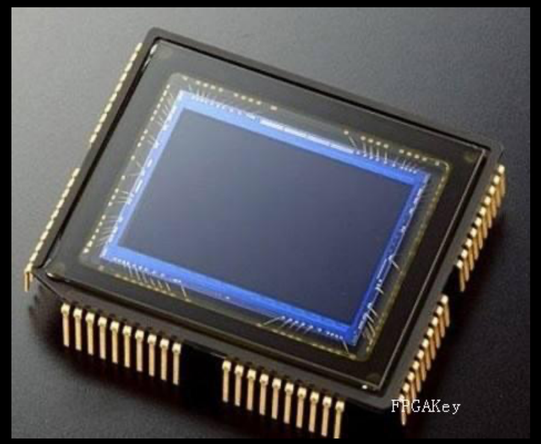
Spettroscopia

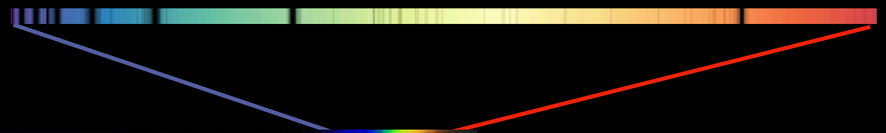


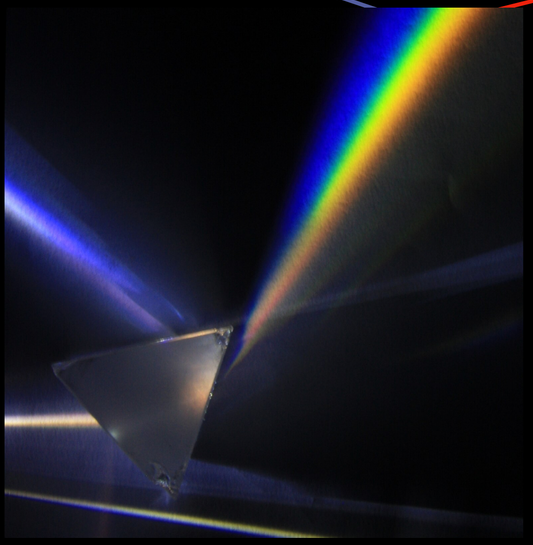


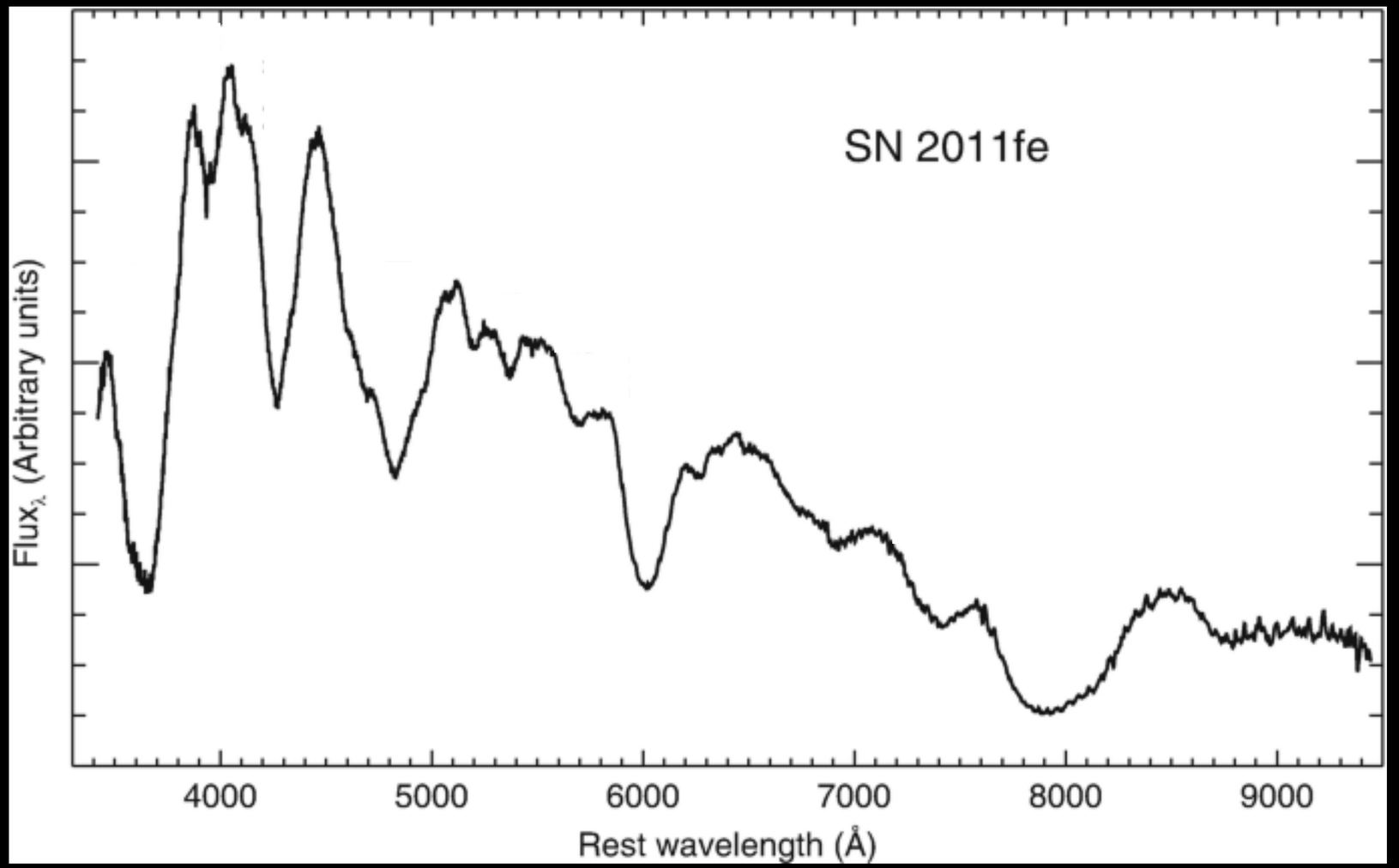
Contreras et al. (2018)

Spettroscopia



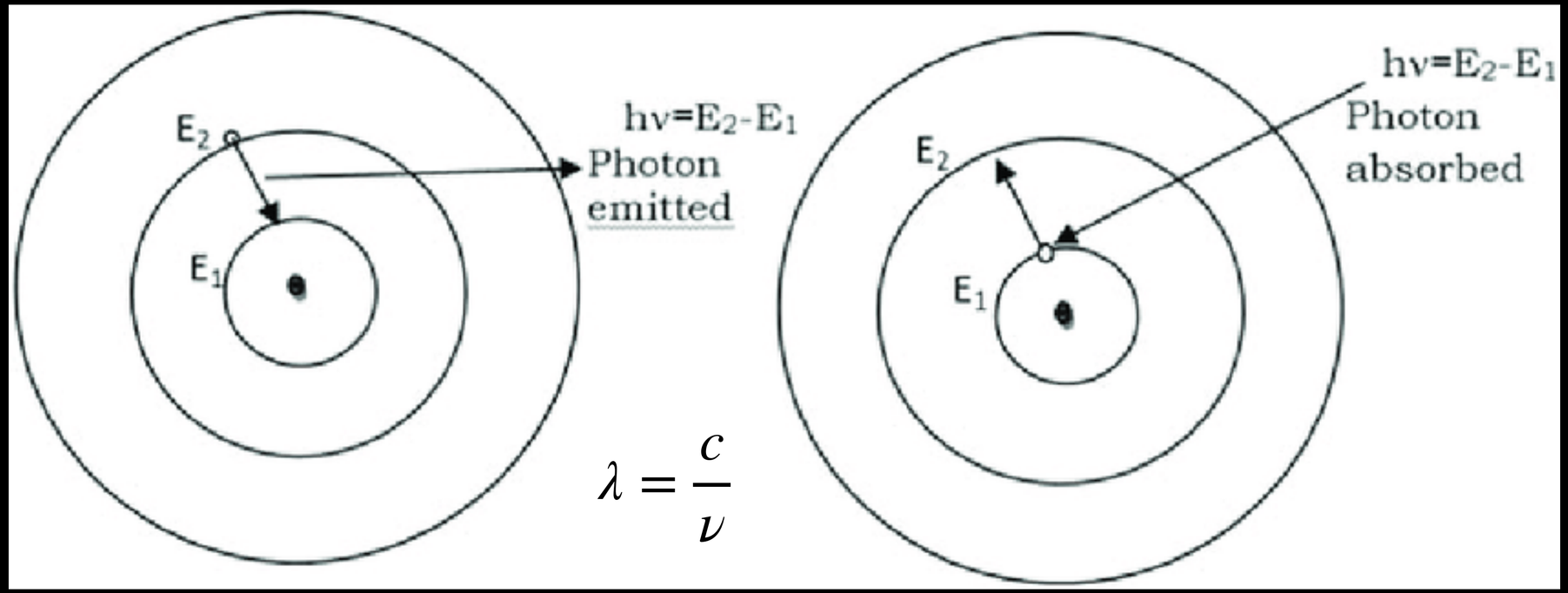






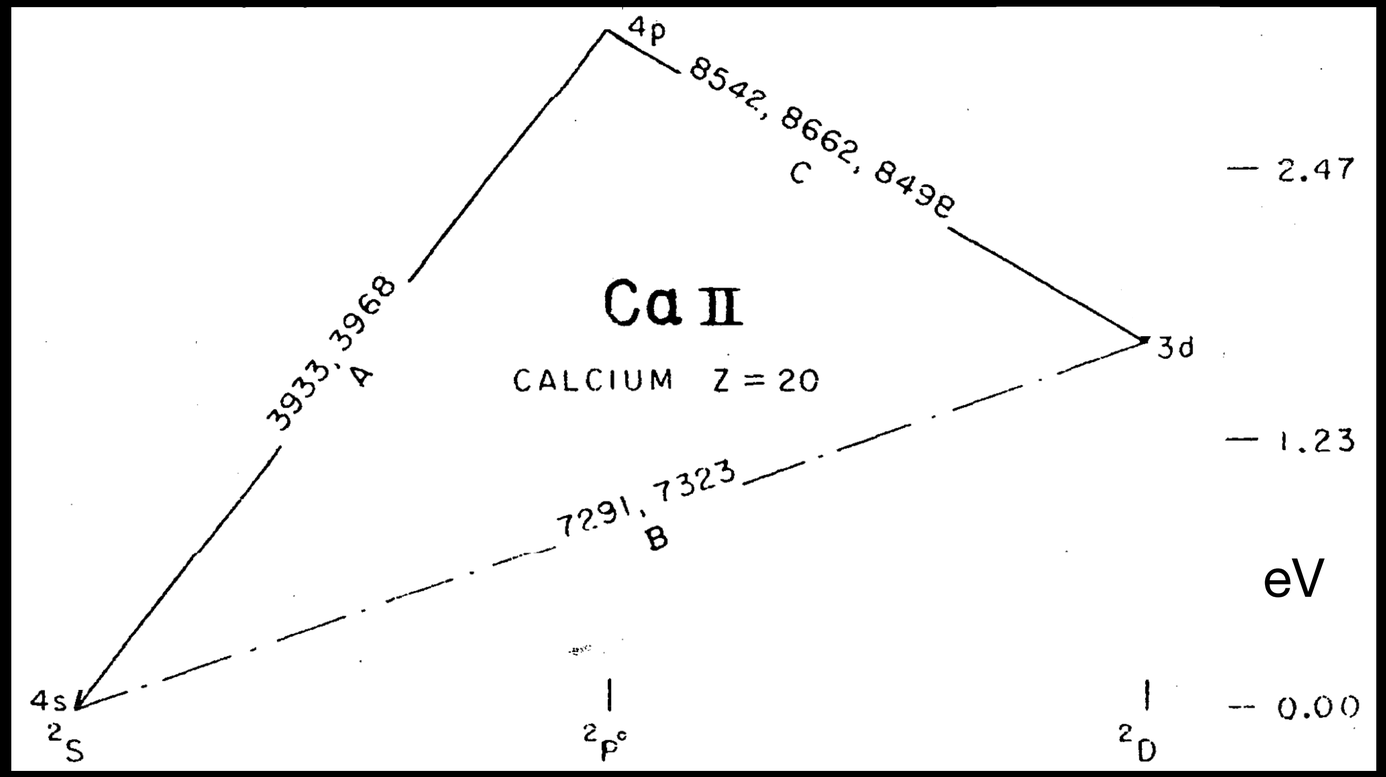
Maguire et al (2017)

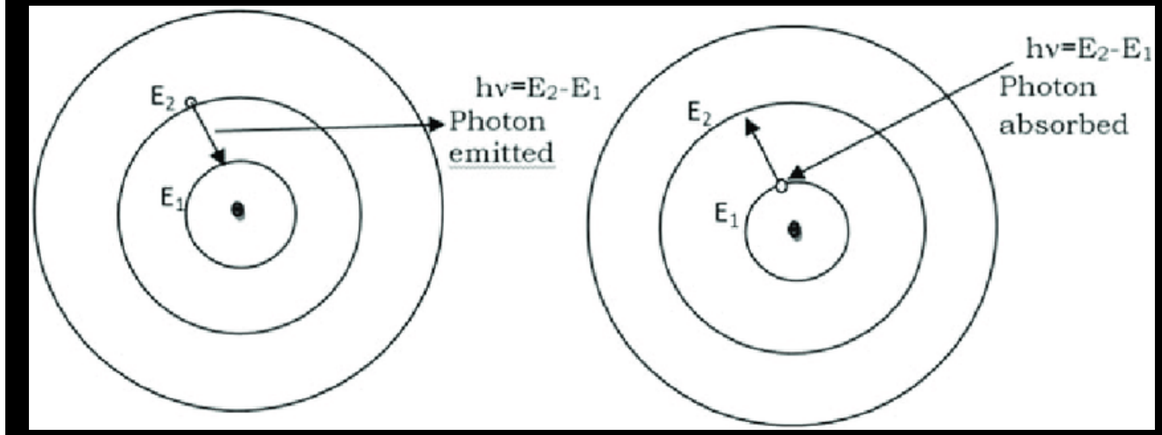
Emissione ed Assorbimento di Fotoni



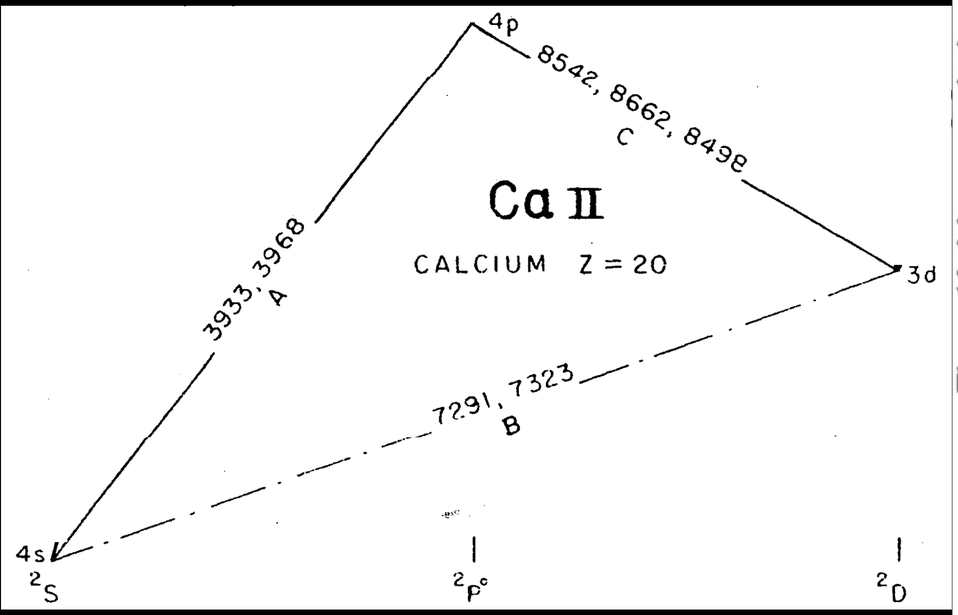
$$\lambda = \frac{c}{\nu}$$

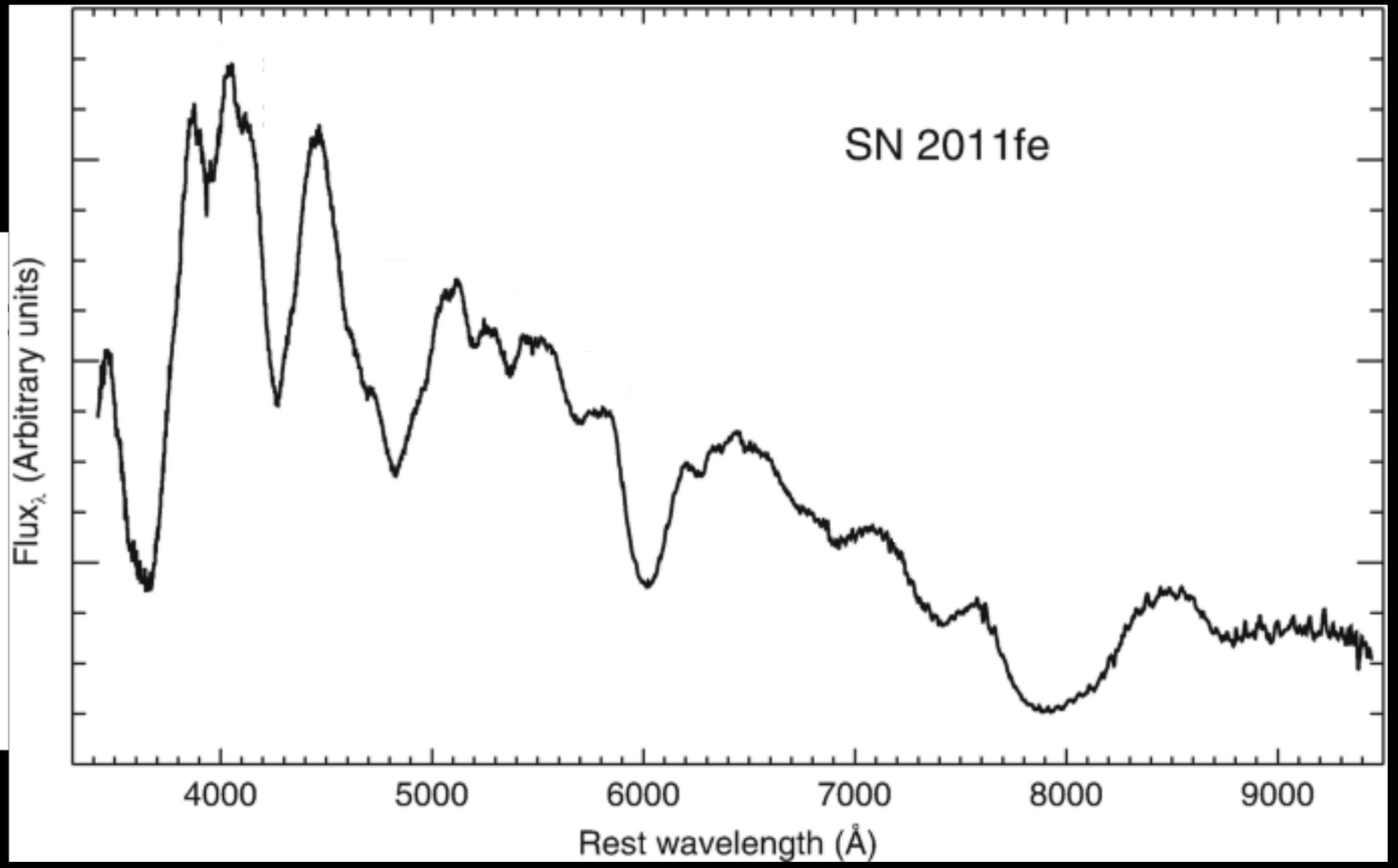
Emissione ed Assorbimento di Fotoni





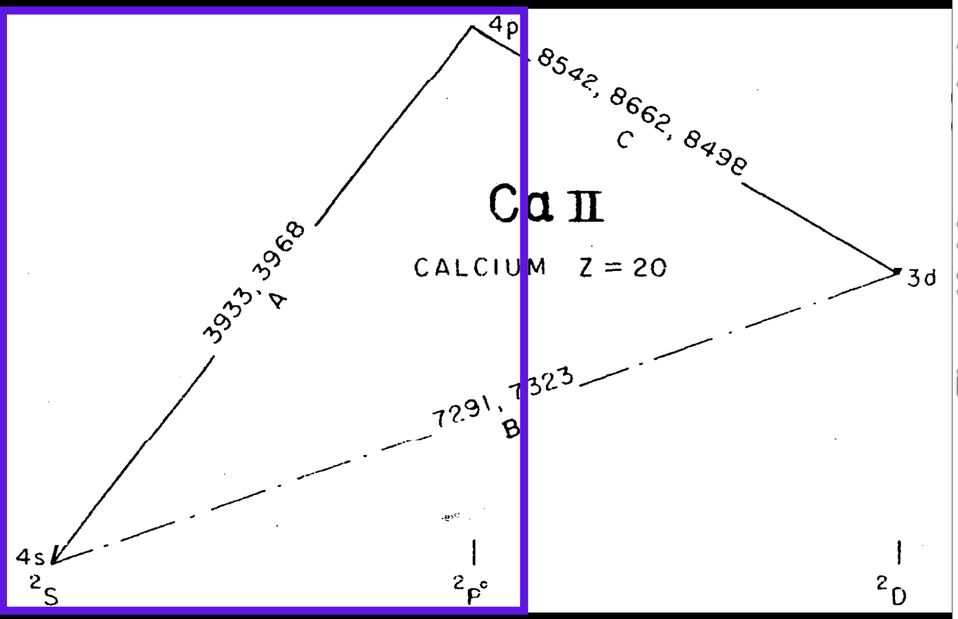
Righe spettrali

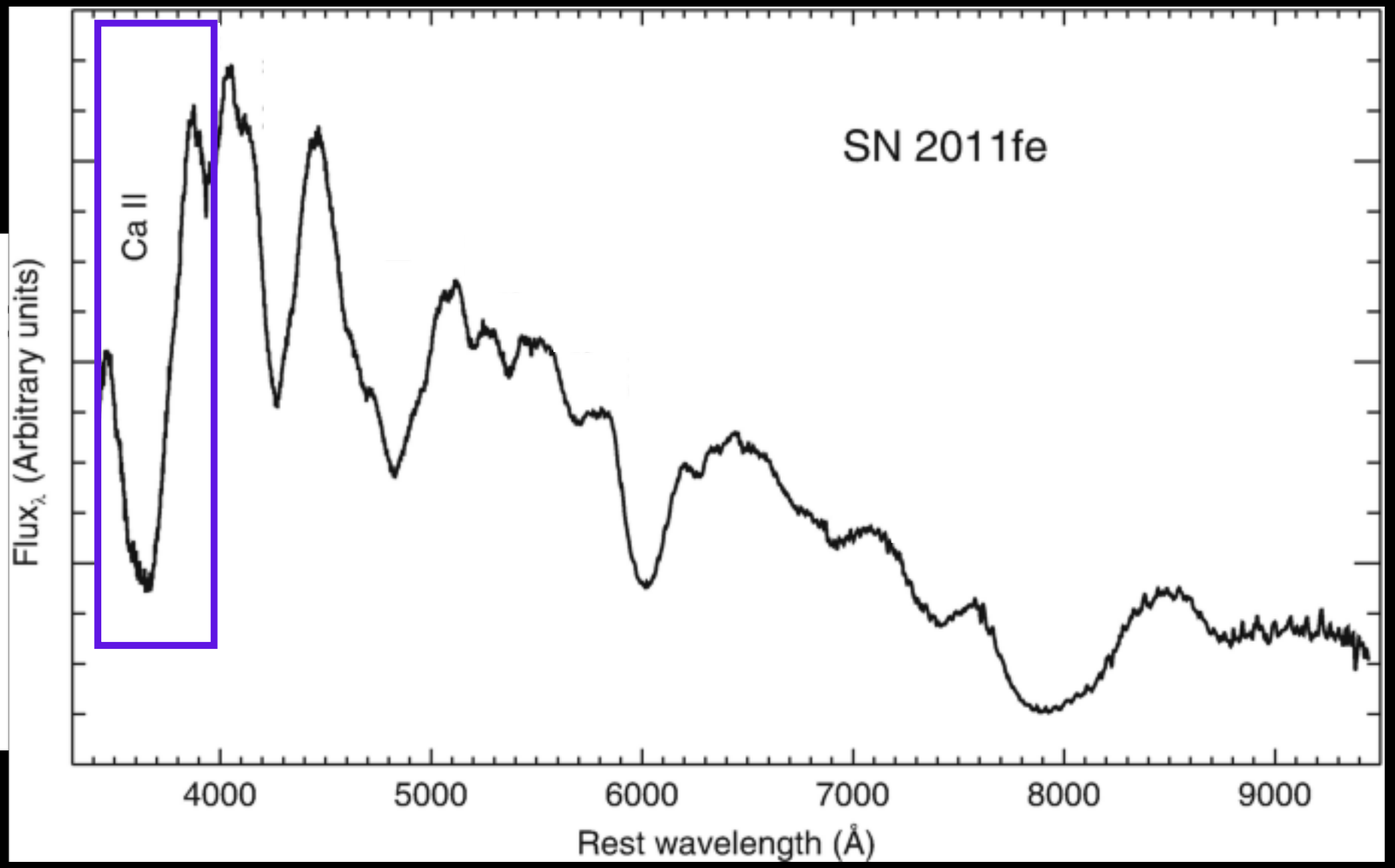




Maguire et al (2017)

