

Conférences publiques d'astronomie UniGE-EPFL

Vers une fin explosive Evolution des étoiles et supernovae

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Observatoire de Genève

Palais de Rumine, Lausanne, 3 mai 2006
Uni-Dufour, Genève, 4 mai 2006





Constellations d'hiver avec Jungfrau



Gornergrat (Orion se couche derrière le Cervin)

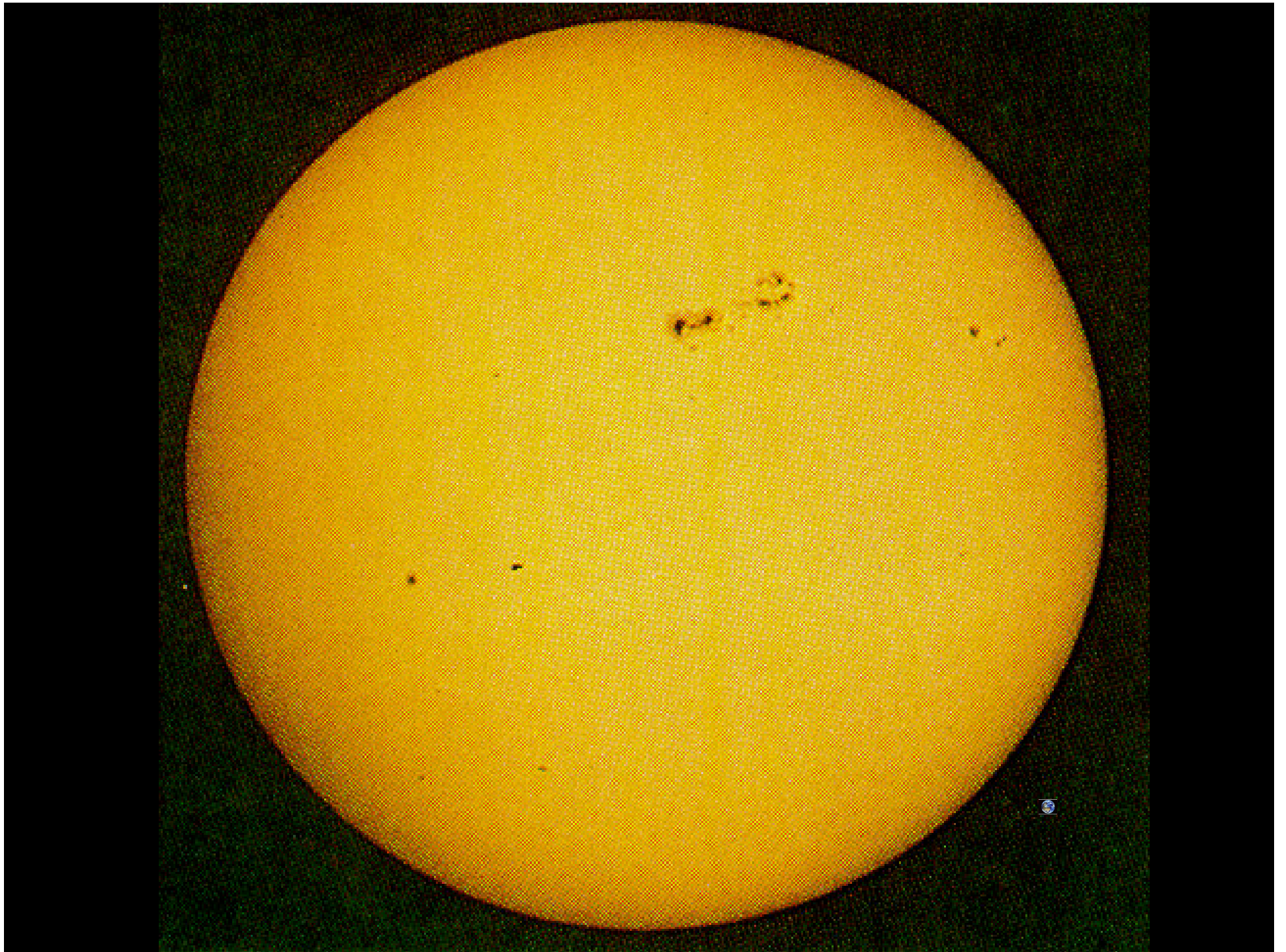


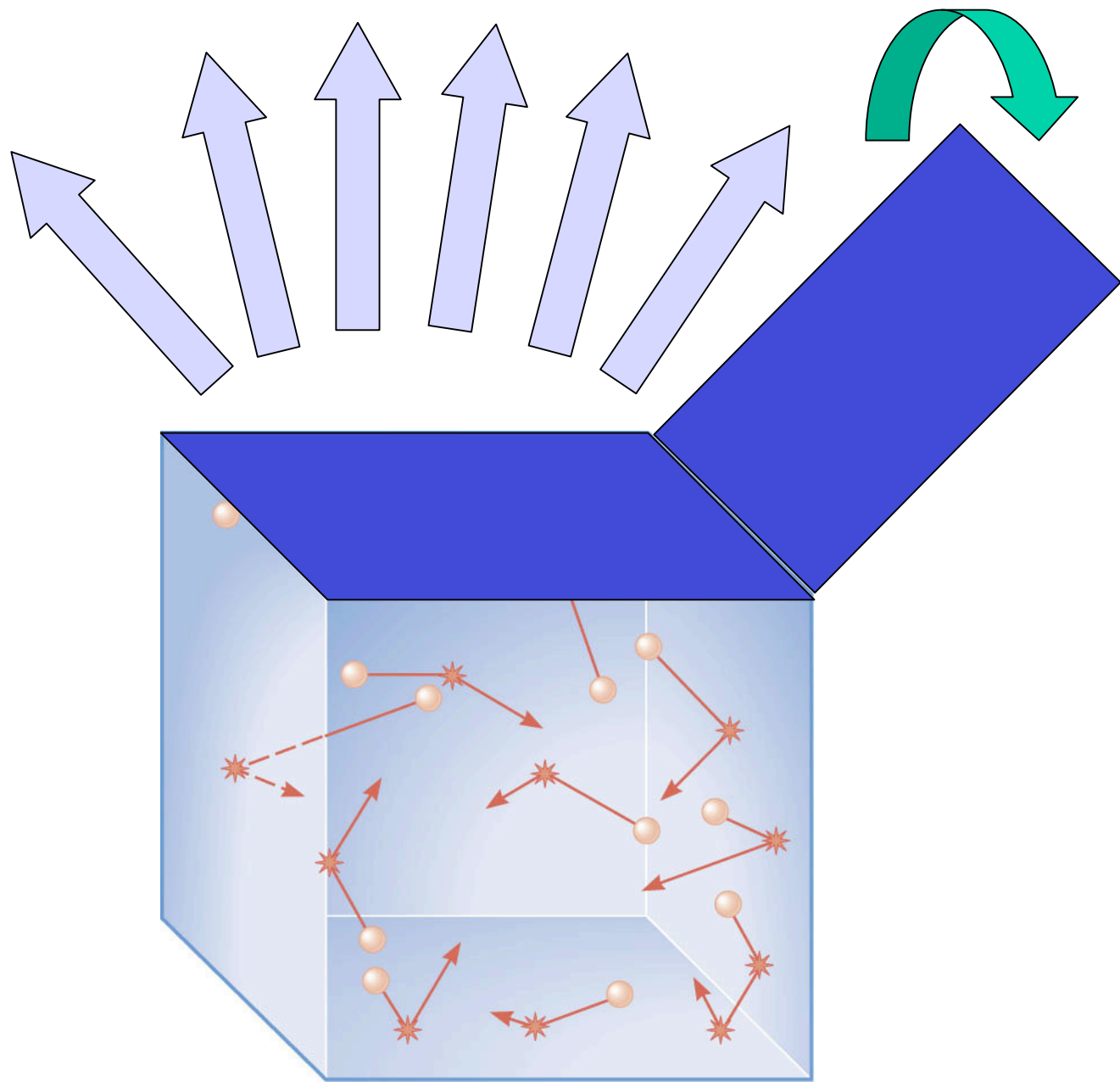


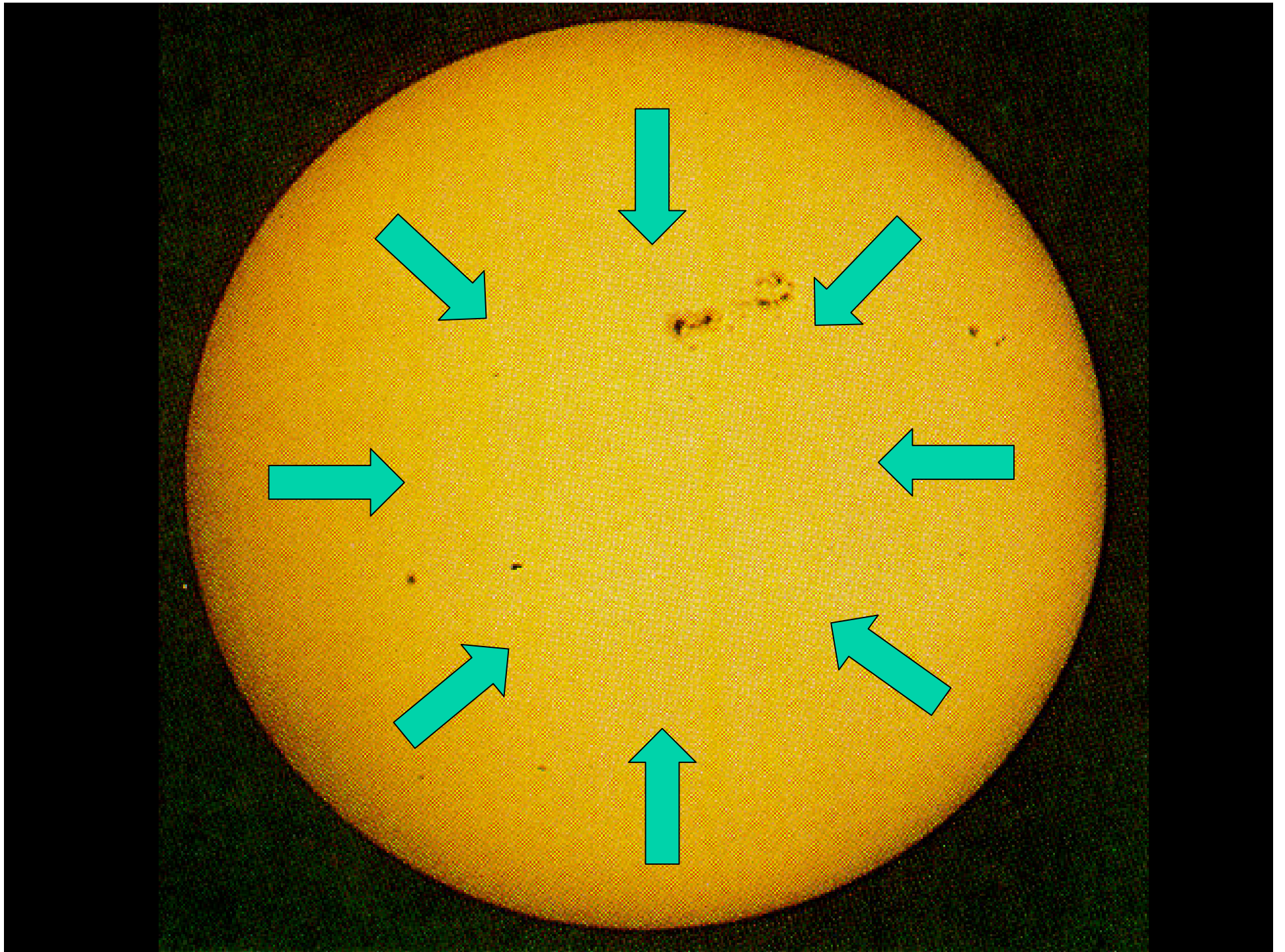