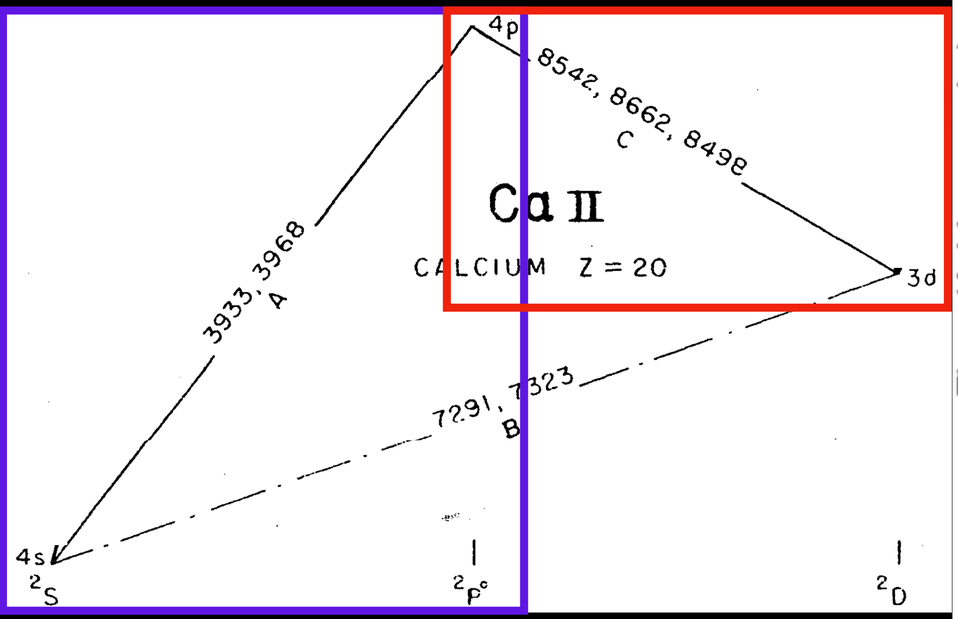
Righe spettrali

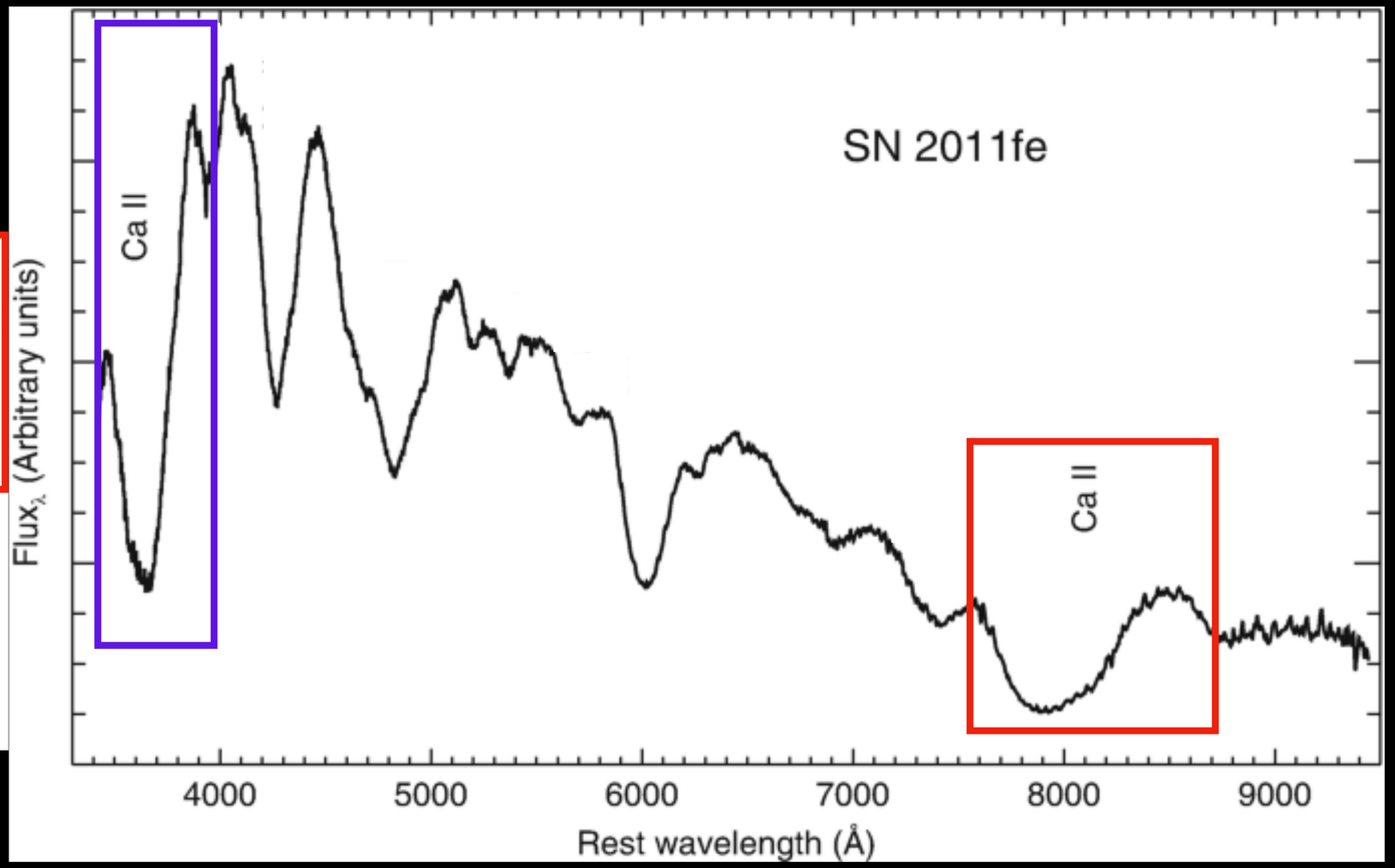




Maguire et al (2017)

Righe spettrali

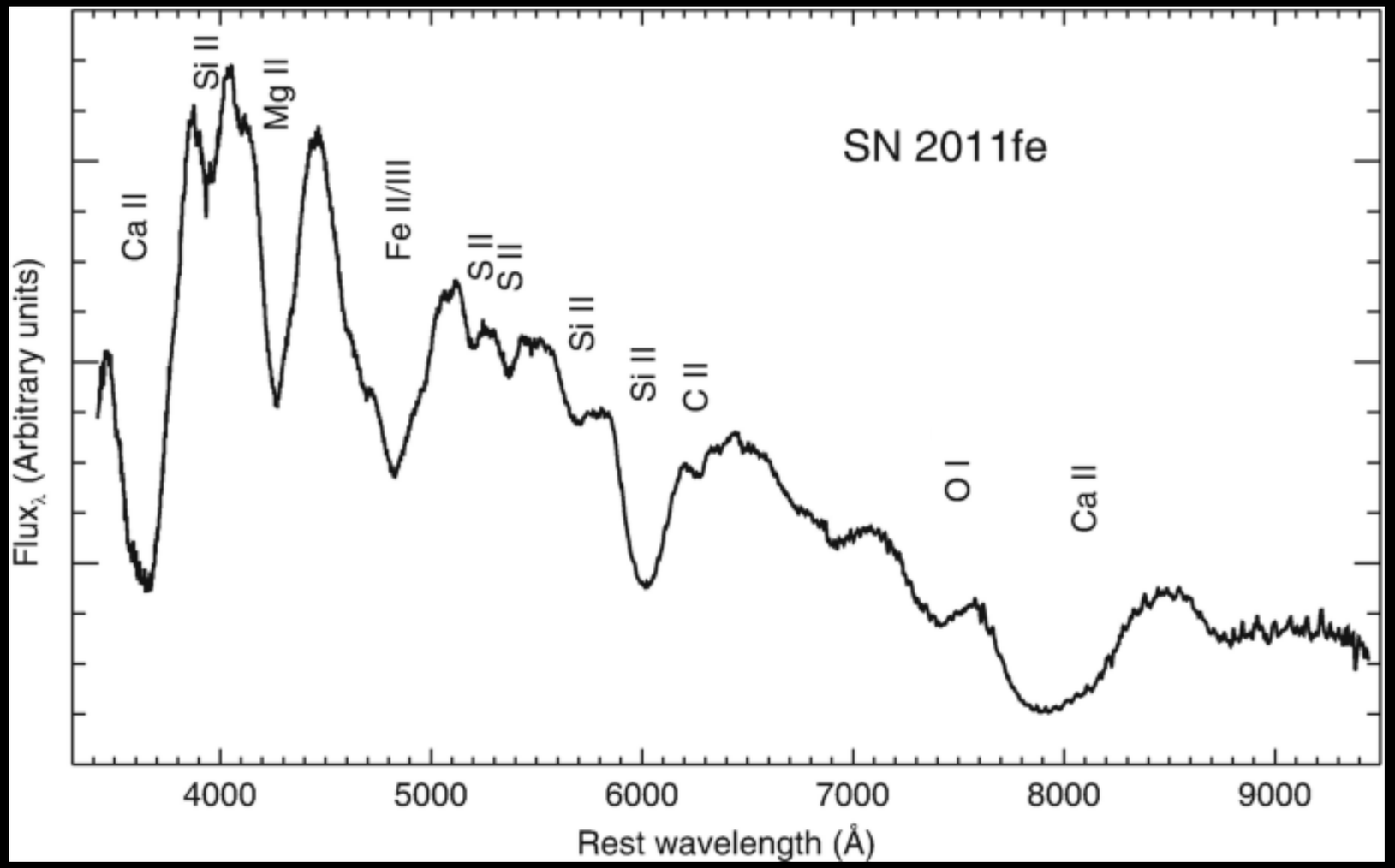




Maguire et al (2017)

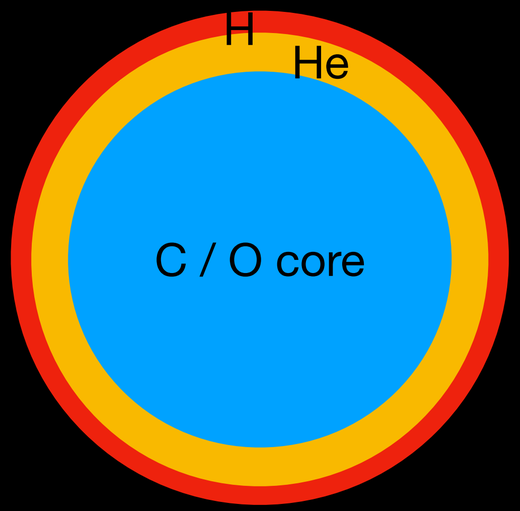
Righe spettrali

Niente idrogeno (H)
Righe di Silicio (Si)



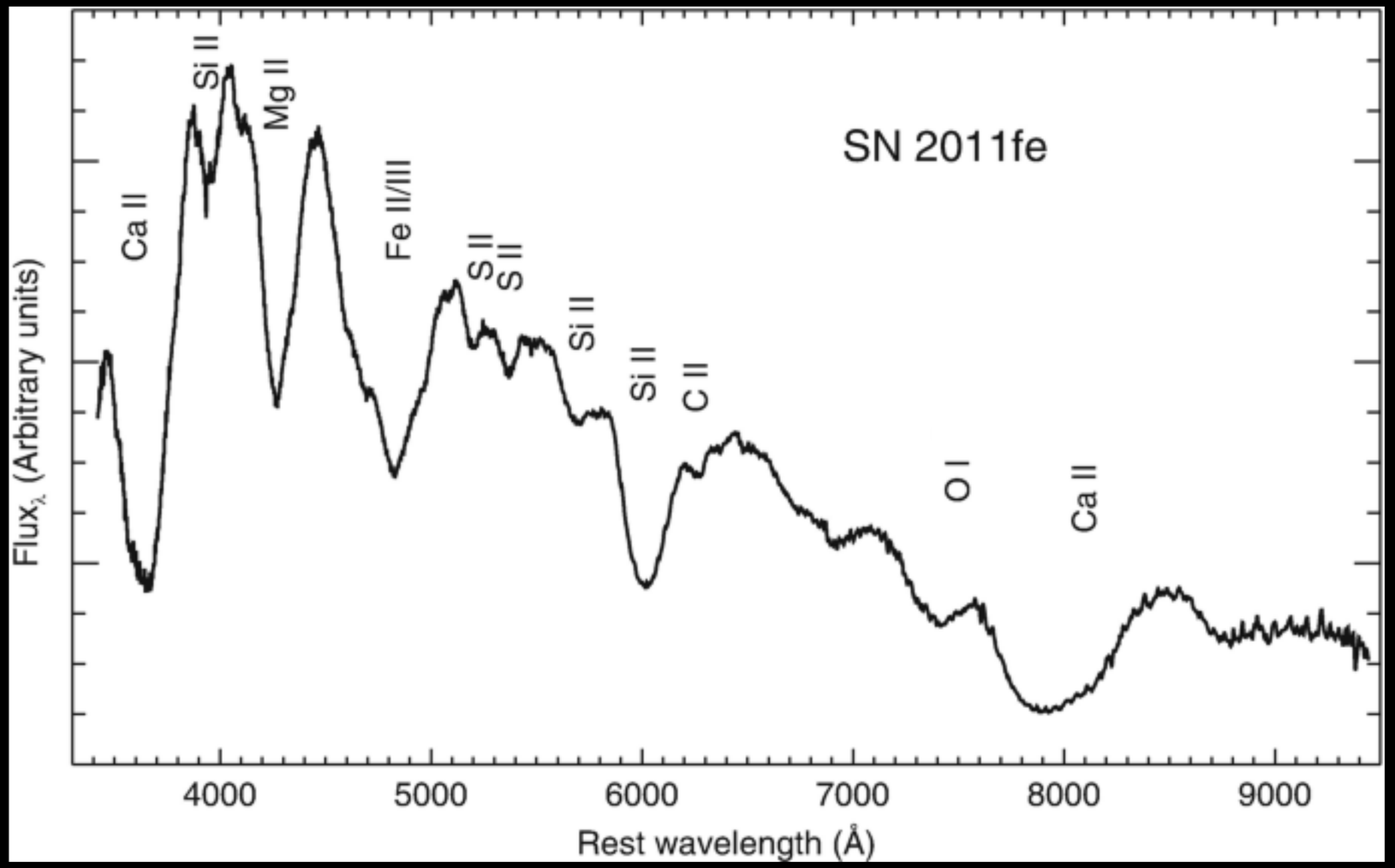
Maguire et al (2017)

Classificazione spettrale



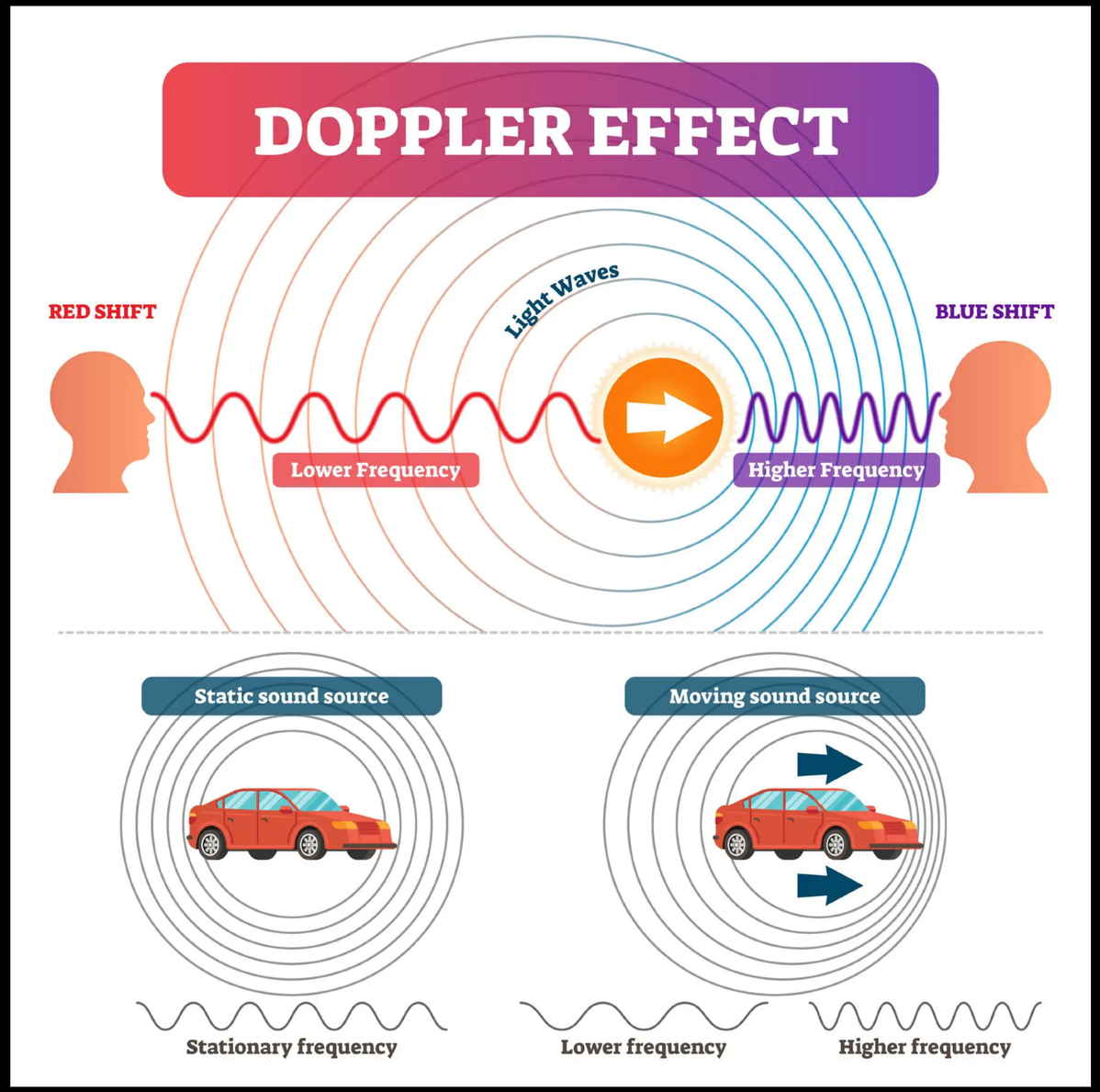
SN Ia

Esplosione di una nana bianca



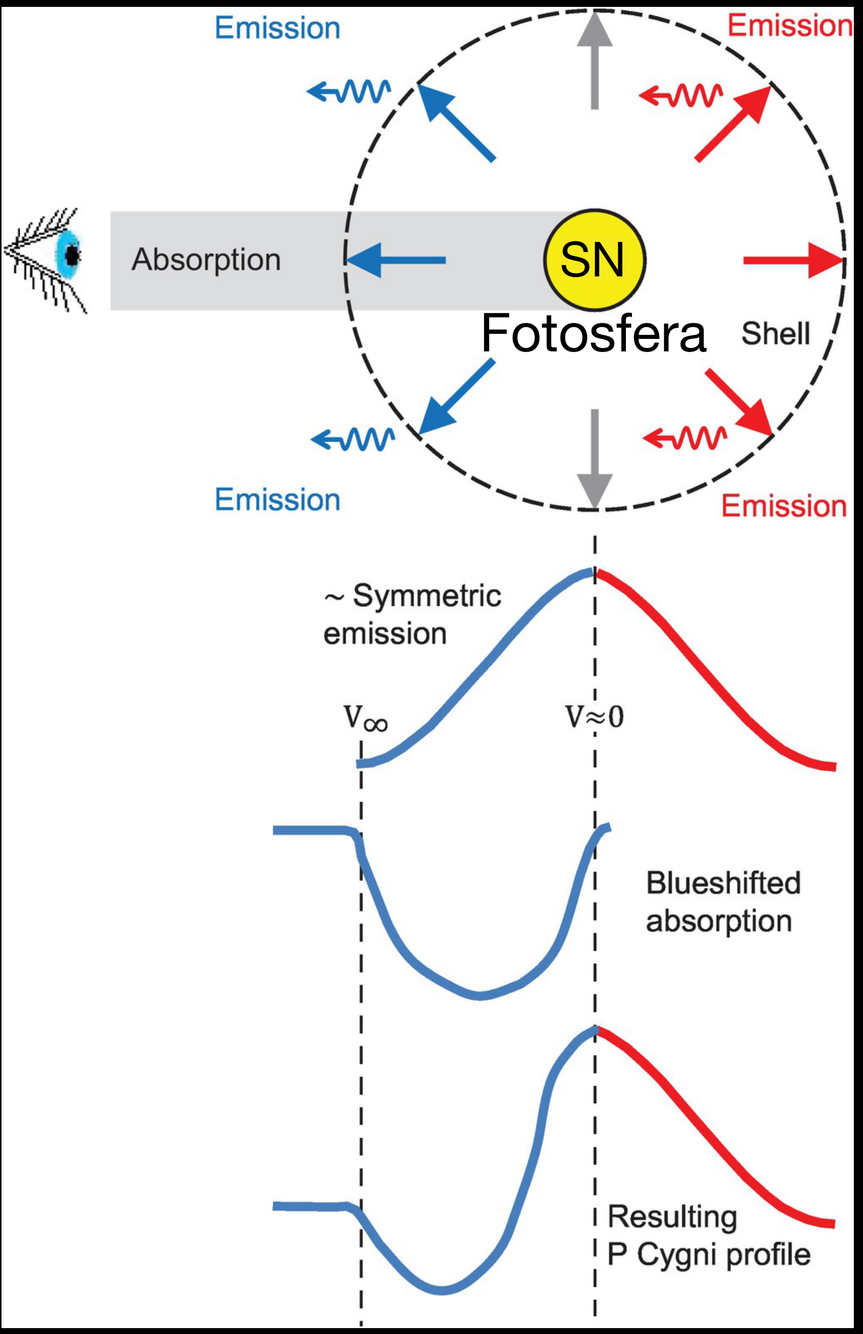
Maguire et al (2017)

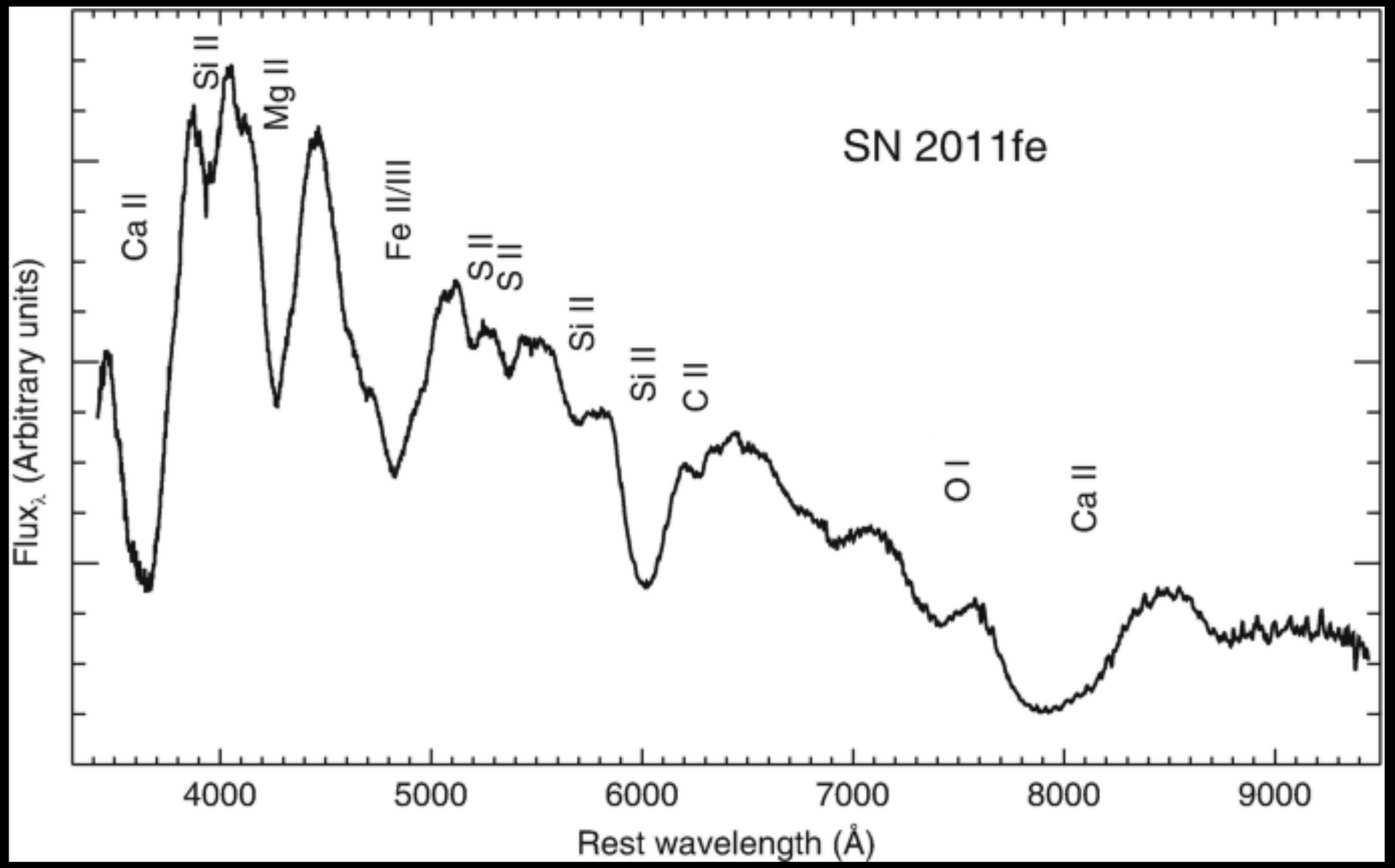
Effetto Doppler



$$V = \frac{\lambda_0 - \lambda_{obs}}{\lambda_0} c$$

Profilo P-Cygni

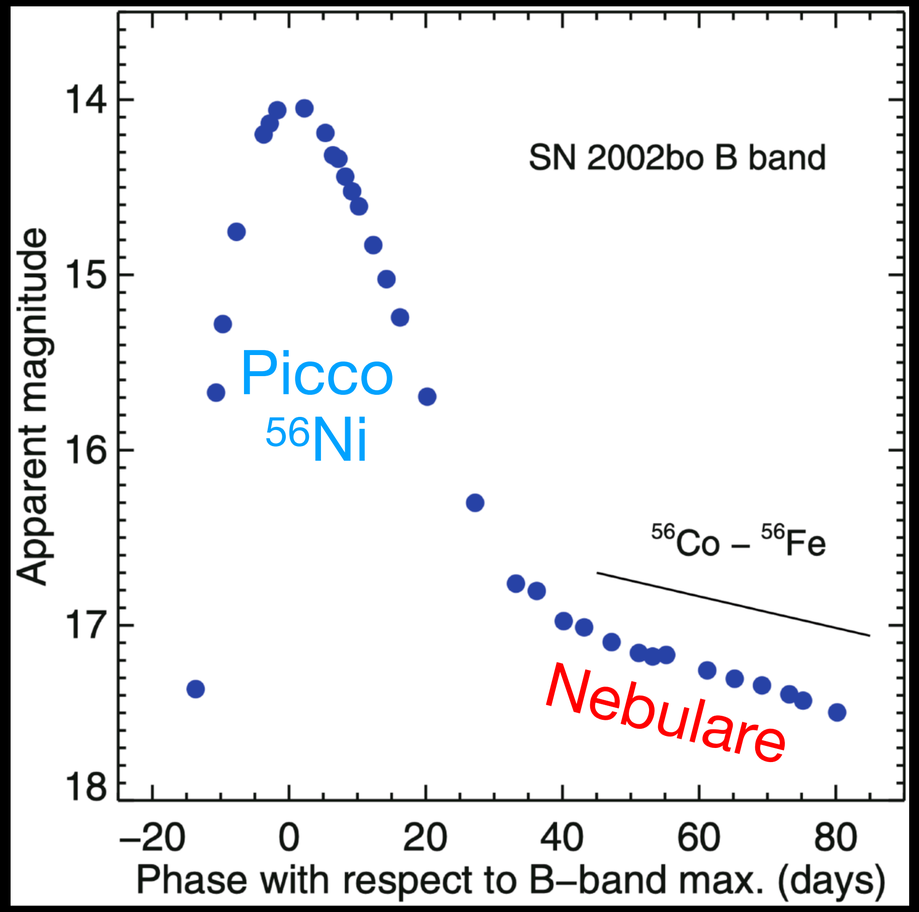




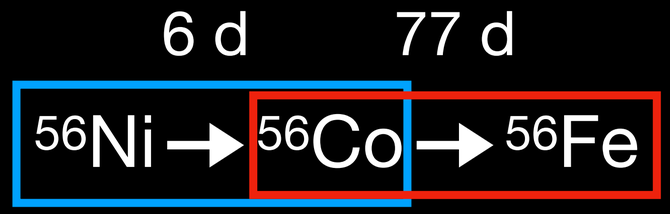
Maguire et al (2017)

Supernove termonucleari [SN Ia]

Curve di luce



Maguire et al (2017)

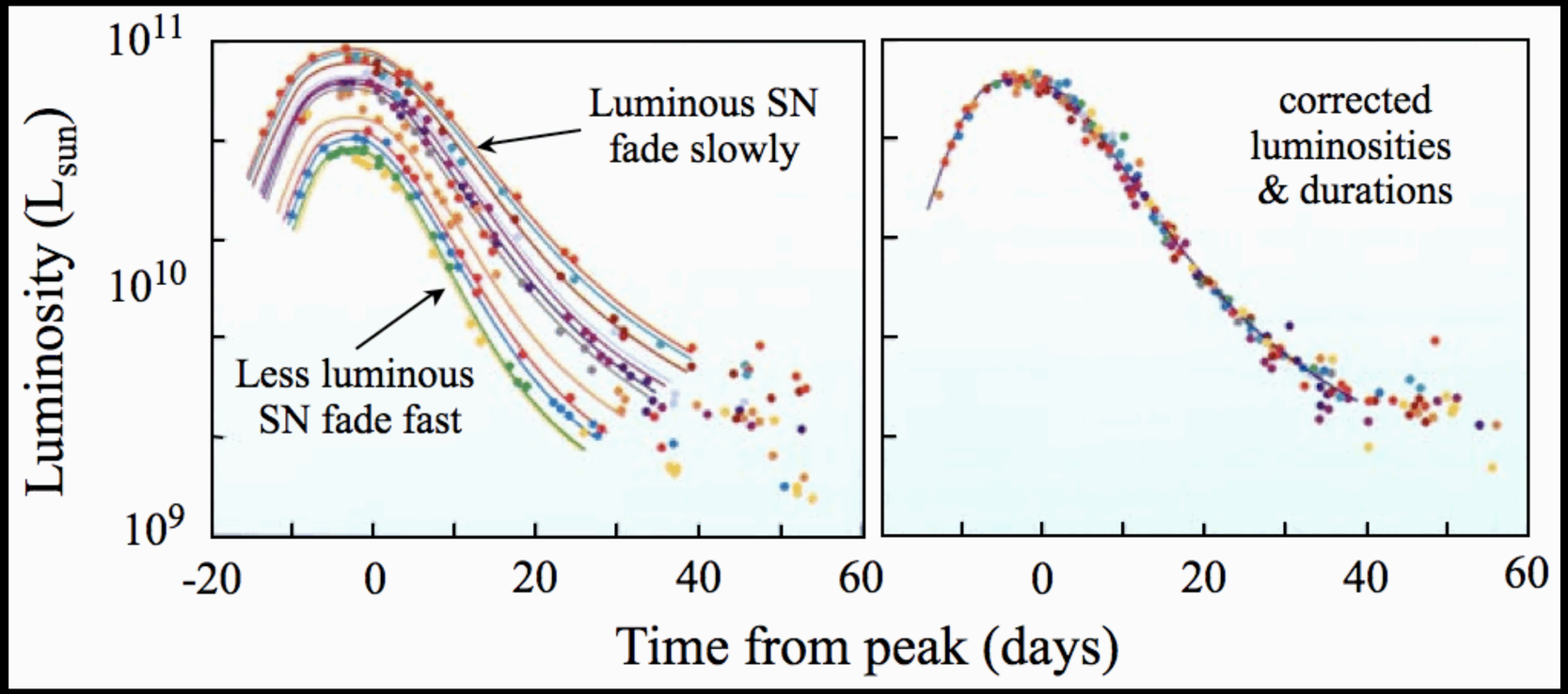


“Type I supernovae. I - Analytic solutions for the early part of the light curve”
Arnett (1982)

Modelli analitici implementati nel codice open source “Tigerfit” (E. Chatzoupolos)

Supernove termonucleari [SN Ia]

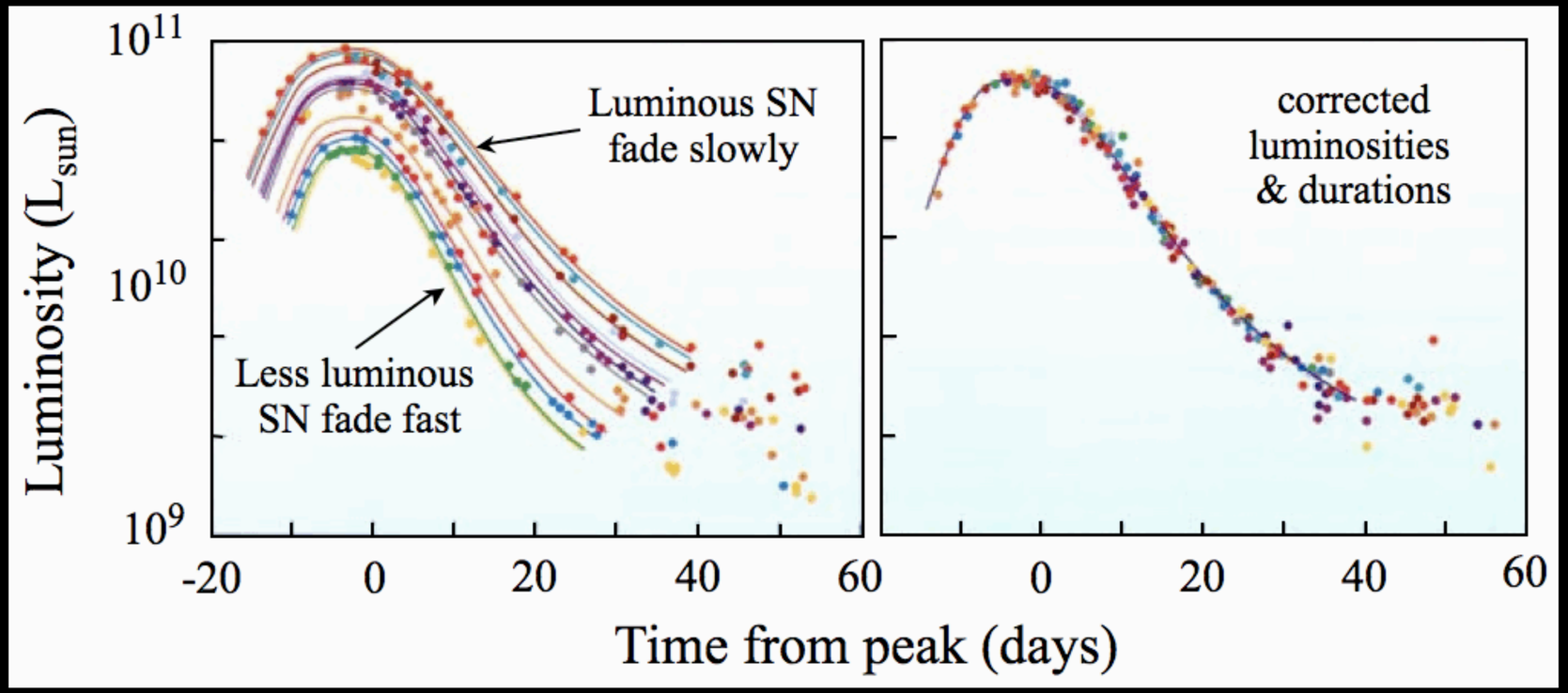
Curve di luce



Durham University webpage

Supernove termonucleari [SN Ia]

Curve di luce



Durham University webpage

$$M_{max}(B) = -21.73 + 2.70\Delta m_{15}(B)$$

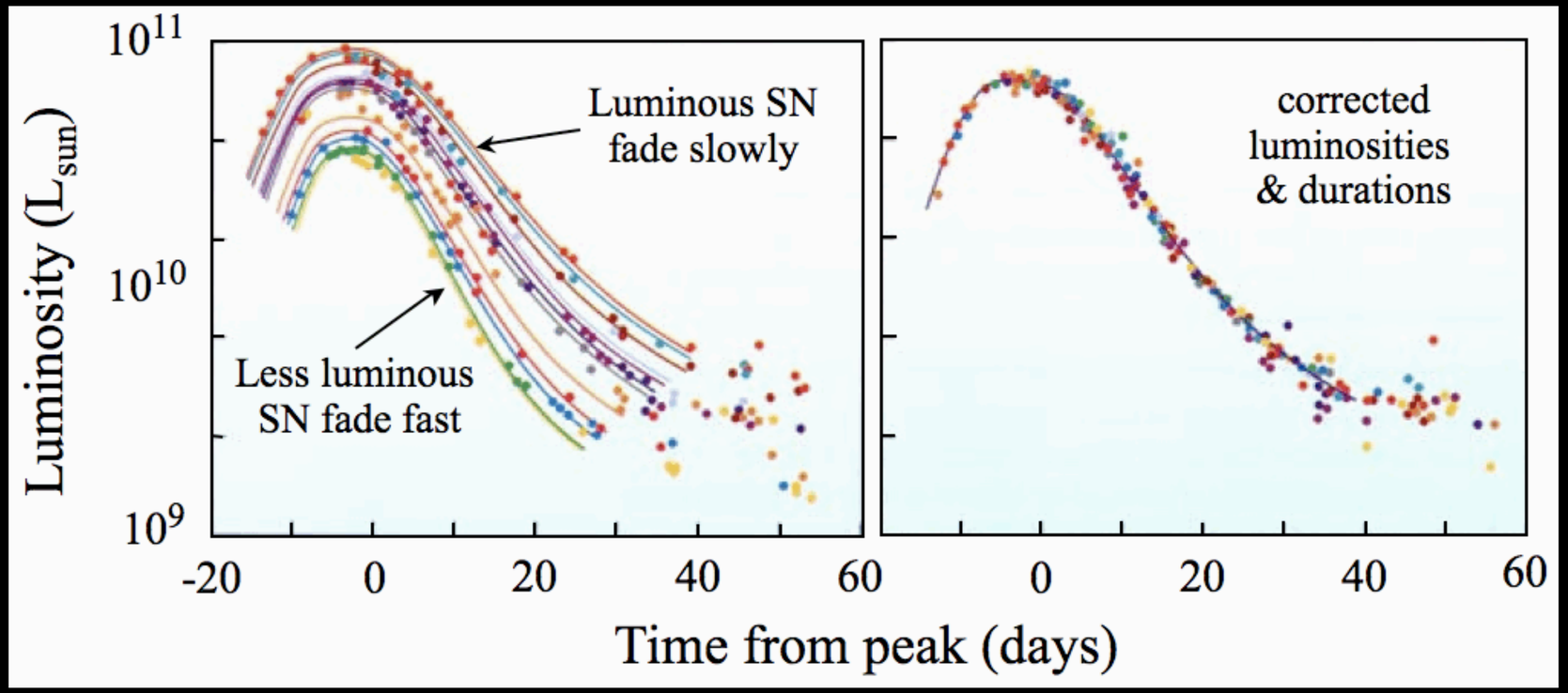
$$M_{max}(V) = -20.88 + 1.95\Delta m_{15}(V)$$

$$M_{max}(I) = -19.59 + 1.08\Delta m_{15}(I)$$

Philips (1993)

Supernove termonucleari [SN Ia]

Curve di luce



Durham University webpage

$$M_{max}(B) = -21.73 + 2.70\Delta m_{15}(B)$$

$$M_{max}(V) = -20.88 + 1.95\Delta m_{15}(V)$$

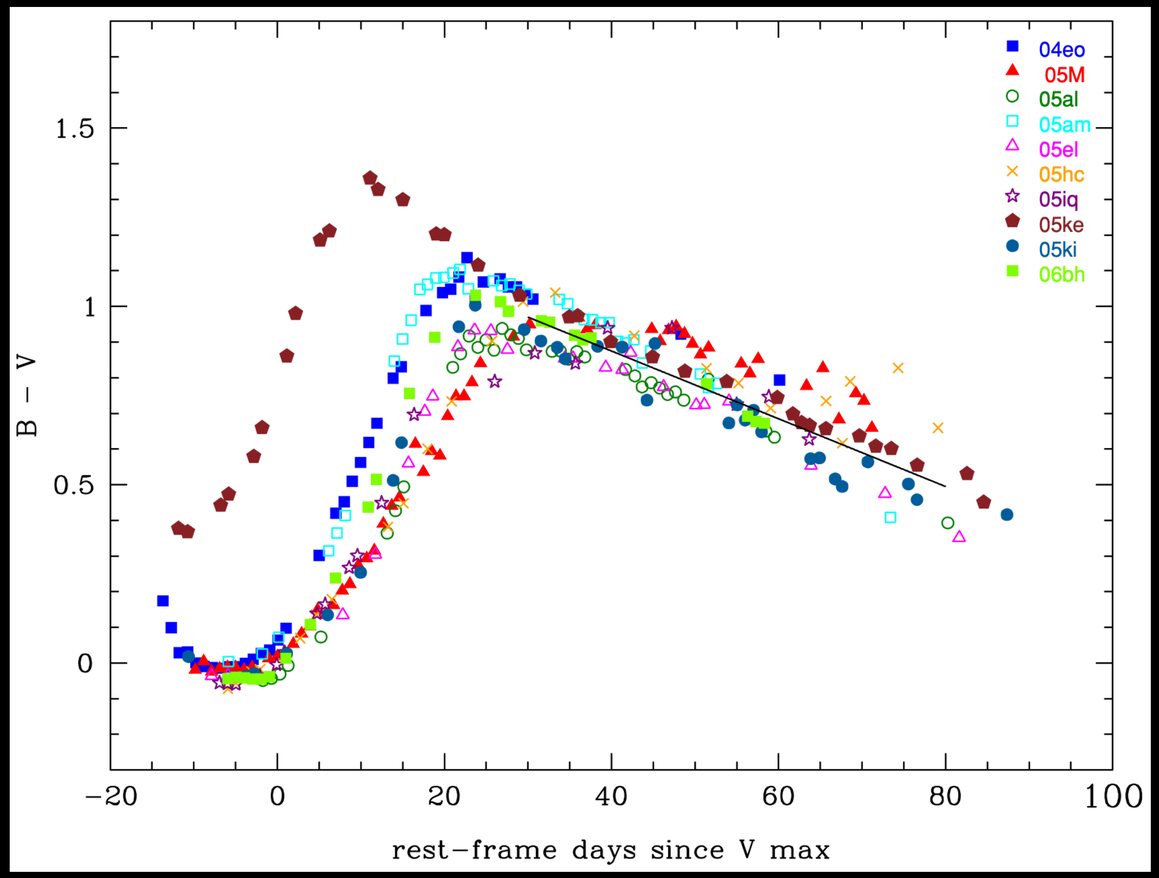
$$M_{max}(I) = -19.59 + 1.08\Delta m_{15}(I)$$

Philips (1993)

$$D[pc] = 10^{\frac{m - M + 5}{5}}$$

Supernove termonucleari [SN Ia]

Relazione di Lira



Folatelli+ (2010)

$$(B-V)_0 = A + Bt_*$$

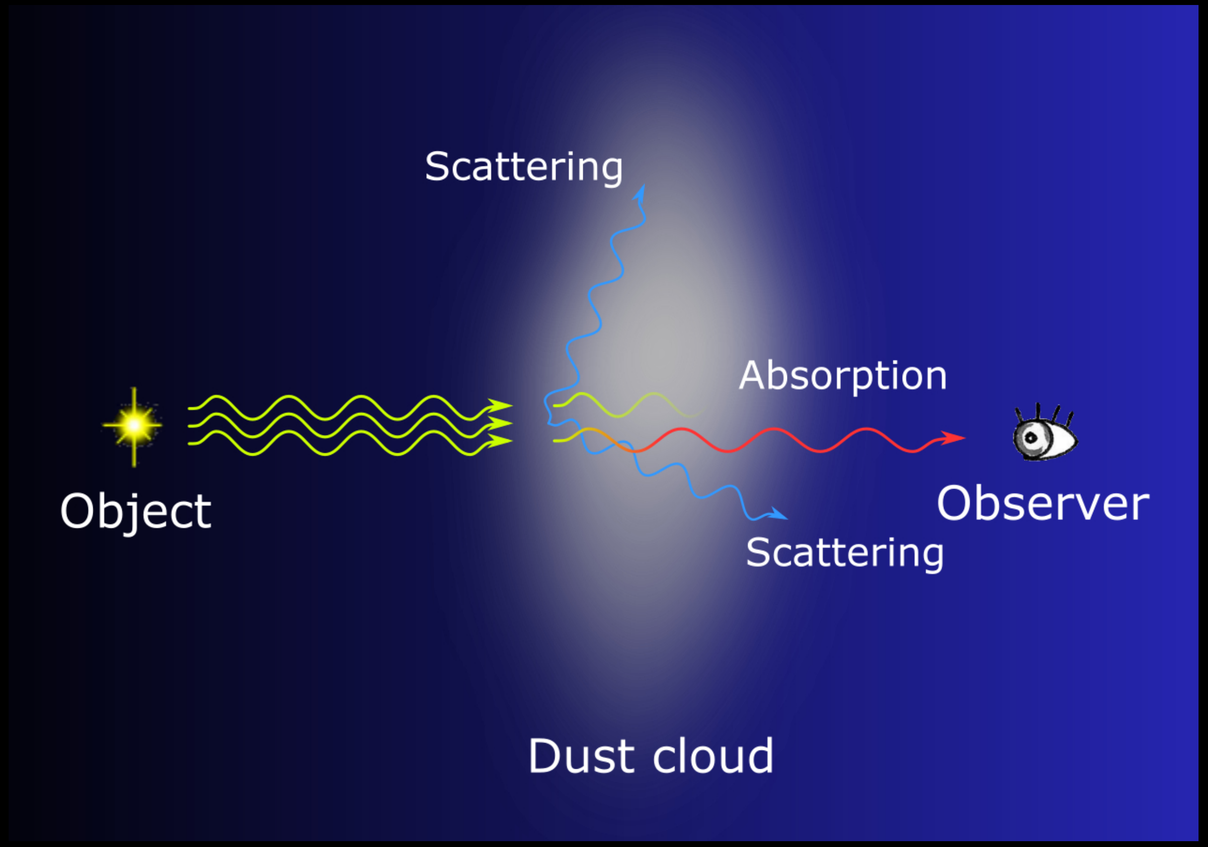
$$A = 0.732 \pm 0.006$$

$$B = -0.0095 \pm 0.0005$$

$$t_* = t - t_{V_{max}} - 55$$

Estinzione e Assorbimento: la Polvere





Wikimedia commons

Spettri in Emissione e Assorbimento

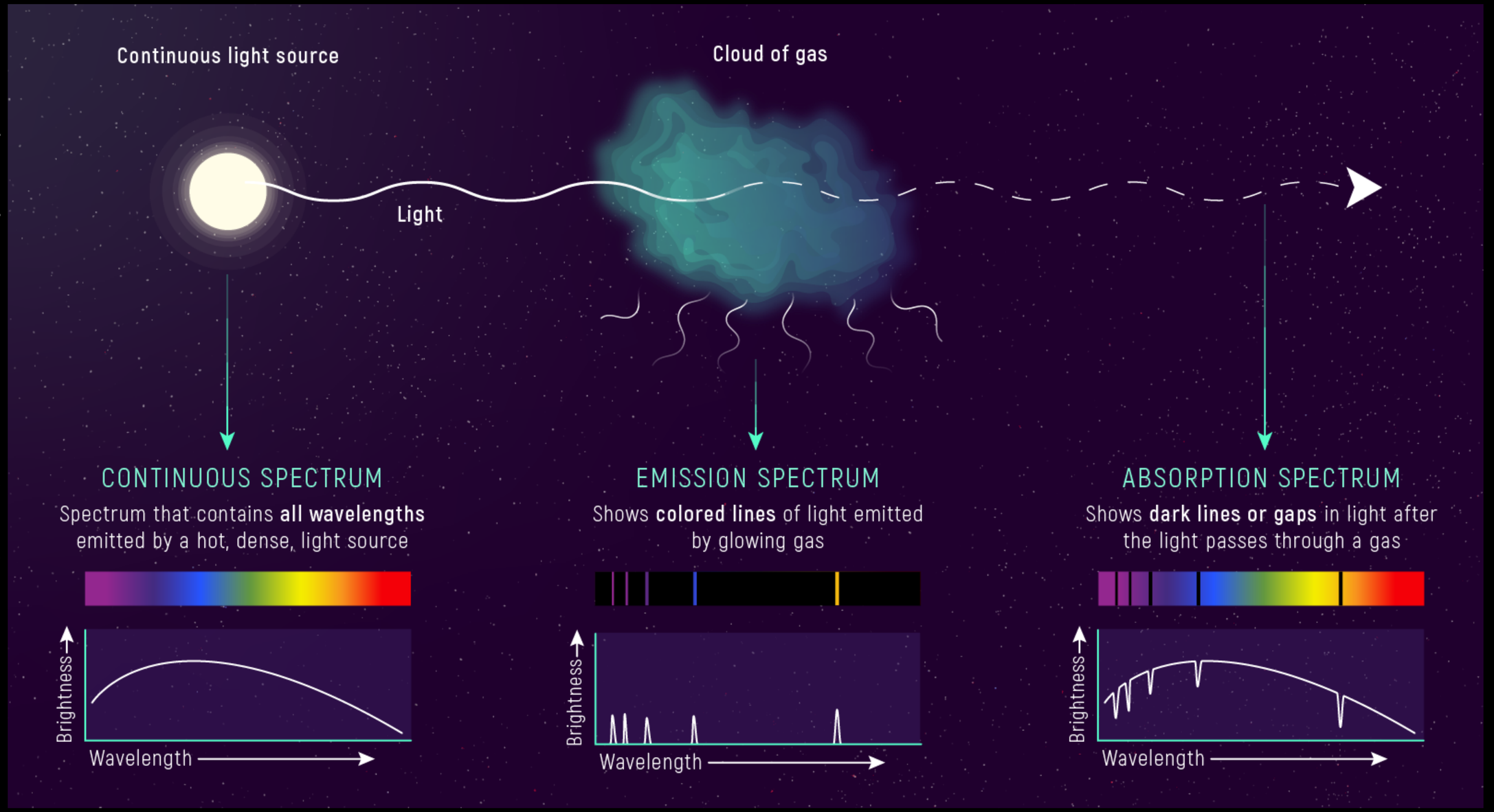
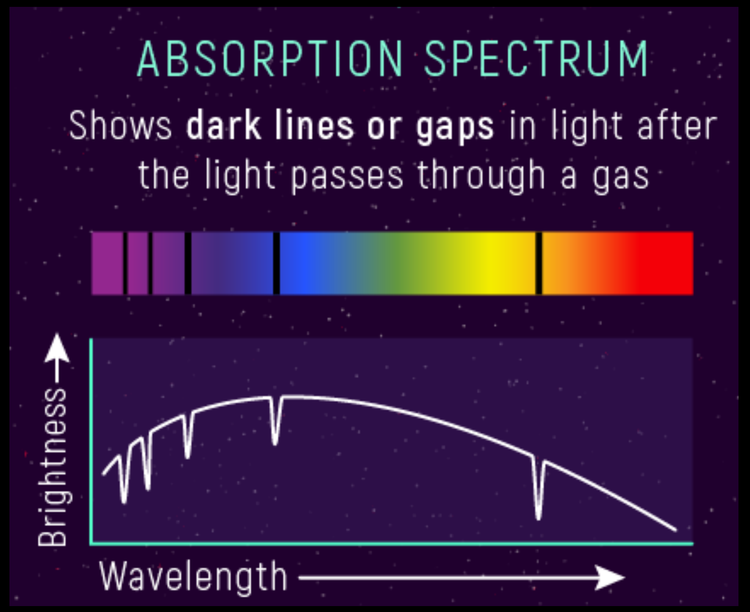
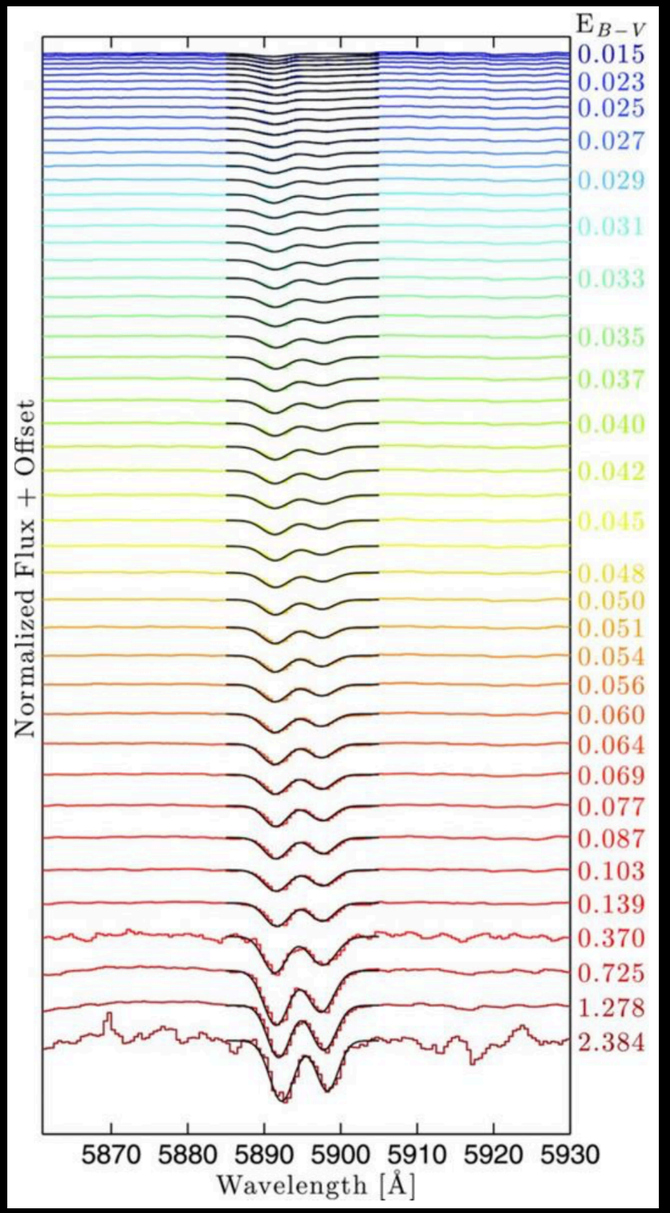