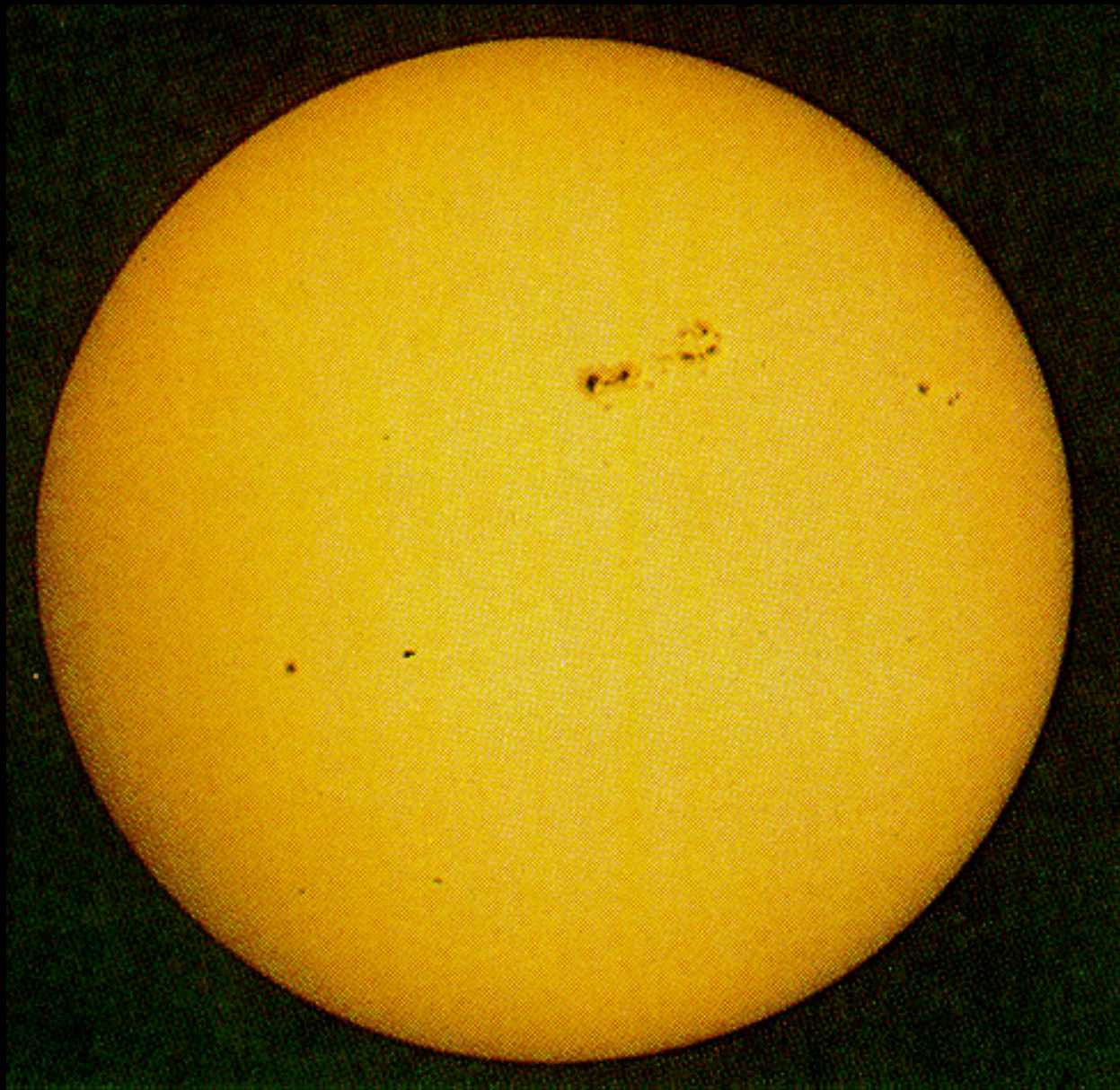


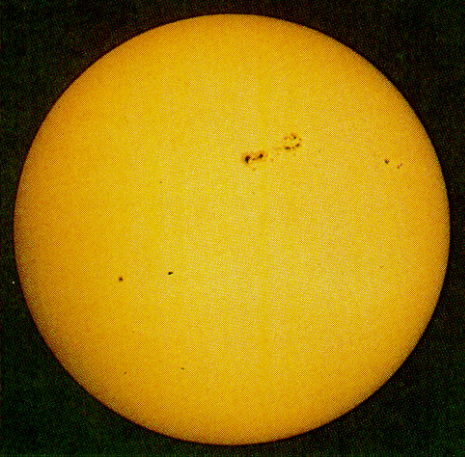
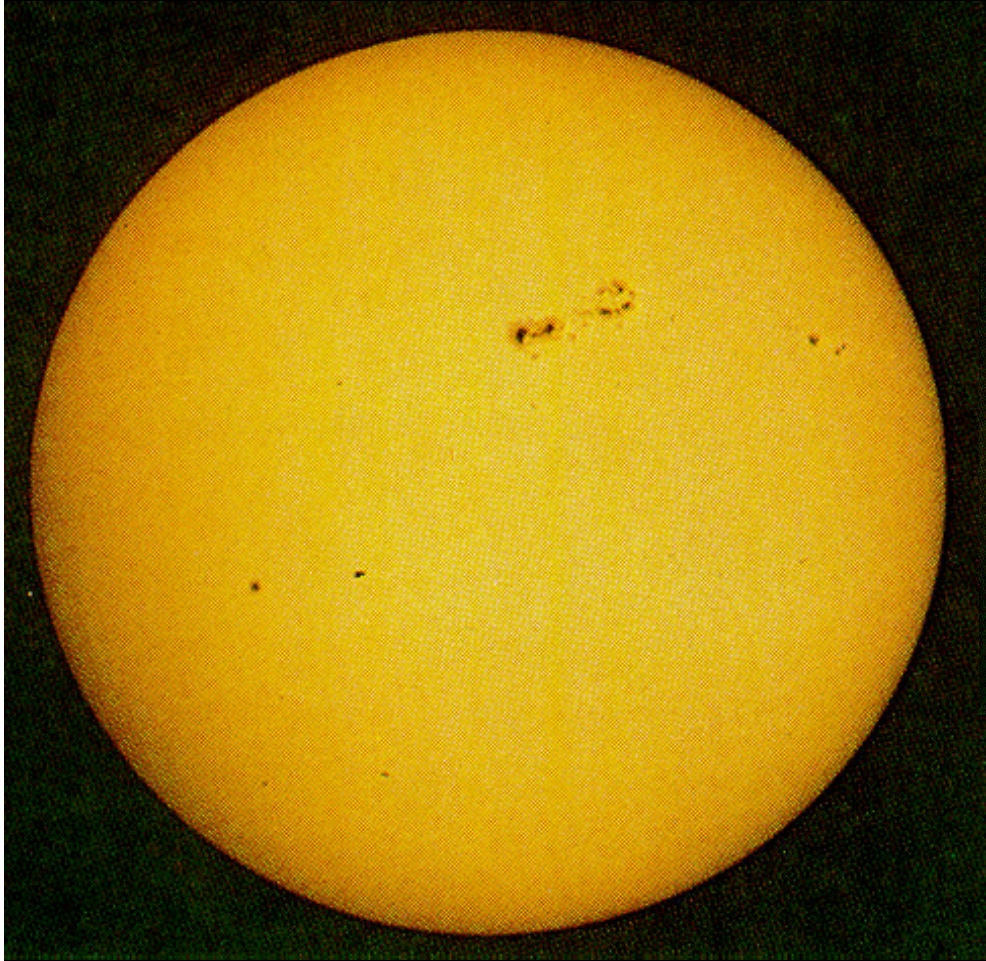