Illustration: NASA, ESA, CSA, Leah Hustak (STScI)

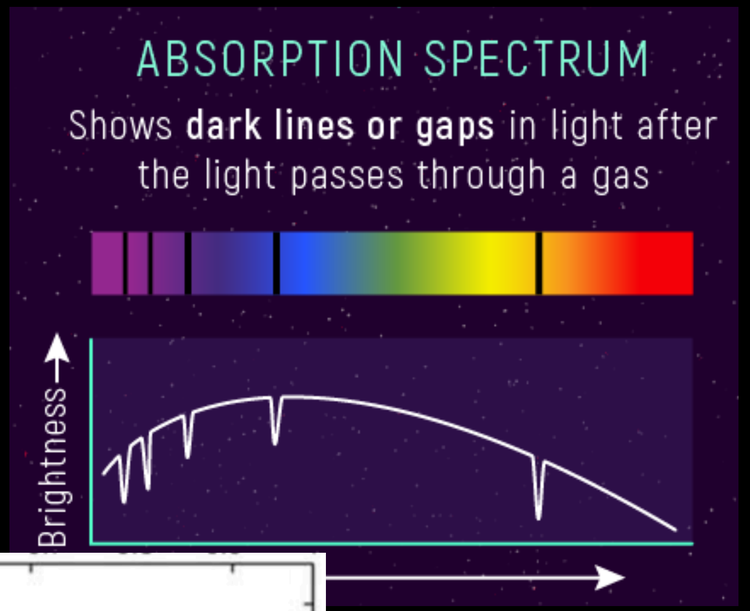
Il Sodio come misura dell'Estinzione

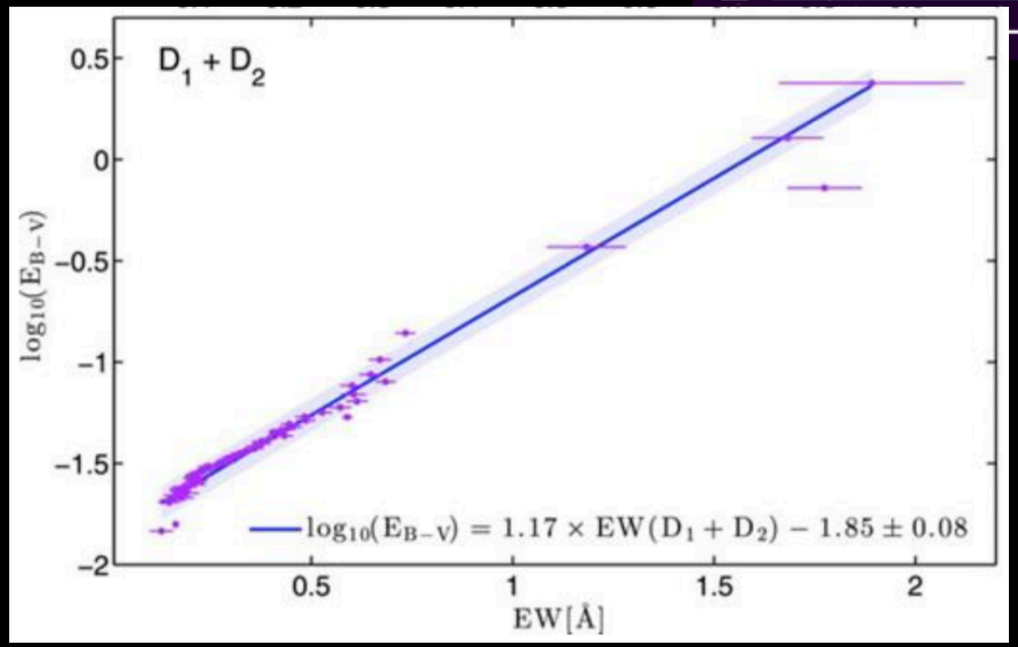


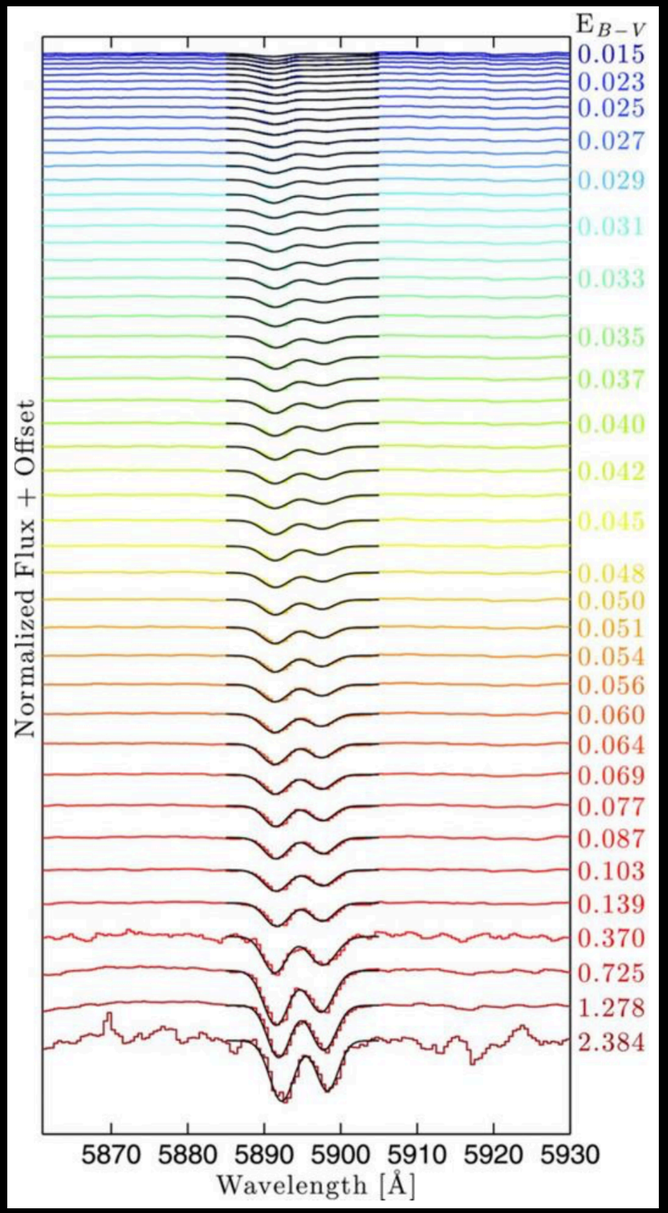


Poznanski+ (2012)

Il Sodio come misura dell'Estinzione

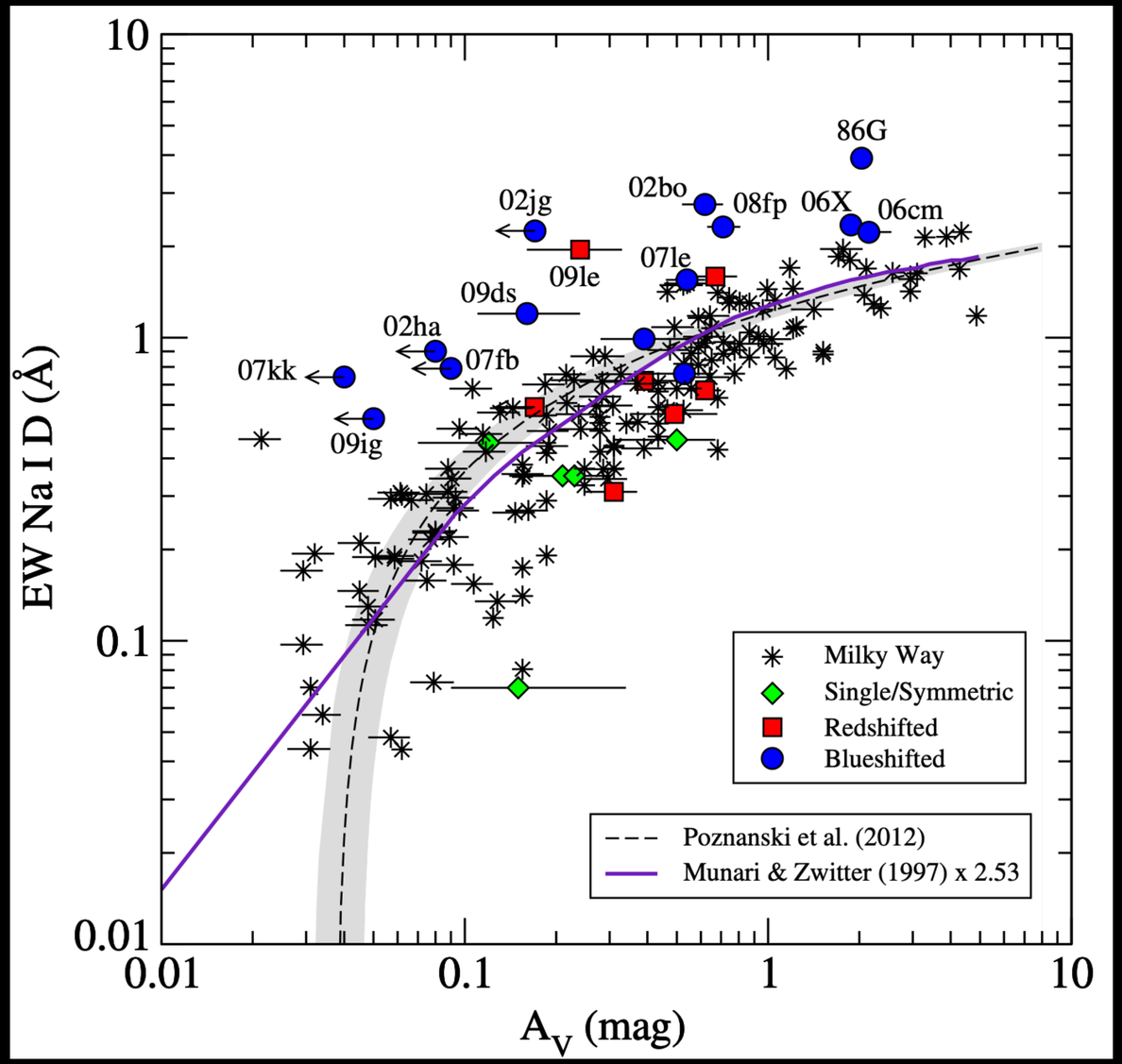






Poznanski+ (2012)

SNe Ia come “prova del nove”



Phillips+ (2013)

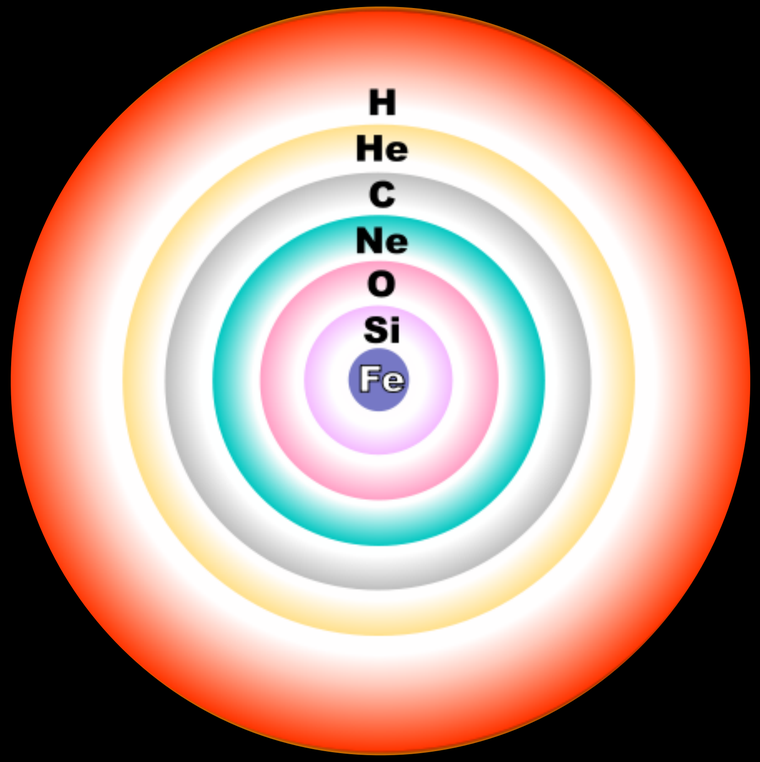
I progenitori delle SNe Ia [?]

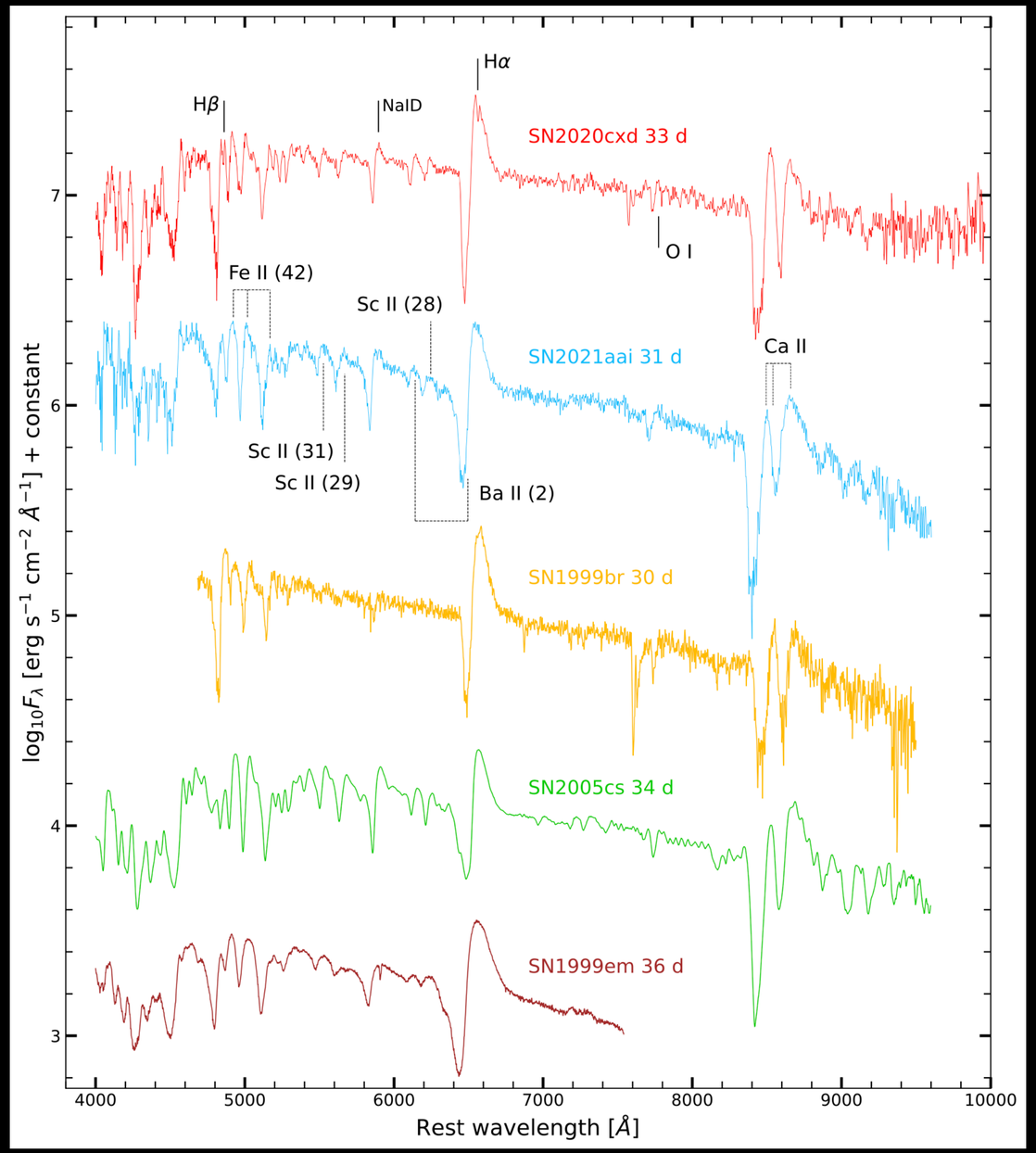




Supernove ricche di Idrogeno [SNe II]

$$M_{zams} \gtrsim 8\ M_{\odot}$$

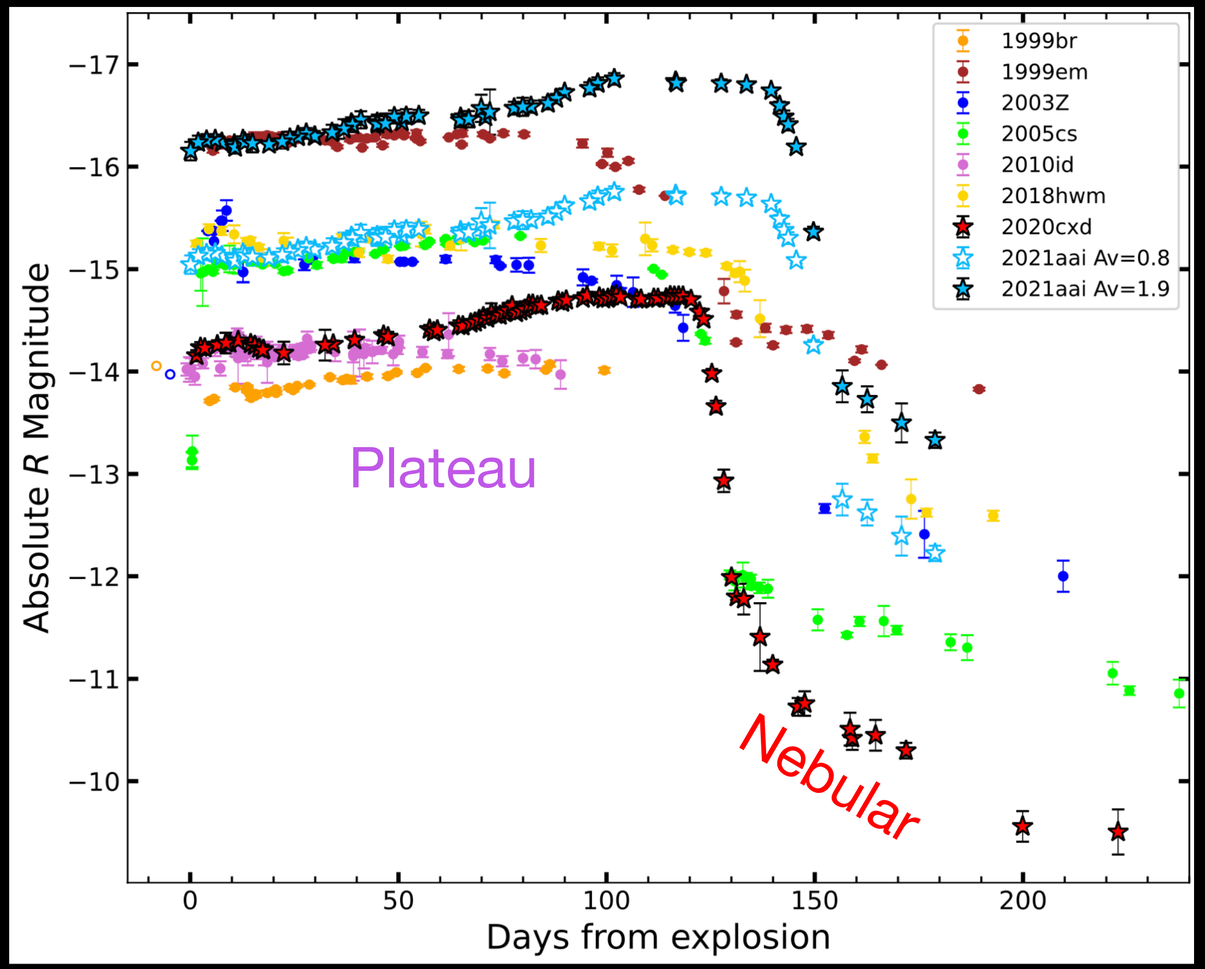




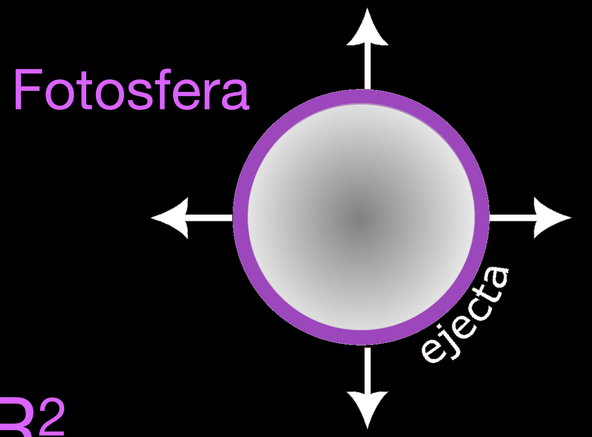
Valerin et al (2022)

Supernove ricche di Idrogeno [SNe IIP]

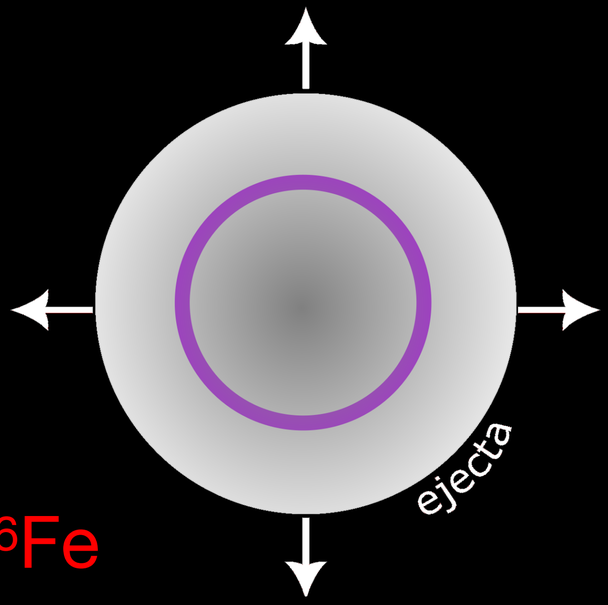
Curve di luce



Valerin et al (2022)



$L = 4\pi\sigma T^4 R^2$



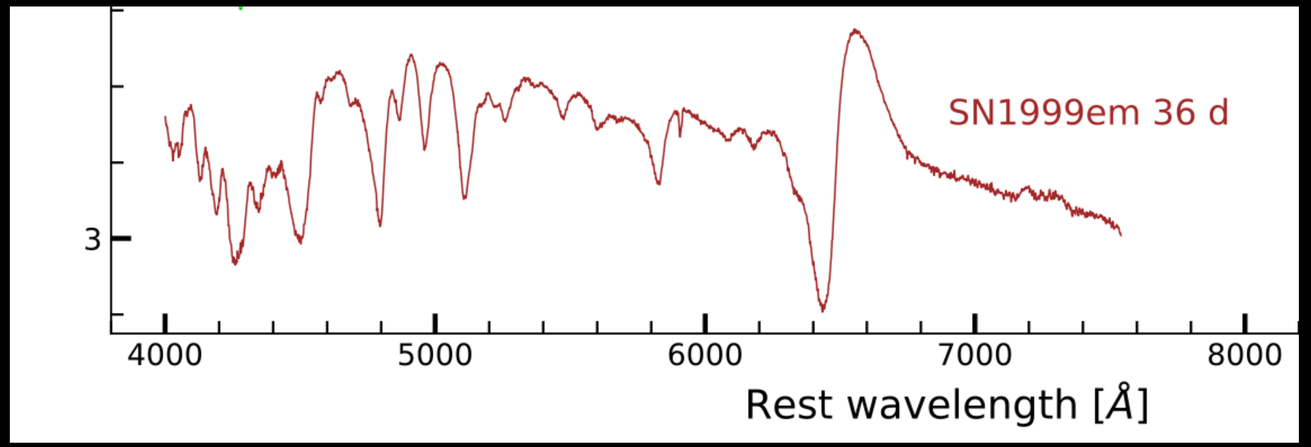
6 d 77 d

$^{56}Ni \rightarrow {}^{56}Co \rightarrow {}^{56}Fe$

Supernove ricche di Idrogeno [SNe IIP]:
Expanding Photosphere Method (EPM)

$$\theta \approx \frac{R}{D}$$

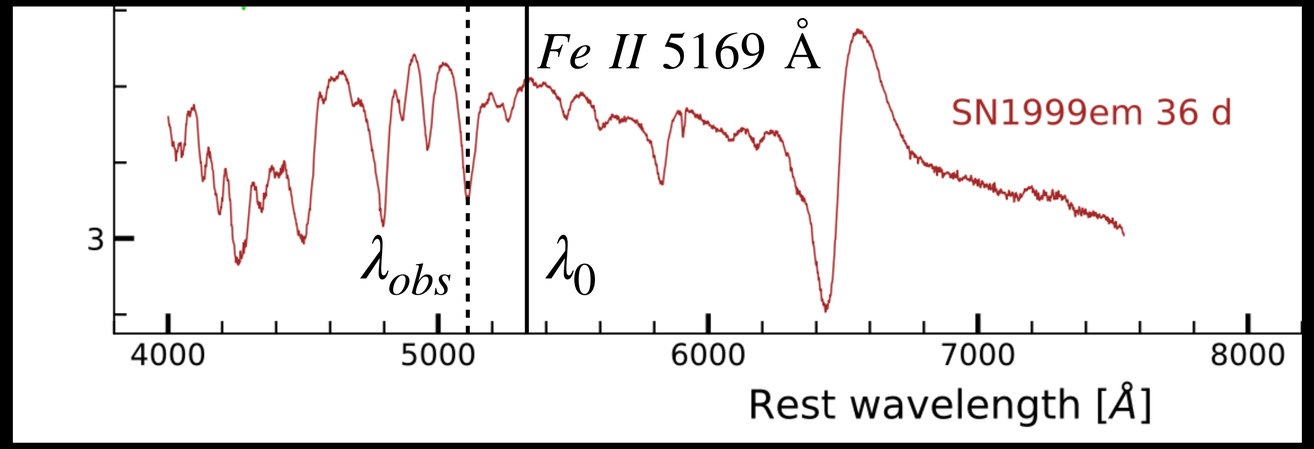
$$R = V_{ph}(t - t_0)$$



Supernove ricche di Idrogeno [SNe IIP]:
Expanding Photosphere Method (EPM)

$$\theta \approx \frac{R}{D}$$

$$R = V_{ph}(t - t_0)$$



$$V_{ph} = \frac{\lambda_0 - \lambda_{obs}}{\lambda_0} c$$

Supernove ricche di Idrogeno [SNe IIP]:
Expanding Photosphere Method (EPM)

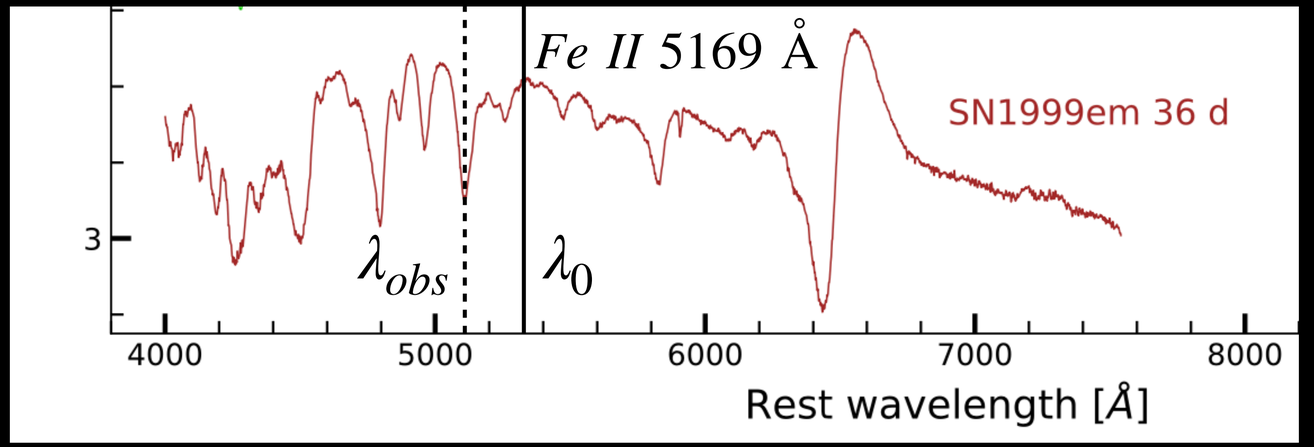
$$\theta \approx \frac{R}{D}$$

$$R = V_{ph}(t - t_0)$$

$$f_\lambda = \zeta^2(T)\ \theta^2\ \pi B_\lambda(T)$$

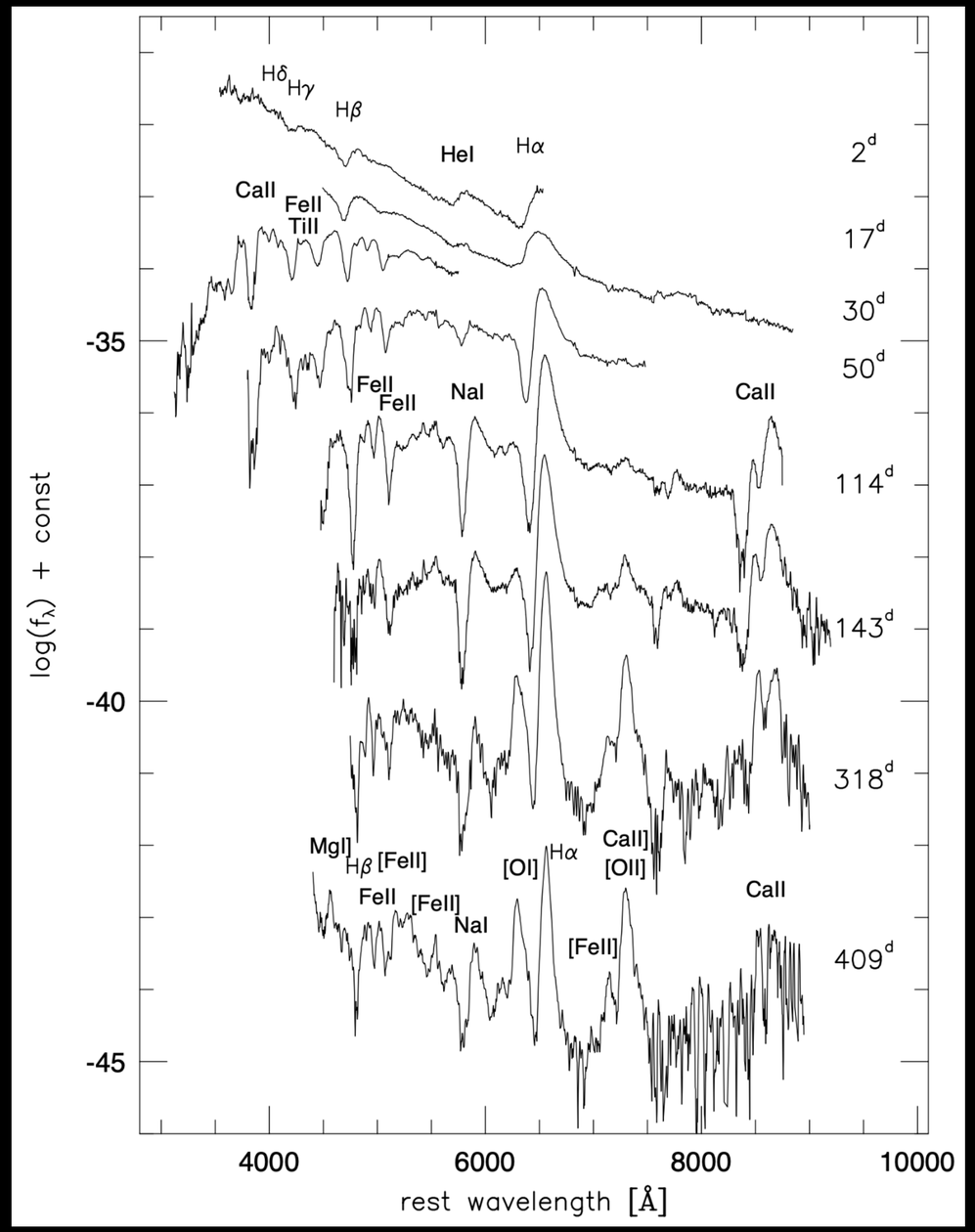
Eastman et al (1996)
Hamuy et al (2001)
Dessart & Hillier (2005)

Dal colore della SN



$$V_{ph} = \frac{\lambda_0 - \lambda_{obs}}{\lambda_0} c$$

Supernove ricche di Idrogeno [SNe II]:



Wheeler, Benetti (2000)

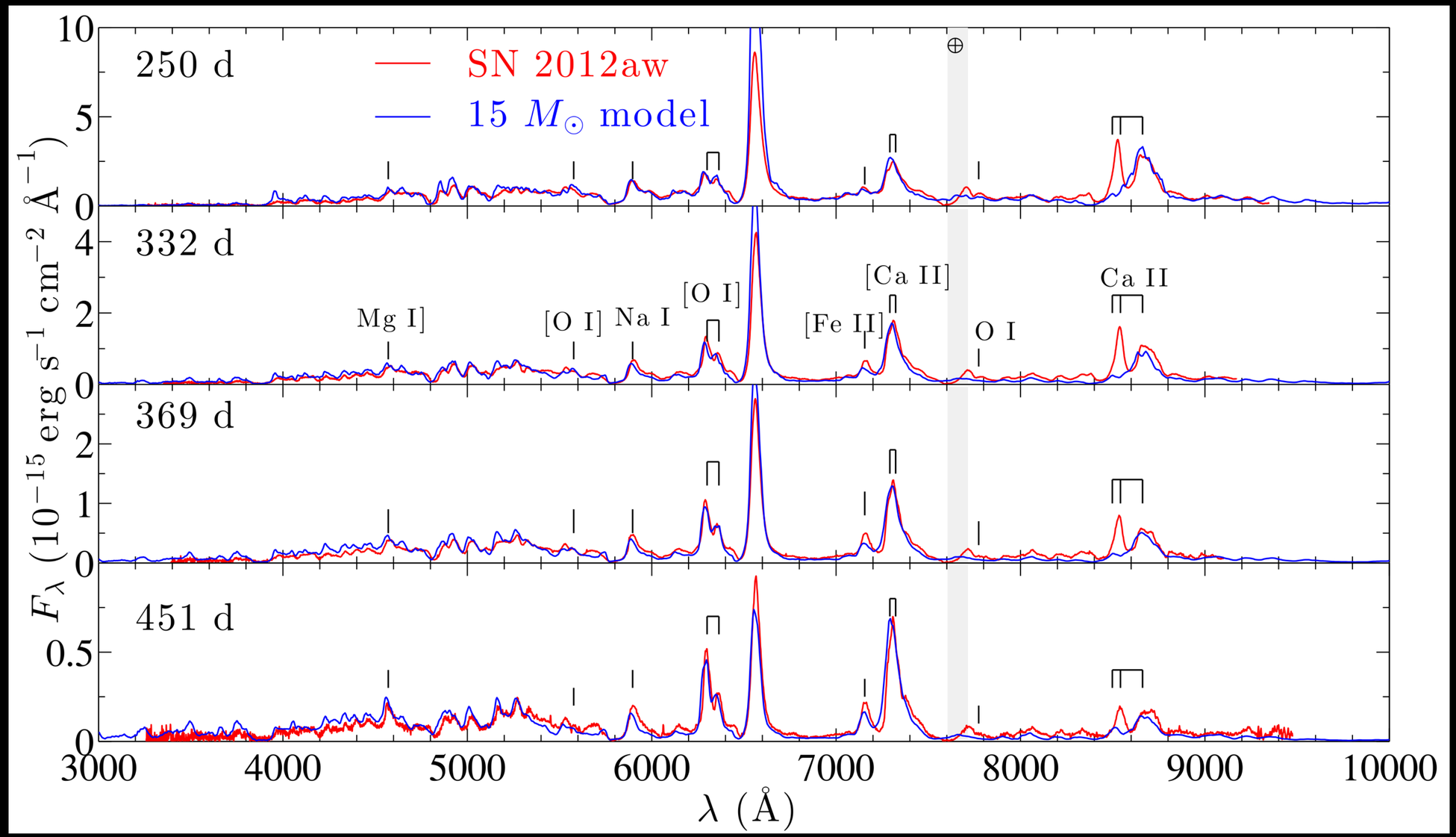
Evoluzione spettrale

Il materiale espulso dalla SN [ejecta] si raffredda mentre si espande

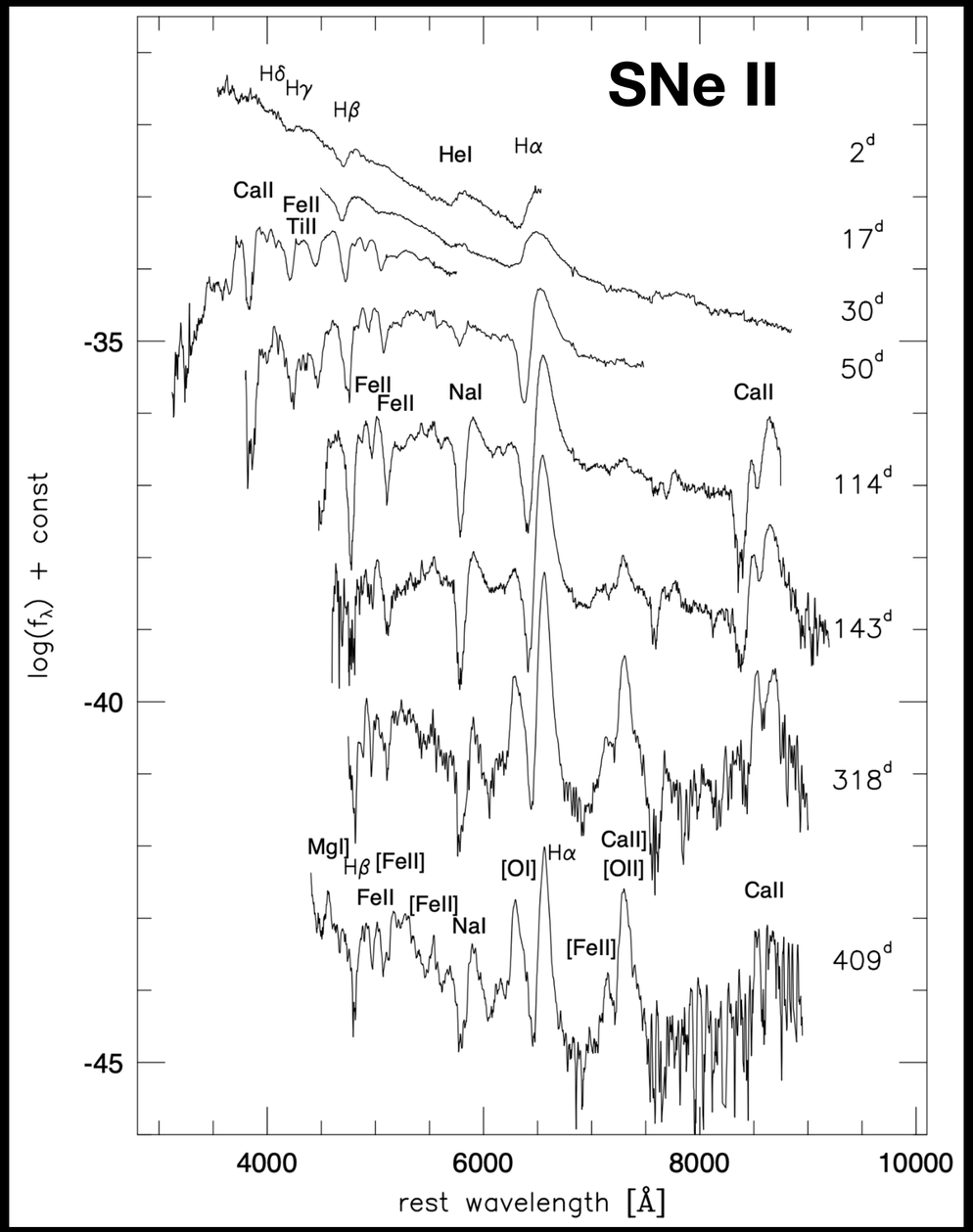
Vediamo strati sempre più interni, che sono più lenti di quelli esterni [Espansione Omologa]

Dopo alcuni mesi, possiamo fare un' "autopsia" del progenitore

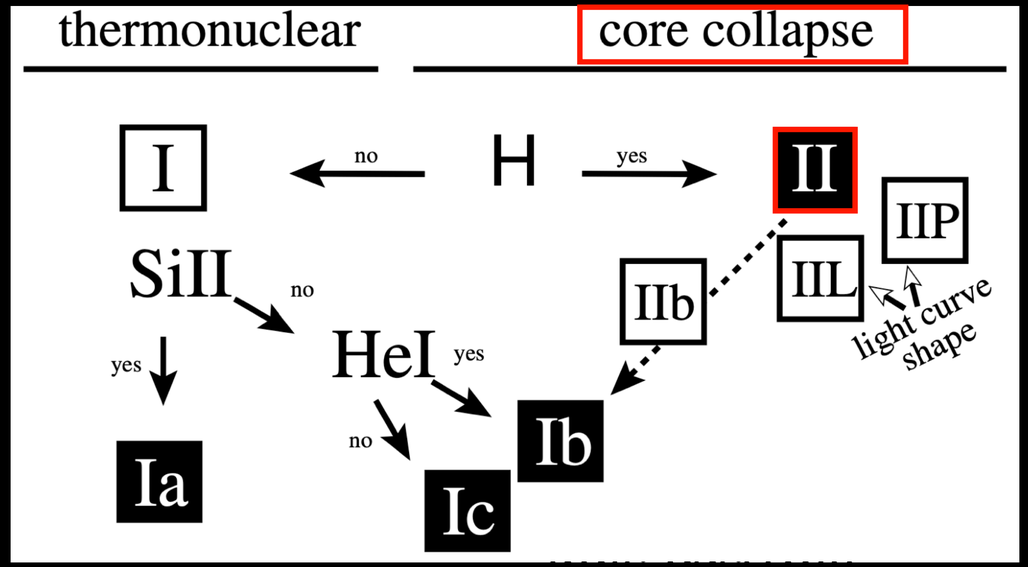
Supernove ricche di Idrogeno [SNe II]:
Spettri nebulari e massa del progenitore



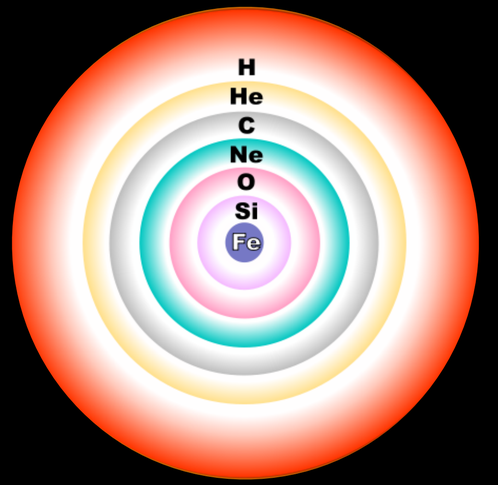
Classificazioni: SNe II



Wheeler, Benetti (2000)

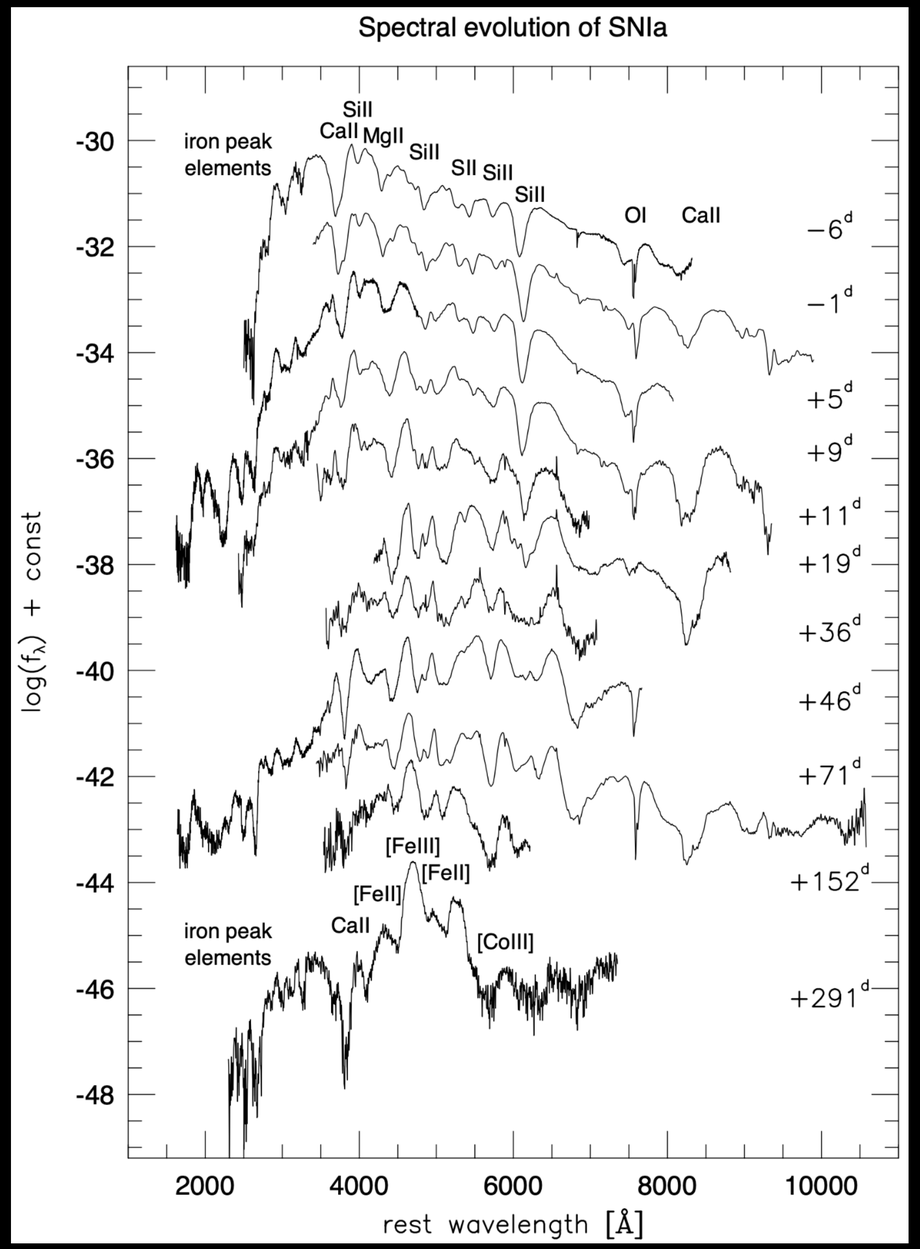


Adapted from Turatto (2003)

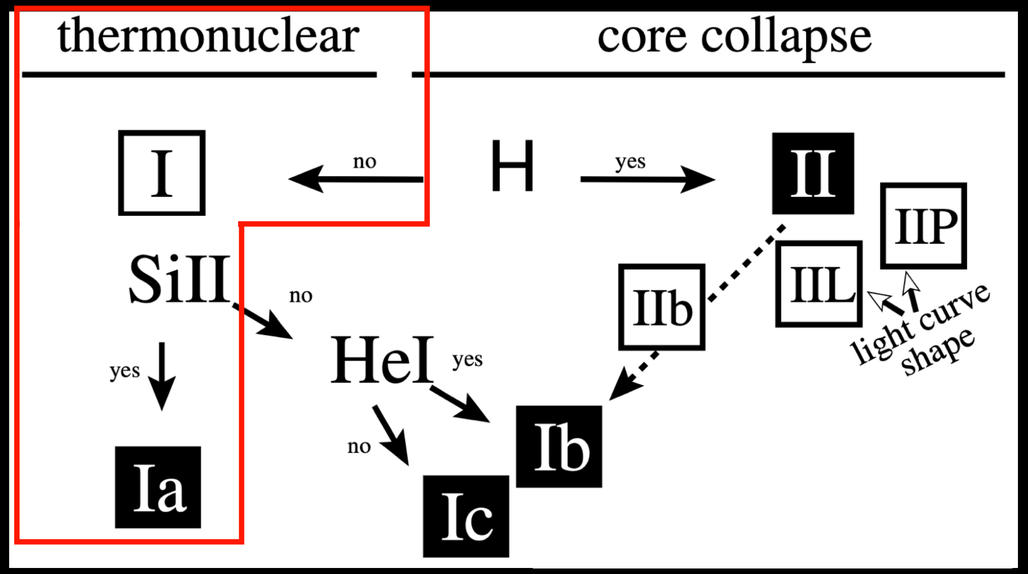


Progenitore di SNe II

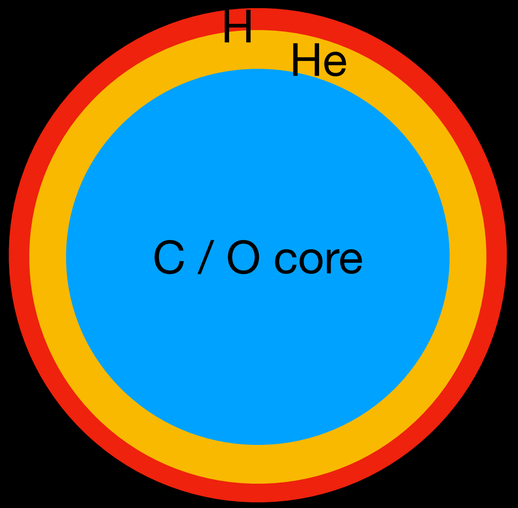
Classificazioni: SNe Ia



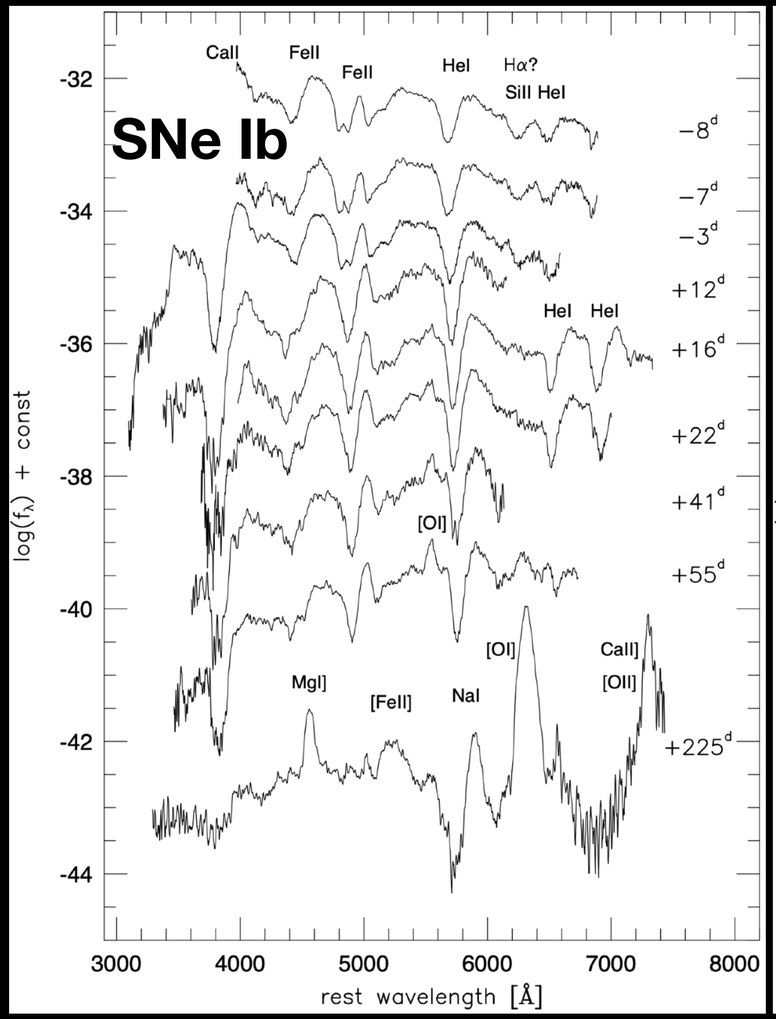
Wheeler, Benetti (2000)

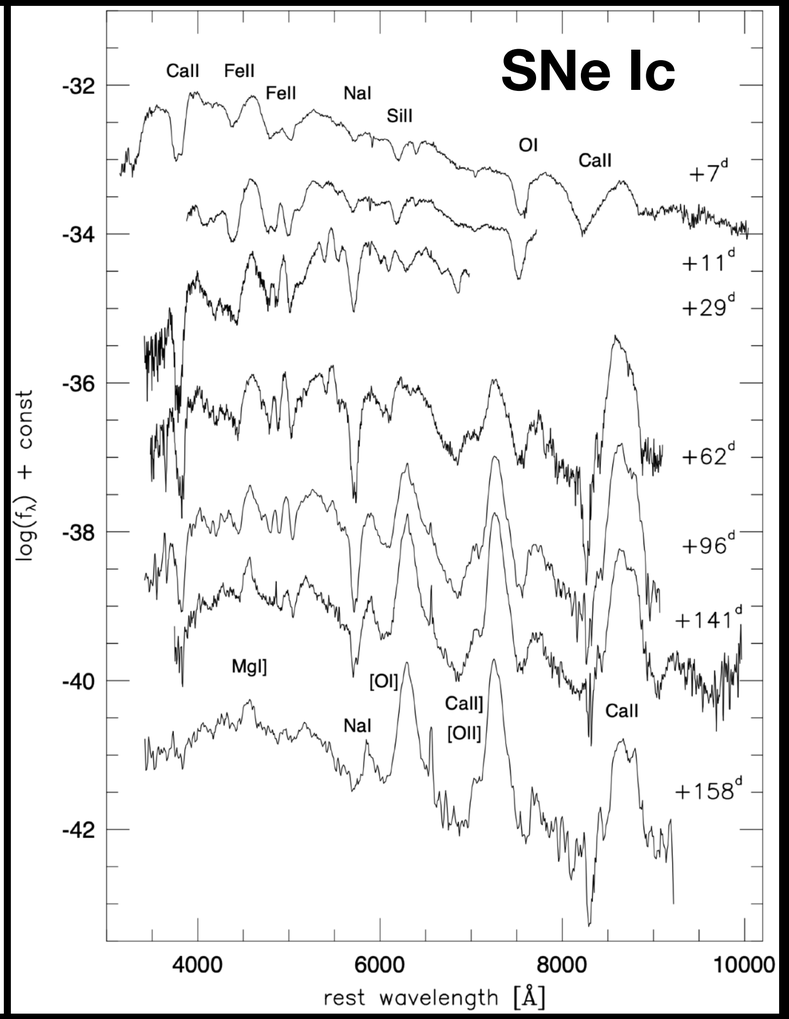


Progenitore di SNe Ia

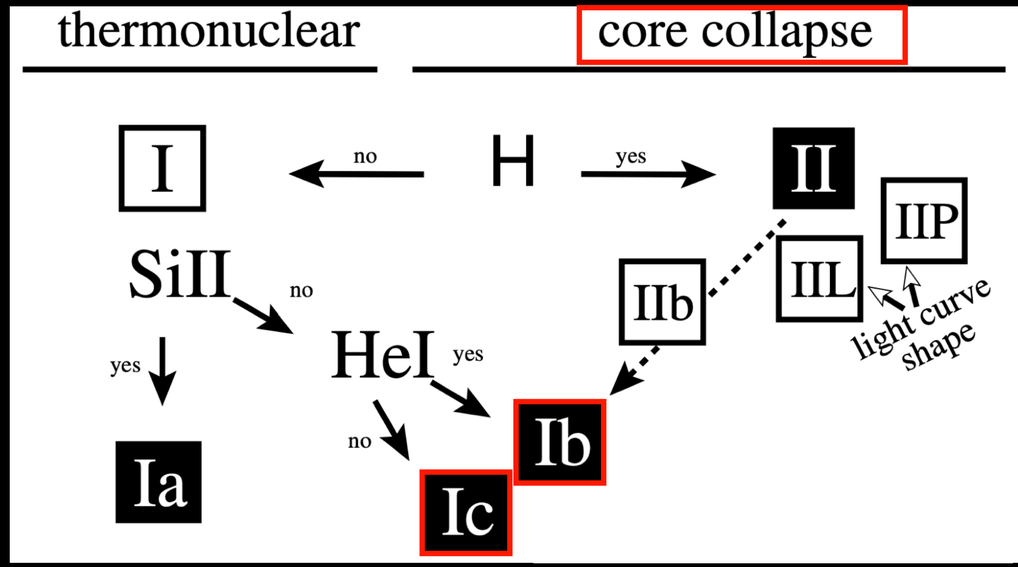


Classificazioni: SNe Ib, Ic

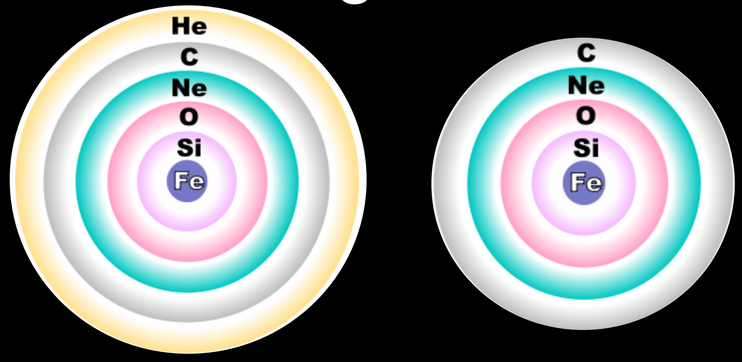




Wheeler, Benetti (2000)

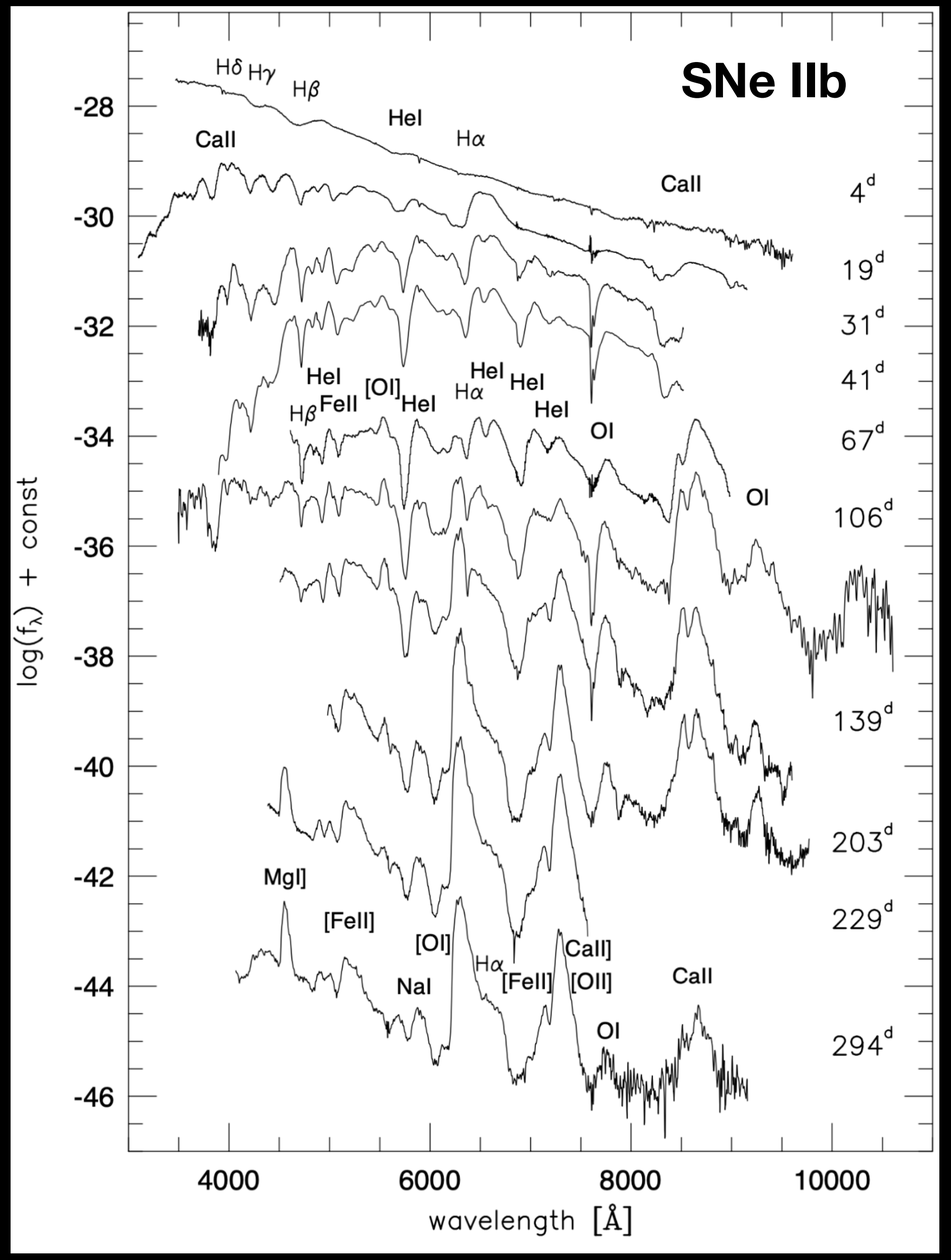


Progenitori

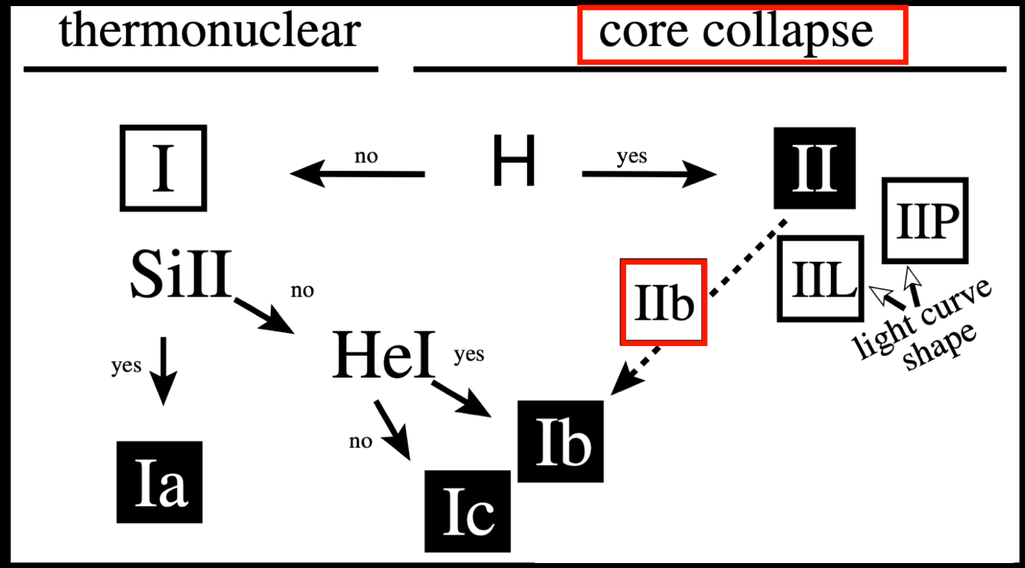


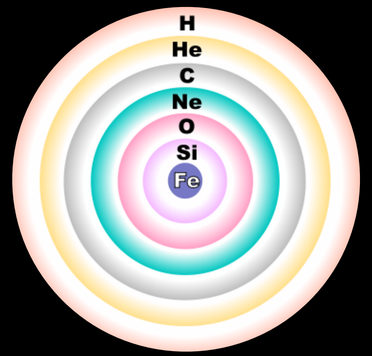
SNe Ib SNe Ic

Classificazioni: SNe IIb



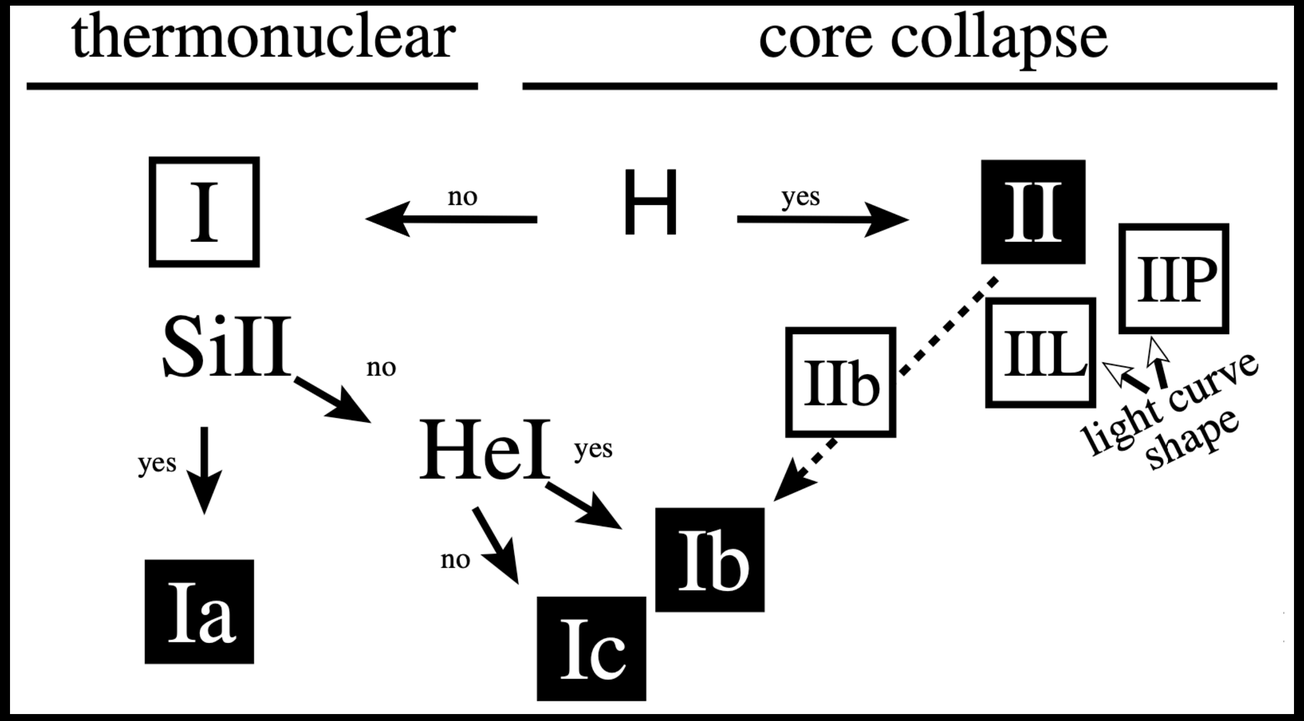
Wheeler, Benetti (2000)





Progenitore di SNe IIb

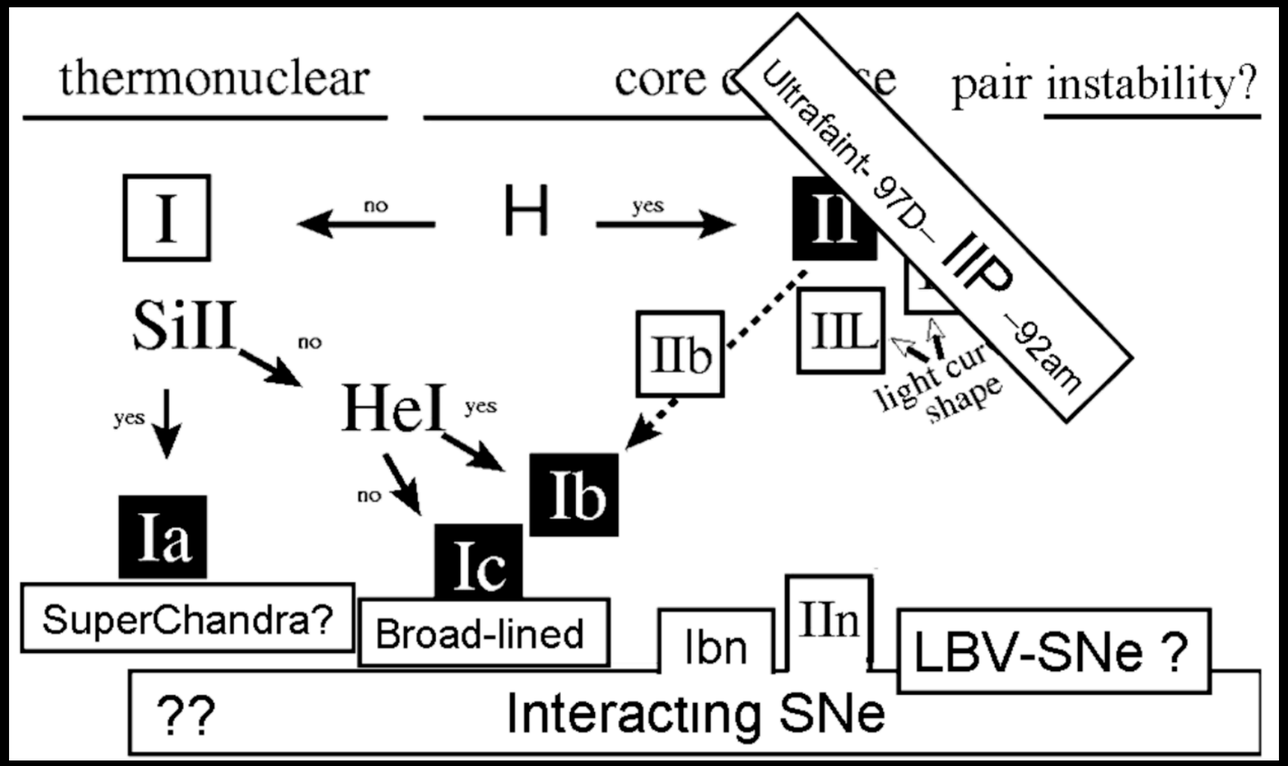
Abbiamo capito tutto?



Adapted from Turatto (2003)

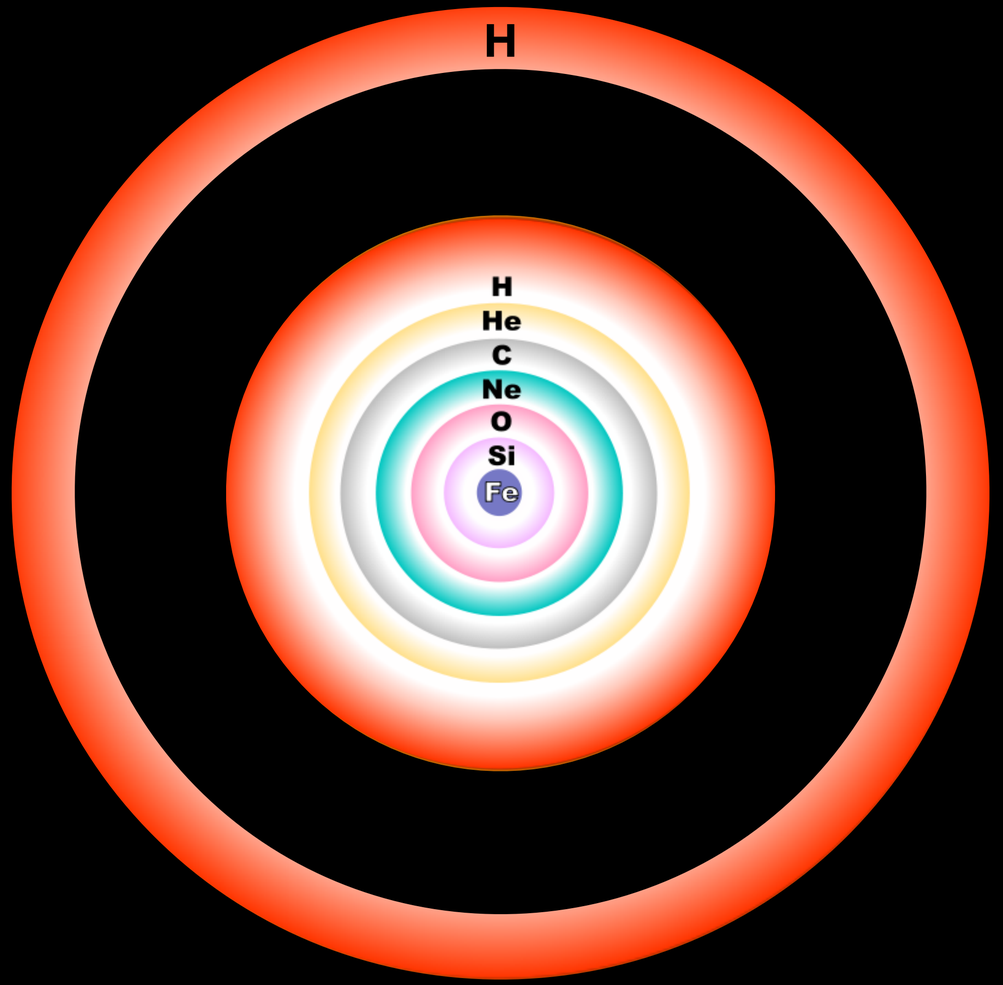
Abbiamo capito tutto?

… Non esattamente 😭

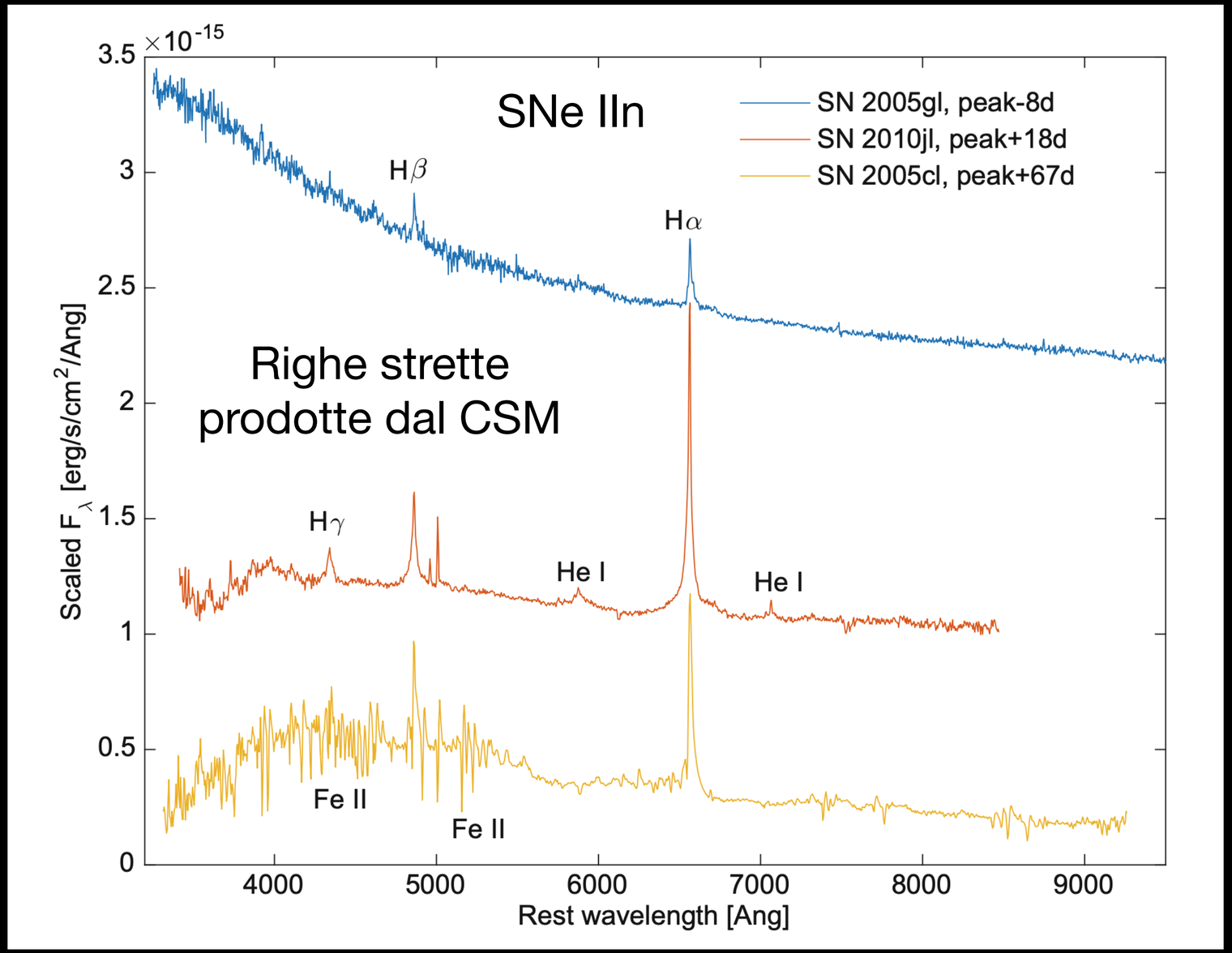


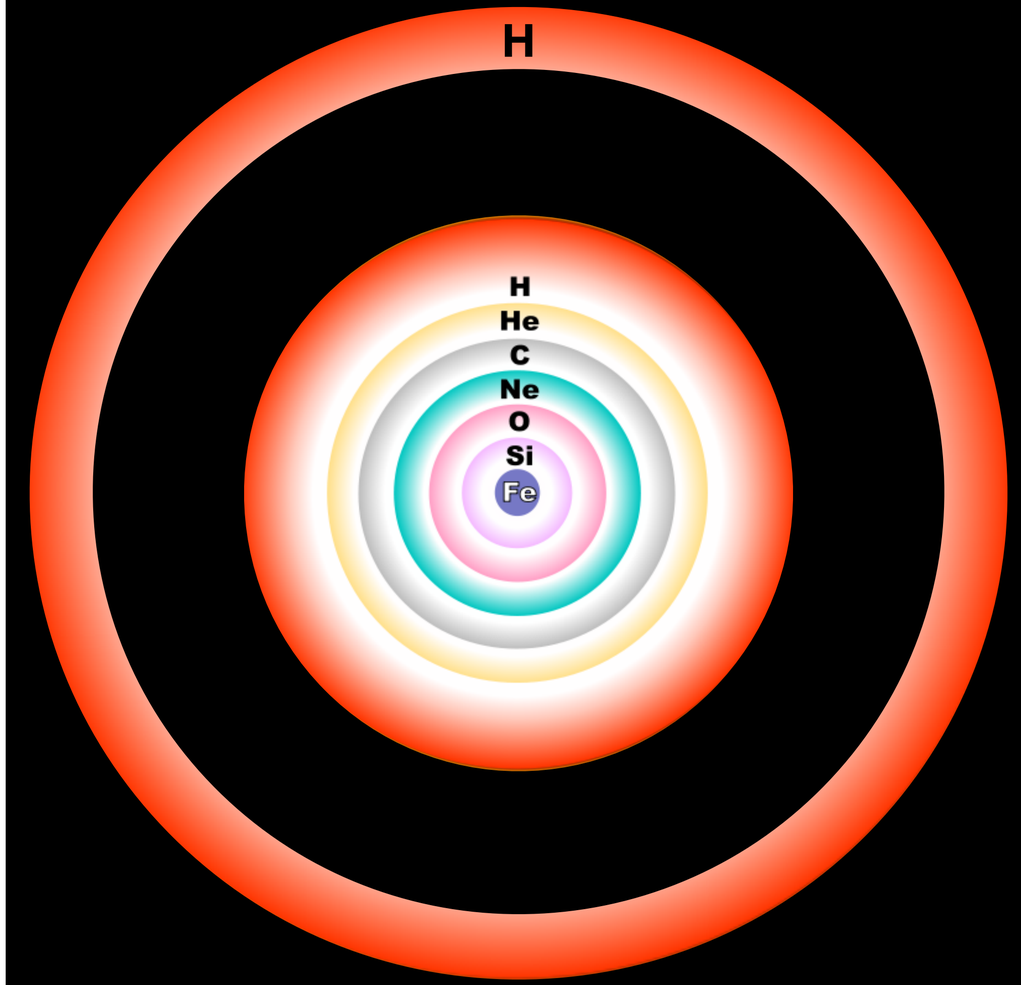
Turatto (2007)

SN interagenti con il mezzo circumstellare (CSM)



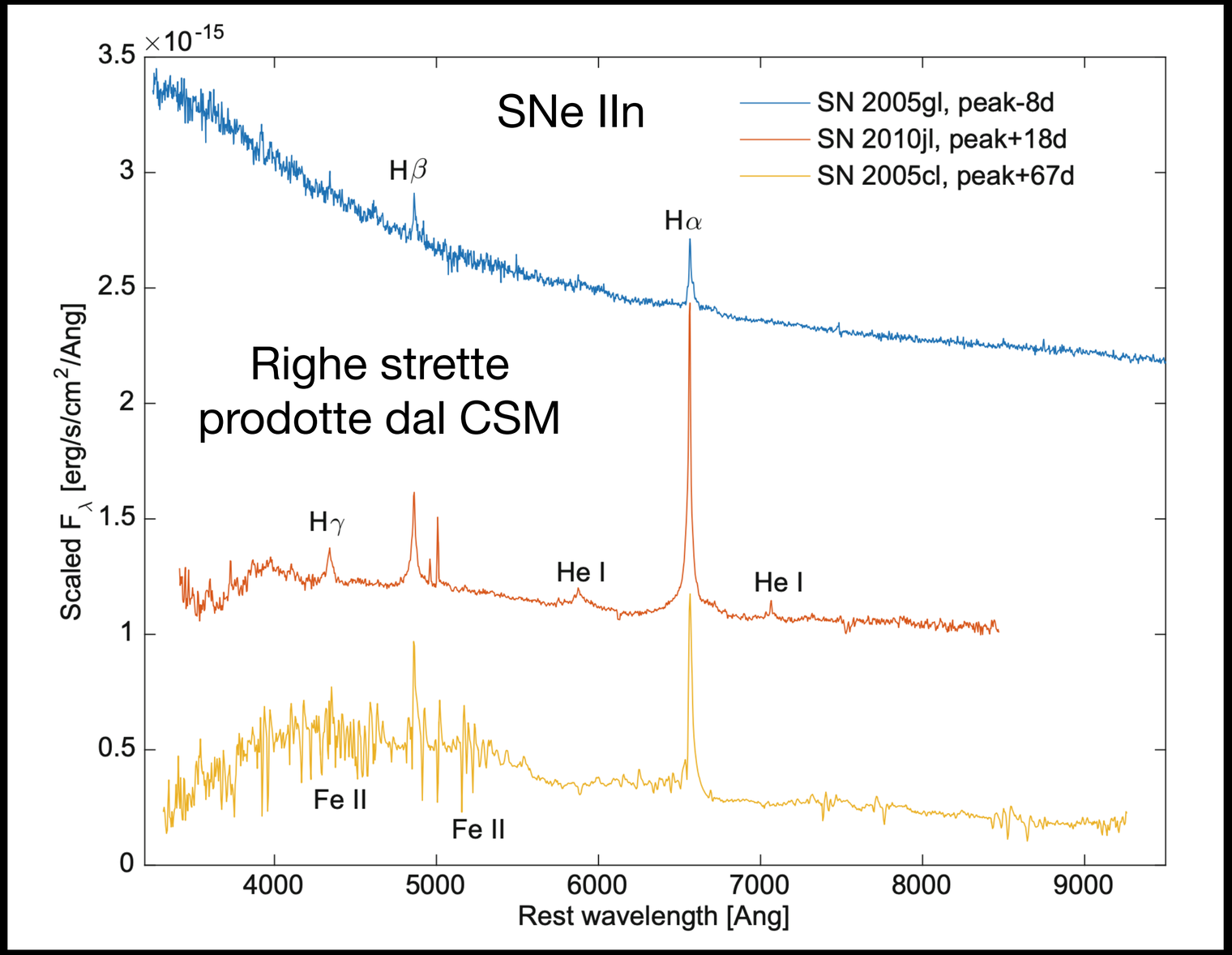
SN interagenti con il mezzo circumstellare (CSM)



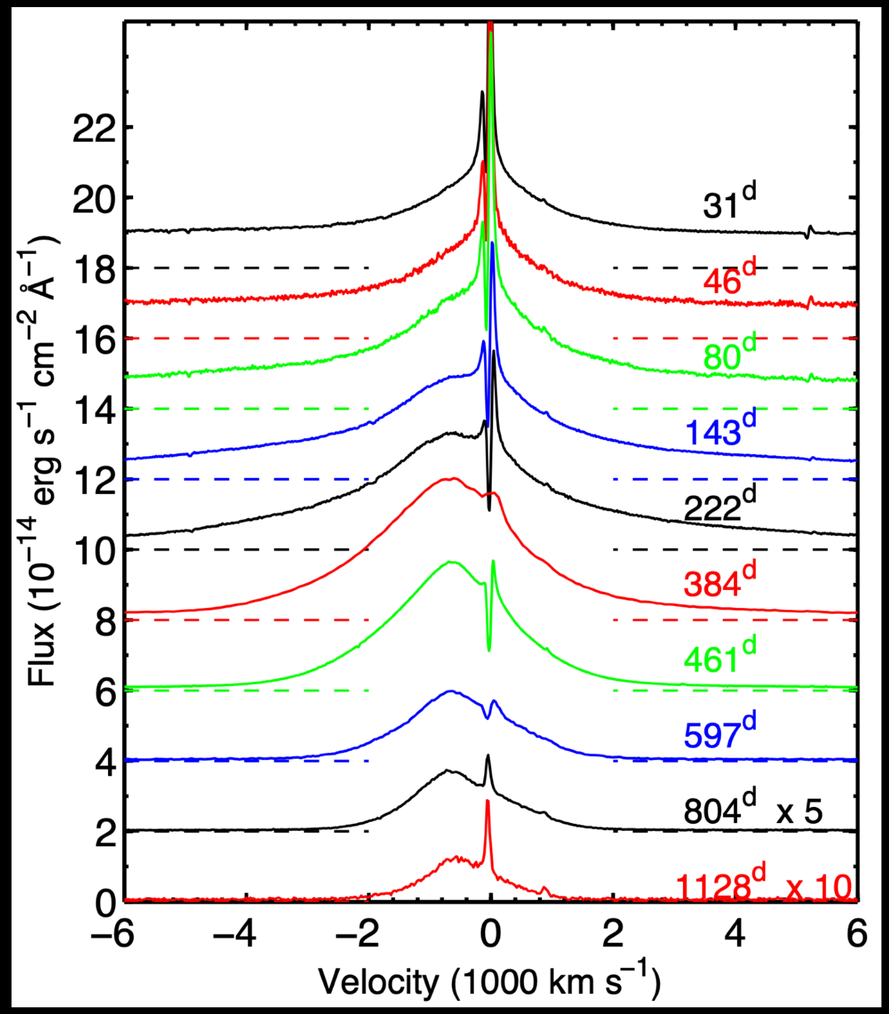


Gal-Yam (2017)

SN interagenti con il mezzo circumstellare (CSM)



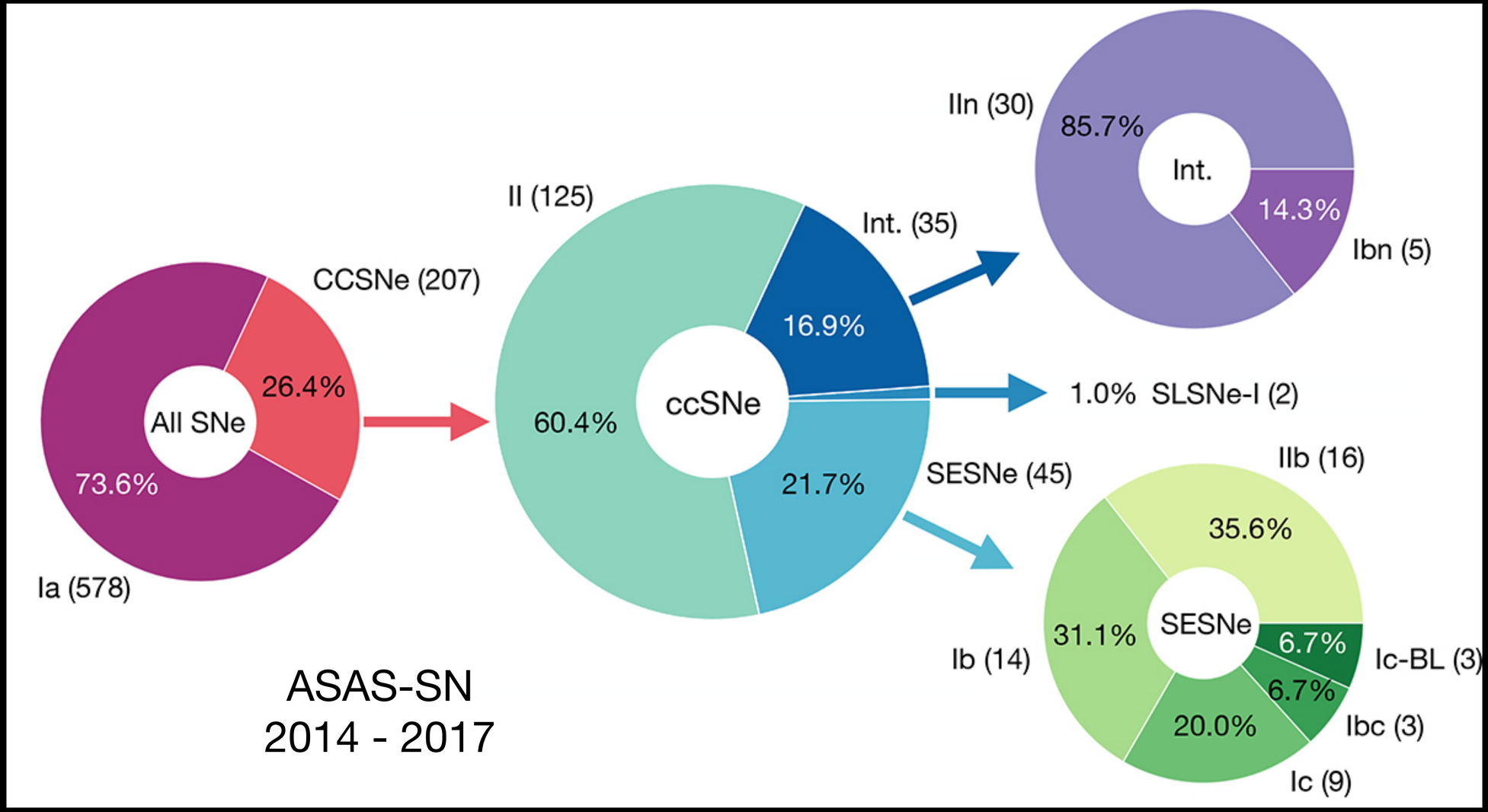
Gal-Yam (2017)



Fransson et al. (2014)

Righe strette: CSM lento
Righe larghe: ejecta veloci

Supernova rates



Pessi et al. (2025)









Stefano Benetti

Transient Name Server



Welcome to TNS Version 2.0.

Please do not hesitate to contact the TNS admins if encountering any issues.

Search by name or coordinates (within 10")

Submit

Check the AstroNotes service!

Allowing TNS users to distribute and receive notifications regarding a broad range of astrophysical topics

Transient Name Server

FRB Advanced Search

Submit | Download as CSV | Download as TSV | Results in page 50

Columns to display

Showing results 1 to 1 out of 1

ID	Name	Reps	Class	RA	DEC	Obj. Type	Redshift	Host Name	Host Redshift	Reporting Group/s	Discovery Data Source/s	Classifying Group/s	Disc. Interna Name
219217	SN 2026aaiv	6	6	22:37:05.628	+34:24:35.19	SN Ia	0.002722	NGC7331		ATLAS, GOTO, Pan-STARRS, ZTF	ATLAS, GOTO, Pan-STARRS, ZTF	None, Supernova Alliance, ZTF, Ondrejov Transient Group	ATLAS2

Copyright © 2015

Built by klido.net

Transient Name Server

SN 2026aaiv

RA/DEC (2000)	Type	Redshift
22:37:05.628 +34:24:35.19	**SN Ia**	**0.002722**
339.27344866482		
+34.409774975719		

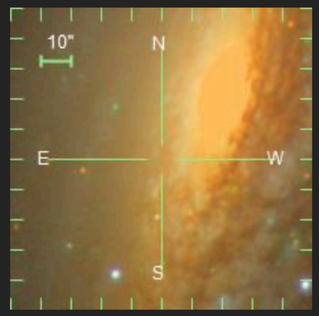
Discovery Report Classification Report

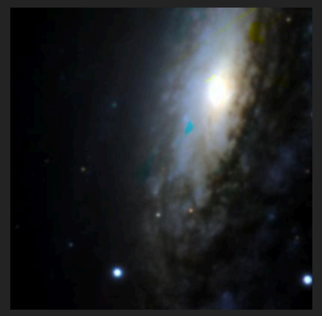
Related AstroNotes: 2026-264 , 2026-274

Reporting Group	Discovering Data Source	Discovery Date	TNS AT	Public	Host Name
ATLAS	**ATLAS**	**2026-09-01 11:23:32.352**	**Y**	**Y**	**NGC7331**

Comments	Discovery Mag	Filter
[Object cross-matched with NGC7331]	**17.325**	**orange-ATLAS**





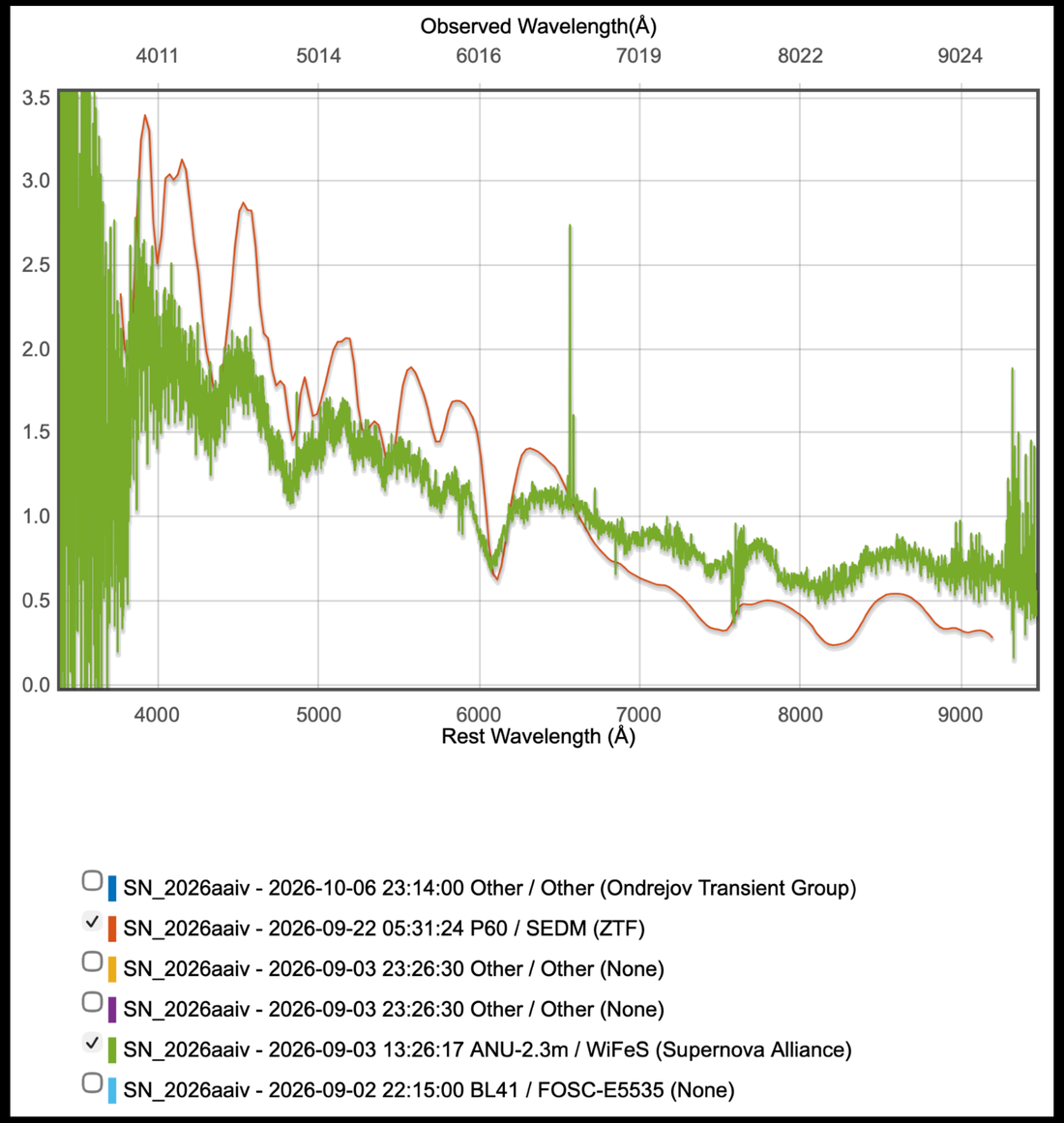


NED SIMBAD DECaLS

PanSTARRS-1 SkyMapper VizieR

WISE DSS ADS

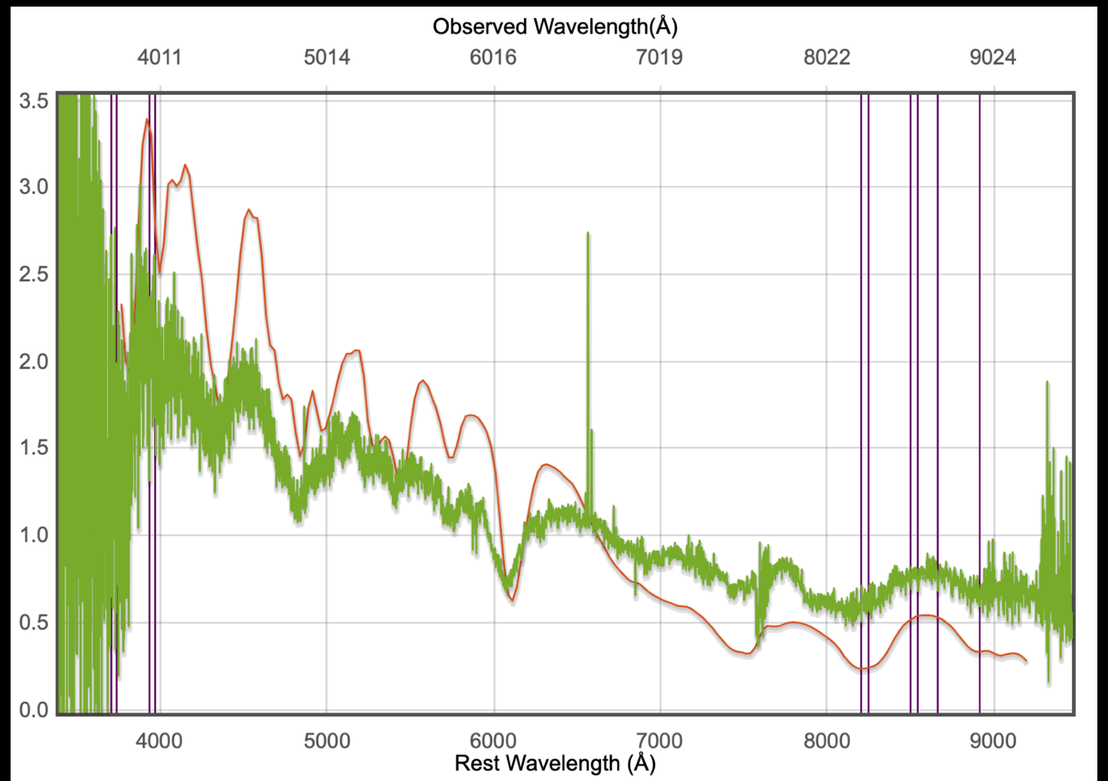
Transient Name Server



Select all spectra | Clear spectra selection | Download selected ASCII | Reload

☐	Show H at	z=0.0027	v_{exp}=0 km/s	☐	Show [O II] at	z=0.0027	v_{exp}
☐	Show He at	z=0.0027	v_{exp}=0 km/s	☐	Show [O III] at	z=0.0027	v_{exp}
☐	Show He II at	z=0.0027	v_{exp}=0 km/s	☐	Show O V at	z=0.0027	v_{exp}
☐	Show C II at	z=0.0027	v_{exp}=0 km/s	☐	Show O VI at	z=0.0027	v_{exp}
☐	Show C III at	z=0.0027	v_{exp}=0 km/s	☐	Show Na at	z=0.0027	v_{exp}
☐	Show C IV at	z=0.0027	v_{exp}=0 km/s	☐	Show Mg at	z=0.0027	v_{exp}
☐	Show N II at	z=0.0027	v_{exp}=0 km/s	☐	Show Mg II at	z=0.0027	v_{exp}
☐	Show N III at	z=0.0027	v_{exp}=0 km/s	☐	Show Si II at	z=0.0027	v_{exp}
☐	Show N IV at	z=0.0027	v_{exp}=0 km/s	☐	Show S II at	z=0.0027	v_{exp}
☐	Show N V at	z=0.0027	v_{exp}=0 km/s	☐	Show Ca II at	z=0.0027	v_{exp}
☐	Show O at	z=0.0027	v_{exp}=0 km/s	☐	Show [Ca II] at	z=0.0027	v_{exp}
☐	Show [O I] at	z=0.0027	v_{exp}=0 km/s	☐	Show Fe II at	z=0.0027	v_{exp}
☐	Show O II at	z=0.0027	v_{exp}=0 km/s	☐	Show Fe III at	z=0.0027	v_{exp}

Transient Name Server

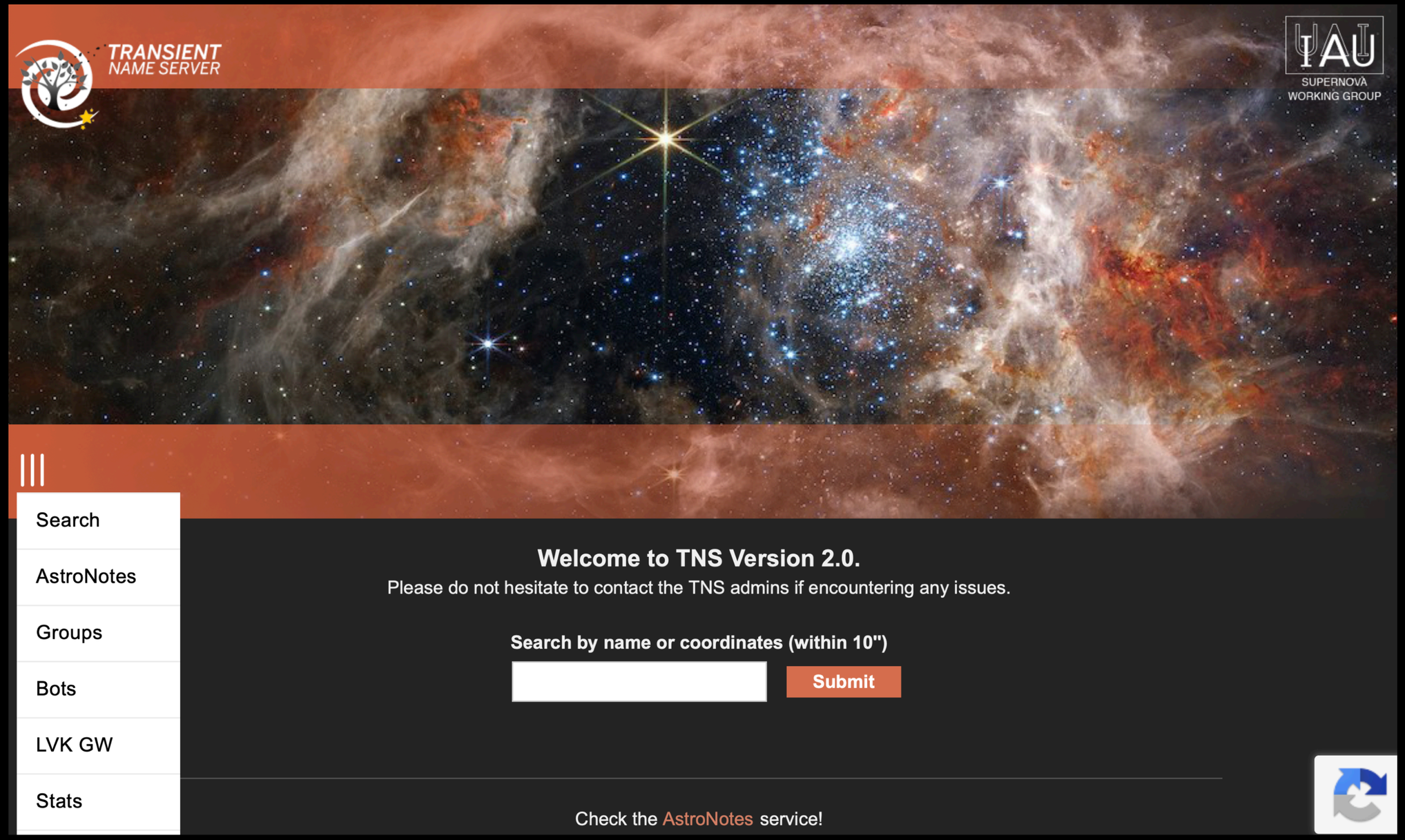


- [ ] SN_2026aaiv - 2026-10-06 23:14:00 Other / Other (Ondrejov Transient Group)
- [x] SN_2026aaiv - 2026-09-22 05:31:24 P60 / SEDM (ZTF)
- [ ] SN_2026aaiv - 2026-09-03 23:26:30 Other / Other (None)
- [ ] SN_2026aaiv - 2026-09-03 23:26:30 Other / Other (None)
- [x] SN_2026aaiv - 2026-09-03 13:26:17 ANU-2.3m / WiFeS (Supernova Alliance)
- [ ] SN_2026aaiv - 2026-09-02 22:15:00 BL41 / FOSC-E5535 (None)

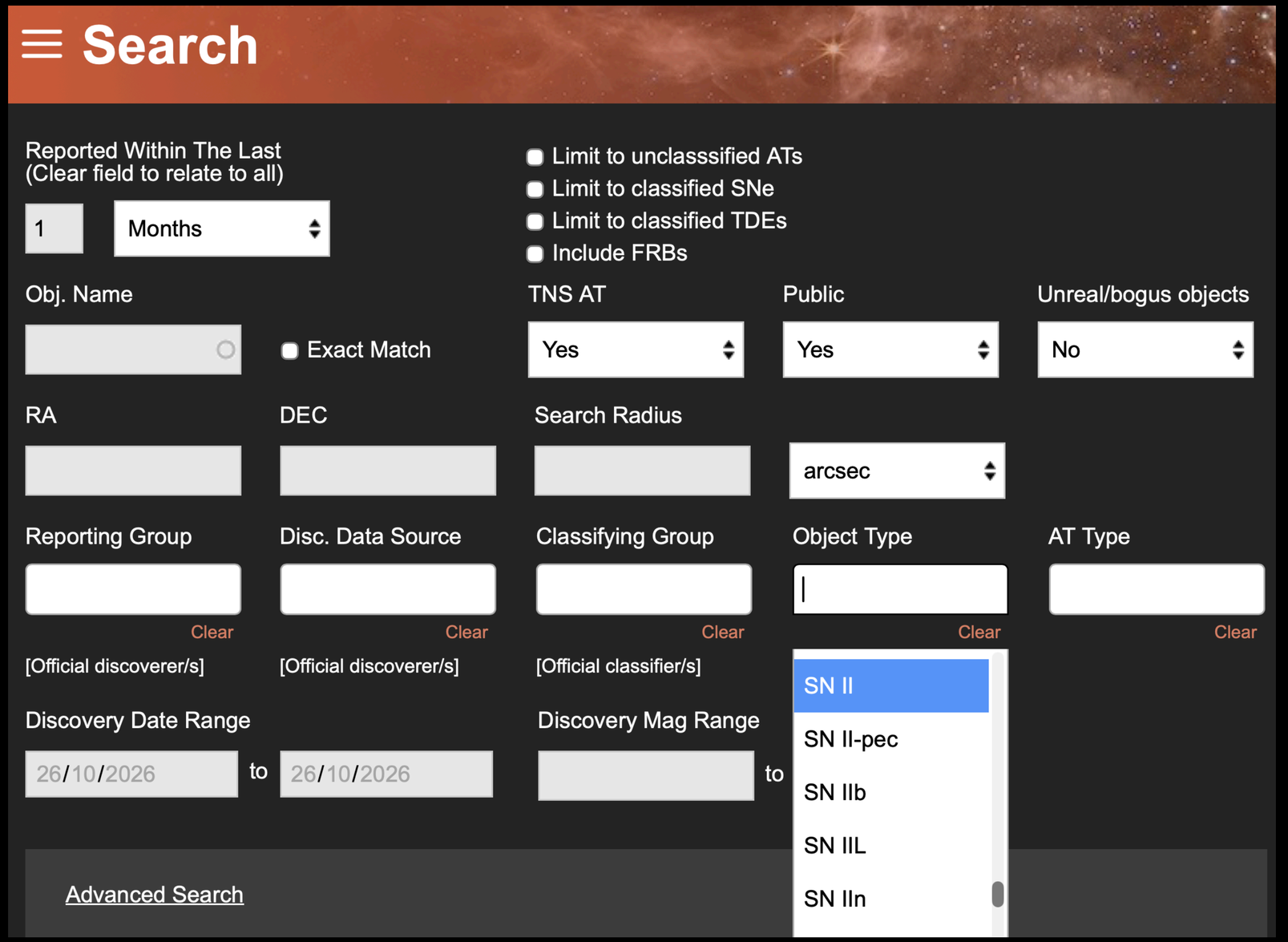
Select all spectra | Clear spectra selection | Download selected ASCII | Reload

☐	Show H at	z=0.0027 v_{exp}=0 km/s	☐	Show [O II] at	z=0.0027 v_{exp}
☐	Show He at	z=0.0027 v_{exp}=0 km/s	☐	Show [O III] at	z=0.0027 v_{exp}
☐	Show He II at	z=0.0027 v_{exp}=0 km/s	☐	Show O V at	z=0.0027 v_{exp}
☐	Show C II at	z=0.0027 v_{exp}=0 km/s	☐	Show O VI at	z=0.0027 v_{exp}
☐	Show C III at	z=0.0027 v_{exp}=0 km/s	☐	Show Na at	z=0.0027 v_{exp}
☐	Show C IV at	z=0.0027 v_{exp}=0 km/s	☐	Show Mg at	z=0.0027 v_{exp}
☐	Show N II at	z=0.0027 v_{exp}=0 km/s	☐	Show Mg II at	z=0.0027 v_{exp}
☐	Show N III at	z=0.0027 v_{exp}=0 km/s	☐	Show Si II at	z=0.0027 v_{exp}
☐	Show N IV at	z=0.0027 v_{exp}=0 km/s	☐	Show S II at	z=0.0027 v_{exp}
☐	Show N V at	z=0.0027 v_{exp}=0 km/s	☑	Show Ca II at	z=0.0027 v_{exp}
☐	Show O at	z=0.0027 v_{exp}=0 km/s	☐	Show [Ca II] at	z=0.0027 v_{exp}
☐	Show [O I] at	z=0.0027 v_{exp}=0 km/s	☐	Show Fe II at	z=0.0027 v_{exp}
☐	Show O II at	z=0.0027 v_{exp}=0 km/s	☐	Show Fe III at	z=0.0027 v_{exp}

Transient Name Server



Transient Name Server

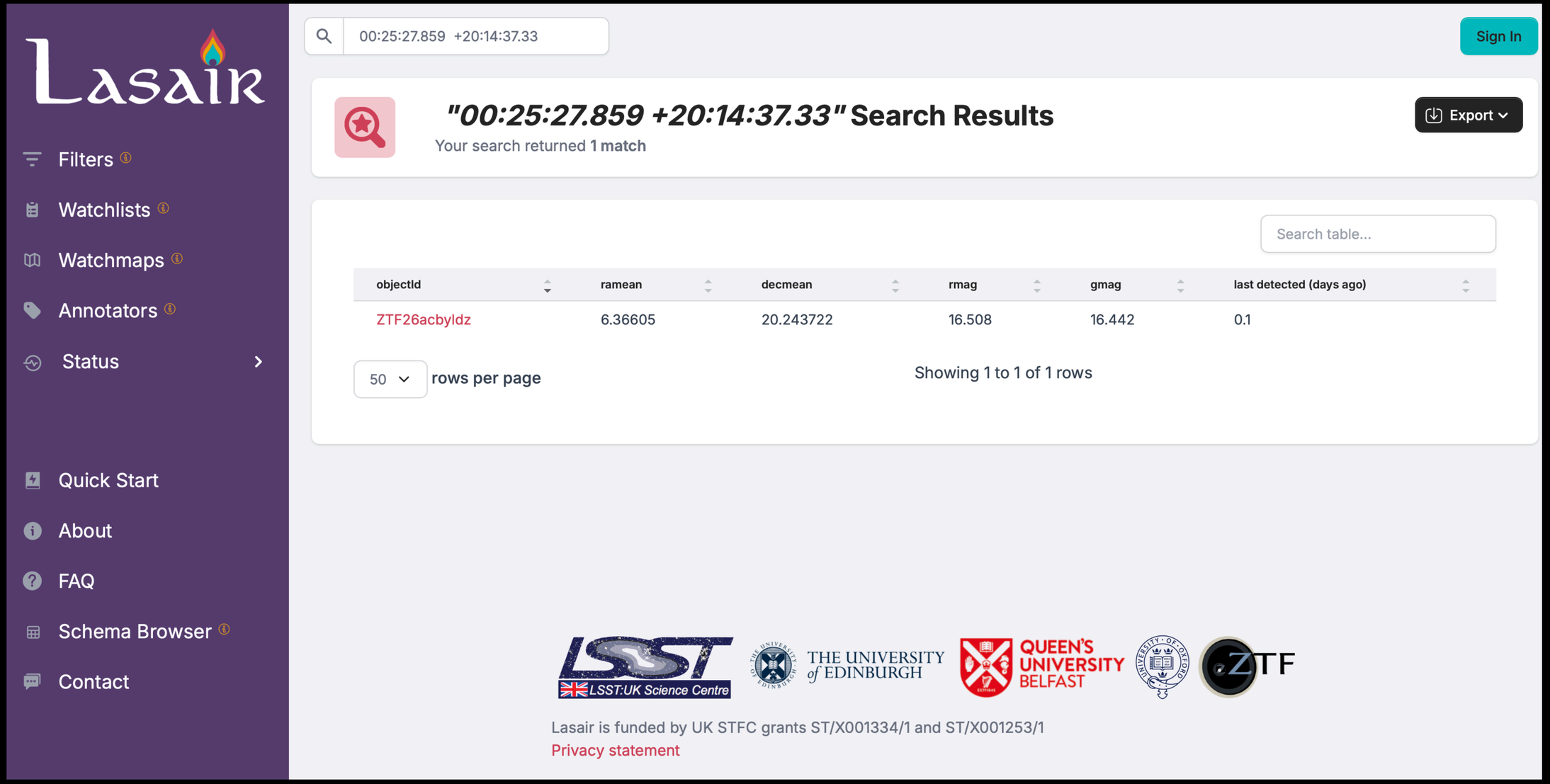


Transient Name Server

Showing results 1 to 42 out of 42

ID	Name	Reps	Class	RA	DEC	Obj. Type	Redshift	Host Name	Host Redshift	Reporting Group/s	Discovery Data Source/s
223068	SN 2026afqd	6	1	00:25:27.859	+20:14:37.33	SN II	0.014657	UGC00242		GOTO, ATLAS, Pan-STARRS, ZTF, LAST, YSE	GOTO, ATLAS, Pan-STARRS, ZTF, LAST
222954	SN 2026afmi	1	1	03:35:52.701	-28:02:49.10	SN II	0.16			YSE	YSE
222108	SN 2026aejv	1	1	09:20:21.334	-07:52:54.85	SN II	0.011	PGC026411		ATLAS	ATLAS
221958	SN 2026aeen	4	1	04:46:14.960	+28:01:12.94	SN II	0.021825	PGC1824103		ATLAS, GOTO, Pan-STARRS, ZTF	ATLAS, GOTO, Pan-STARRS, ZTF
221872	SN 2026aebl	3	2	00:43:52.136	-04:09:35.26	SN II	0.0224			ZTF, ATLAS, GOTO	ZTF, ATLAS, GOTO

Lasair



https://lasair-ztf.lsst.ac.uk/search/

Lasair

Lasair

- Filters
- Watchlists
- Watchmaps
- Annotators
- Status

- Quick Start
- About
- FAQ
- Schema Browser
- Contact

6.366054, 20.243722

Discovery Date: 2026-10-19 07:14:33 UTC
Discovery MJD: 61332.30
Disc i-Mag: 17.16±0.03

Latest Date: 2026-10-26 09:29:19 UTC
Latest MJD: 61339.40
Latest r-Mag: 16.51±0.04

SN II SN2026afqd

The transient was discovered on ***17th October 2026 at 02:14:46*** (MJD 61330.09) by GOTO as GOTO26lfk with a discovery magnitude of ***L = 19.18***. It was subsequently classified as a ***SN II*** at ***z = 0.015***.

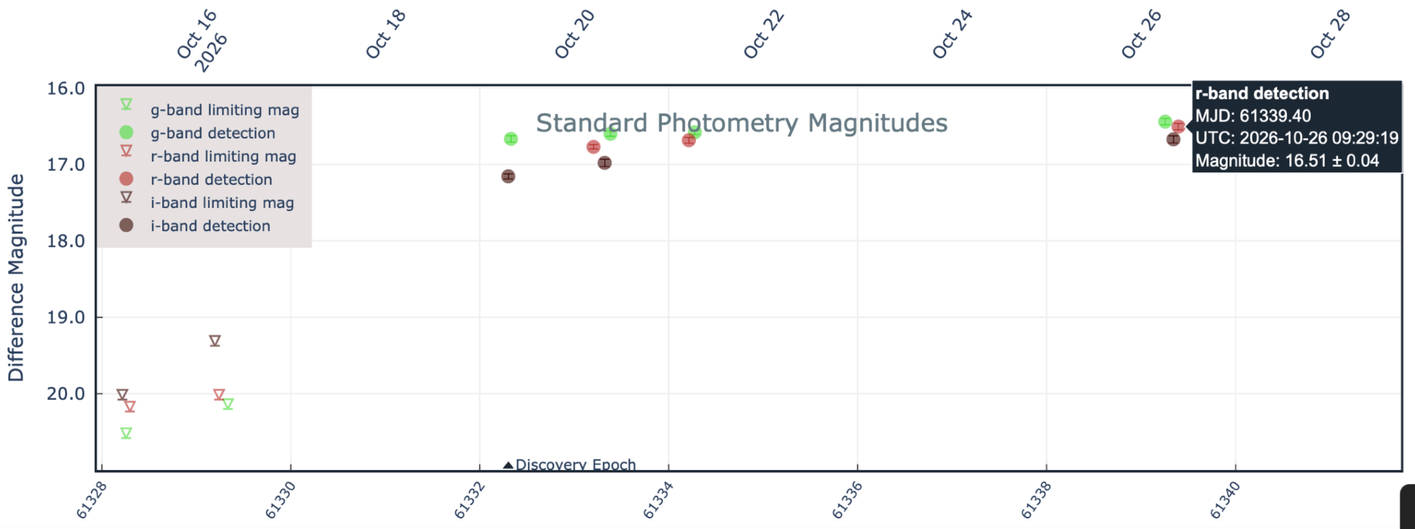
Sherlock Contextual Classification

Prediction: **Supernova**

The transient is possibly associated with *SDSS J002528.49+201439.4*; an r=21.15 mag galaxy found in the SDSS catalogue. Its located 2.04" S, 9.01" W (2.8 Kpc) from the galaxy centre. A host z=0.015 implies a *m - M* = 34.04.

Difference Image Lightcurves

Access the data from these plots in the *ZTF Alert Packet Data* table below. Double click on the plots to see the full lightcurve.



Help

ATLAS

atlas

Home Output Queue API API Guide FAQ Stats & Issues Register Log in

2026-09-09 07:45 UTC: Normal operations have resumed. Apologies for the delay!

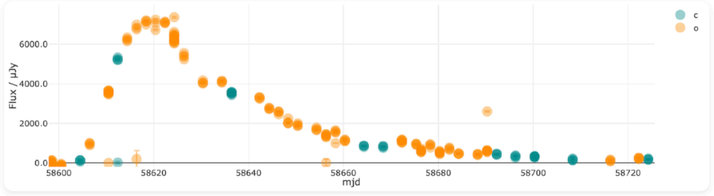
ATLAS Forced Photometry

Four telescopes, the whole sky every night or two, and a light curve at any position you name.

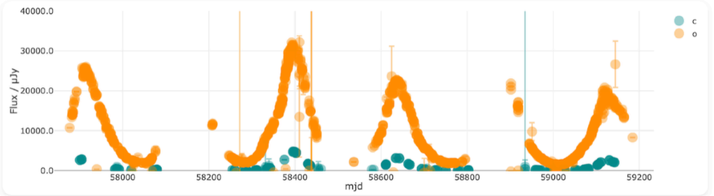
This is the ATLAS forced photometry server, which provides full public access to photometric measurements over the full history of ATLAS survey. After registration, a user can request forced photometry at any position on the sky either for a single position, a list of positions, or moving objects (by MPC name).

ATLAS is a quadruple 0.5m telescope system with two units in Hawaii (Haleakala and Mauna Loa), and one each in Chile (El Sauce) and South Africa (Sutherland). With the installation of the two southern units, we are robotically surveying the whole sky with a cadence of 1 day between -50 and +50 and 2 days in the polar regions, weather permitting. Two filters are used, cyan and orange (denoted c and o; all mags quoted are in the AB system).

As described in Tonry et al. (2018), ATLAS surveys the whole visible sky. On each night, a sequence of 4 x 30 second exposures are taken, spaced over a period of about one hour to provide identification and orbit constraints for near-earth objects (NEOs). Discovery of NEOs and potentially hazardous objects is the main purpose of ATLAS. However the all-sky, frequent coverage, to o ~ 19.5 makes it treasure trove for time domain science. A full description is on the ATLAS homepage at fallingstar.com



A supernova: a fast rise, then months of decline.



A variable star: the same brightening, over and over.

A forced photometry means that a point-spread-function is calculated for each image based on high signal to noise stars, and a profile fit is forced at the user's input coordinates. The forced measurement can be made on either a target image (e.g. for the measurement of flux of a variable star), or on a difference image (e.g. for a lightcurve point for a transient). Data processing and photometry are described in more detail in Tonry et al. (2018) and Smith et al. (2020).

https://fallingstar-data.com/forcedphot/

ATLAS

atlas | followup | good | snooze | attic | extragalactic | galactic | fast-track | current-fast-track | other | custom | dashboard | 00:25:27.859 +20:14:37.33 | Search | bug/feature request | pessto

Object List

(1)

Page 1 of 1.

ATLAS26mss (0.04")

Coords:

00:25:27.86 +20:14:37.3 (6.36609 20.24370)

Flag Date:

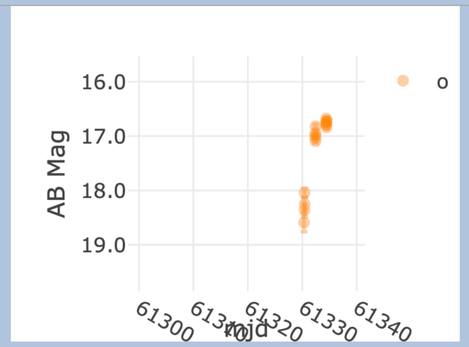
17 Oct 2026, 10:54 a.m.

Context

SN

Spectral Type

SN II

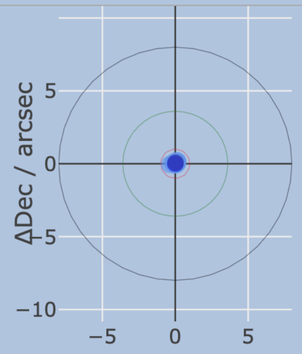


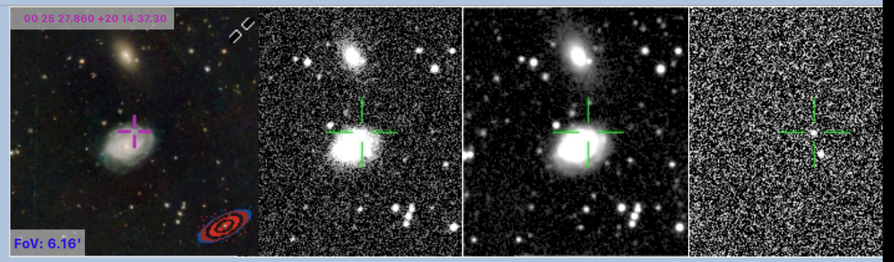
Catalogue:

NED-D Galaxy Catalogue v17.1.2

Host:

UGC 00242





The transient is possibly associated with *SDSS J002528.49+201439.4*; an r=21.15 mag galaxy found in the SDSS catalogue. It's located 2.05" S, 8.82" W (2.7 Kpc) from the galaxy centre. A host z=0.015 implies a *m* - *M* = 34.04.

Comments:

2026-10-17 13:03:53[61330.54436] (ken.smith): GOTO object. Fast track.

2026-10-17 17:33:36[61330.73167] (stephen.smartt): 60Mpc and young

2026-10-17 17:33:52[61330.73185] (stephen.smartt): 60Mpc and young

2026-10-23 10:24:58[61336.43400] (stephen.smartt): Blue and featureless, in PESSTO queue and Shubham to queue LT

TNG +DOLORES



Name	disp. [Å/px]	λ_{min} [Å]	λ_c [Å]	λ_{max} [Å]	R_c (1") (4)
LR-B	2.52	3000	5850	8430	585
LR-R(1)	2.61	4470	7400	10073	714
V390(2)	0.26	3634	3900	4166	3766
V486(5)	0.20	4612	4725	4838	5953
V510(2)	0.22	4875	5100	5325	5950
V589(2)	0.27	5619	5895	6171	5502
V656	0.32	6232	6560	6888	5248
V860(3)	0.44	8149	8600	9051	4000
VHRV	0.95	4752	5725	6698	1527
VHRR(3)	0.70	6238	7000	7717	2513
VHRI(3)	0.68	7433	8130	8826	3035

https://www.tng.iac.es/instruments/lrs/

Exposure time calculator

Exposition Time Calculator for Spectroscopy

This exposure calculator predicts the signal-to-noise ratio achieved with DOLORES or NICS for a given exposure time and observing conditions. If sky brightness is not entered, the program uses the default values (new moon for DOLORES).
To run the program enter values below and click on 'Submit'. You may set signal-to-noise and obtain the corresponding exposure time, or viceversa.

Note the javascript option on your browser should be activated for the exposure time calculator to work properly.

Instrument	DOLORES	**Grism**	LR-B
Source Type	Point	**NICS FOV**	Large
Fwhm	1.0 arcsec	**Slit width**	1.0
Air Mass	1.3	**Sky Brightness**	Days from new Moon: 0
Apparent Magnitude	17.0 mag (mag/arcsec^2 if extended)	**Band**	V
(•) **Exposure Time**	900.0 seconds	( ) **Signal-To-Noise**	10.0

SUBMIT RESET

https://www.tng.iac.es/observing/expcalc/imaging/

https://www.tng.iac.es/observing/expcalc/spectro/

Exposure time calculator

Exposition Time Calculator for Spectroscopy

This exposure calculator predicts the signal-to-noise ratio achieved with DOLORES or NICS for a given exposure time and observing conditions. If sky brightness is not entered, the program uses the default values (new moon for DOLORES).
To run the program enter values below and click on 'Submit'. You may set signal-to-noise and obtain the corresponding exposure time, or viceversa.

Note the javascript option on your browser should be activated for the exposure time calculator to work properly.

Instrument	DOLORES	**Grism**	LR-B
Source Type	Point	**NICS FOV**	Large
Fwhm	1.0 arcsec	**Slit width**	1.0
Air Mass	1.3	**Sky Brightness**	Days from new Moon: 0
Apparent Magnitude	17.0 mag (mag/arcsec^2 if extended)	**Band**	V
● **Exposure Time**	900.0 seconds	○ **Signal-To-Noise**	10.0

SUBMIT RESET

OUTPUT

DETECTED ELECTRONS FROM OBJECT	**8655.17**
DETECTED ELECTRONS/PIXEL FROM SKY	**51.60**
S/N(*) at central wavelength	**88.25**
PSF EXTENSION (pixels)	**7.27**

(*) Signal to noise per pixel on the spectrum extracted along the slit.





11. List of targets (note that the absence of a proper object list, or poor target visibility, may weaken the proposal)

Name	α	δ	Epoch	Mag.	Time	Additional Information

INAF – TIME ALLOCATION COMMITTEE

Application for observing time **Category:**

Period AOT53 (April 2026 – September 2026) **Submit using: www.tng.iac.es/submit.html**

1. Title

2. Abstract

3a. Number of requested hours per telescope and instrument (must include overheads)

TNG						REM	
DOLORES	DOL.+MOS	NICS	HARPS-N	GIANO-B	SIFAP2	ROSS	REMIR

3b. Observing modes

TNG:		Visitor		Service		ToO
REM:		Rapid Response		Queuing		ToO



Grazie dell’attenzione!





giorgio.valerin@inaf.it