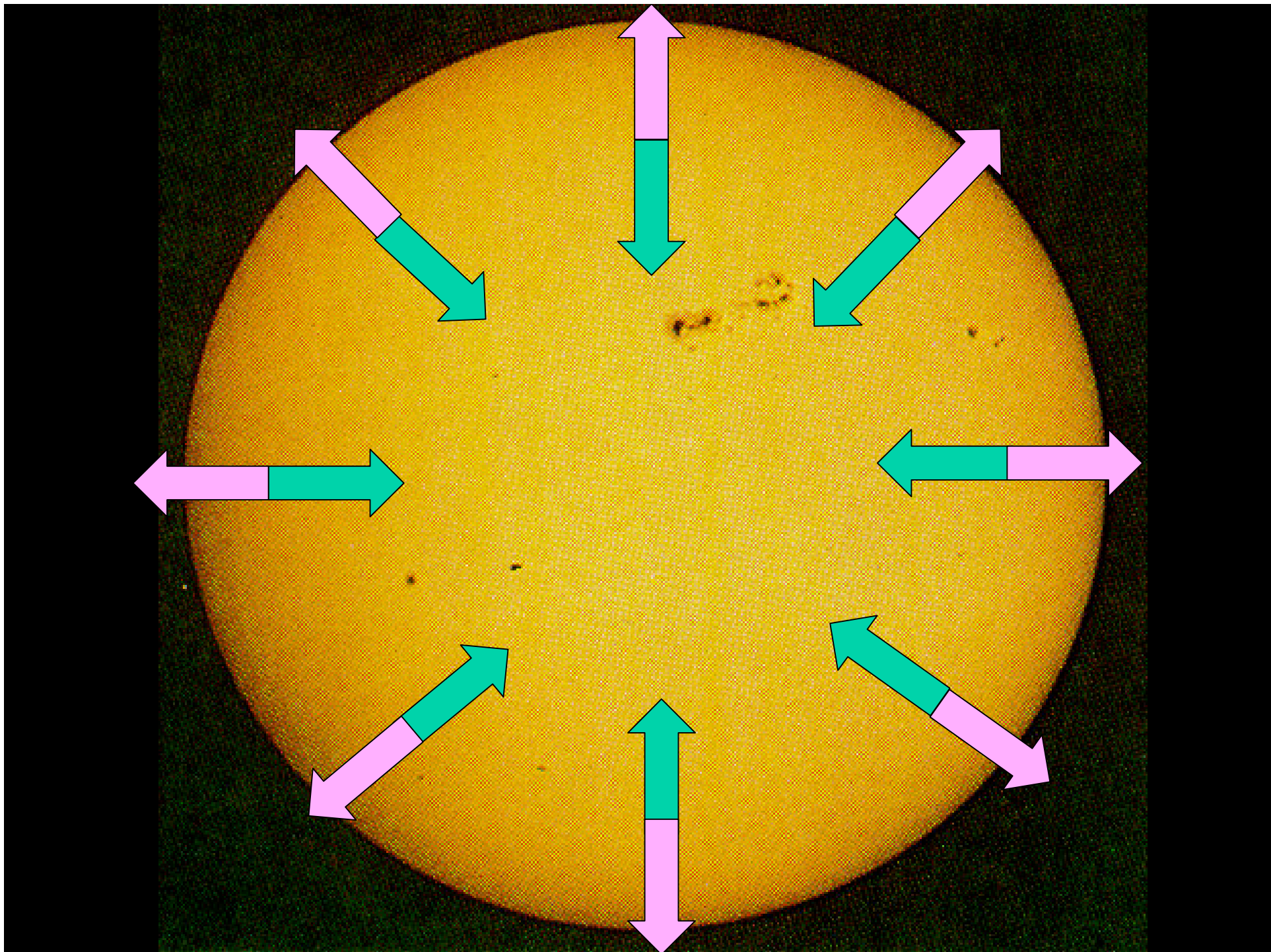




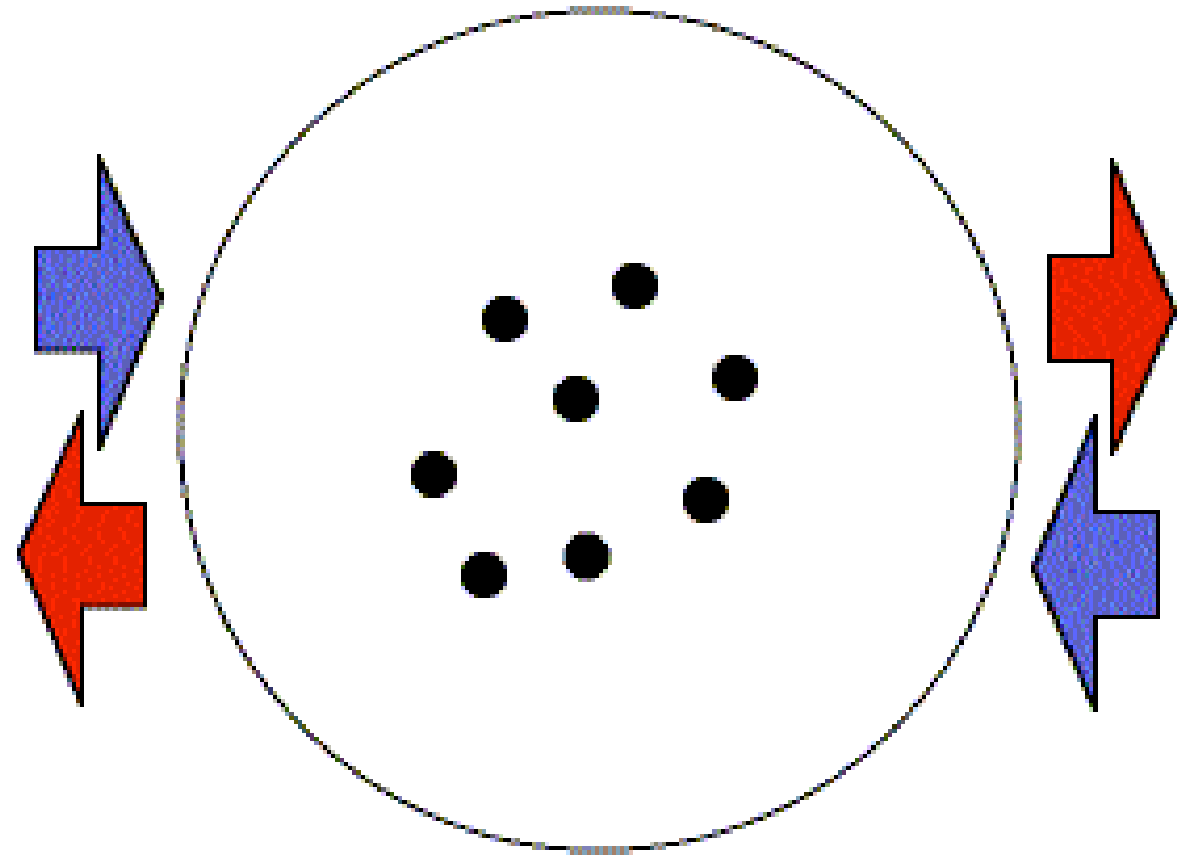




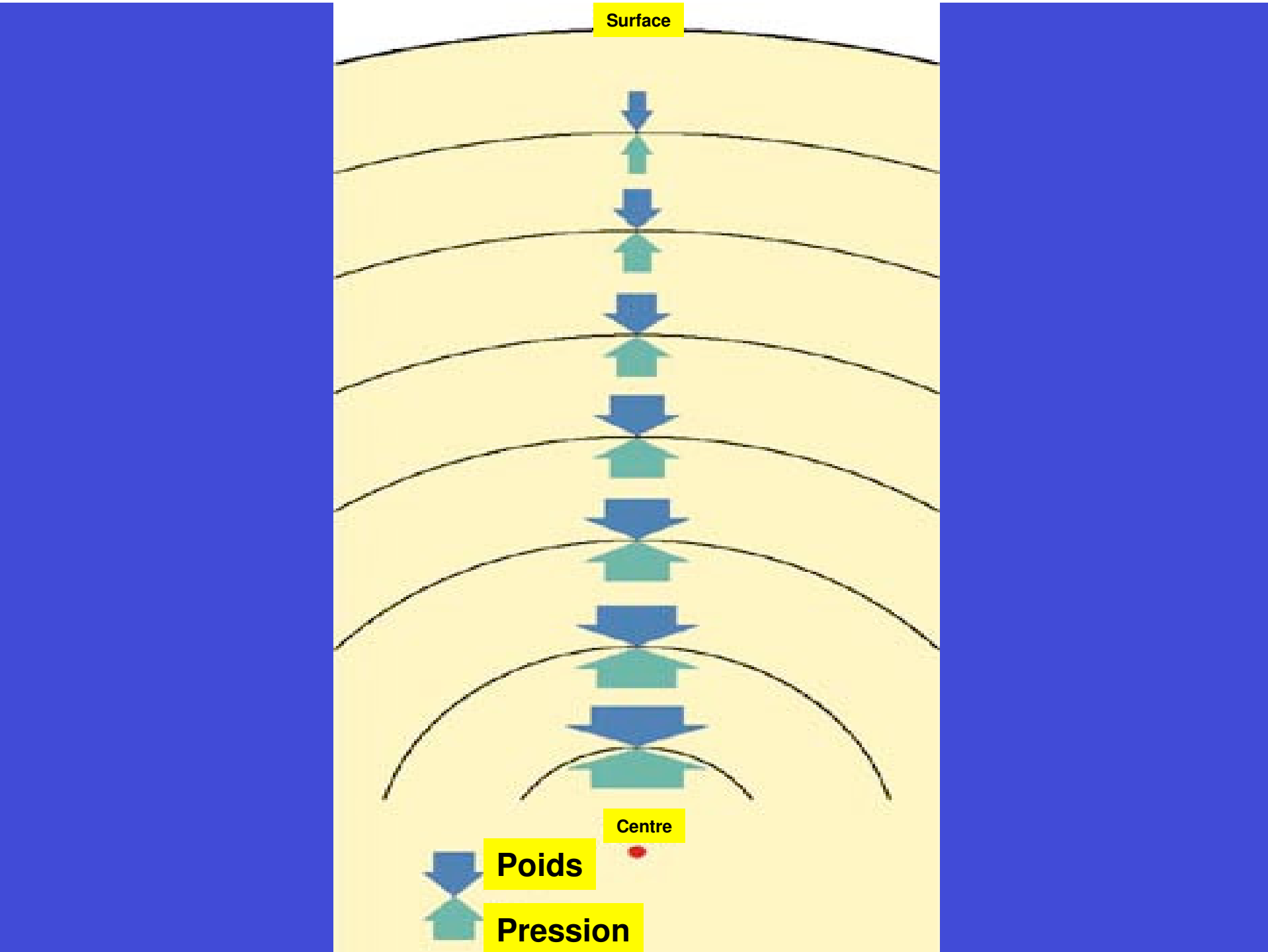




Gravity Pressure



Pressure Gravity



FAIBLES TEMPERATURES
PETITES VITESSES



TEMPERATURES ELEVEES
GRANDES VITESSES



Evolution d'une étoile de 25 fois la masse du Soleil

Fusion de l'hydrogène



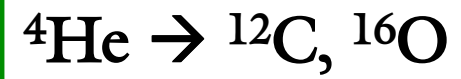
$$T_c = 40 \text{ millions K}$$

$$\rho_c = 5'000 \text{ g/cm}^3$$

Durée: 7 millions ans



Fusion de l'hélium



Hélium

$T_c = 200$ millions K

$\rho_c = 700'000$ g/cm³

Carbone/Oxygène

Durée: 700'000 ans

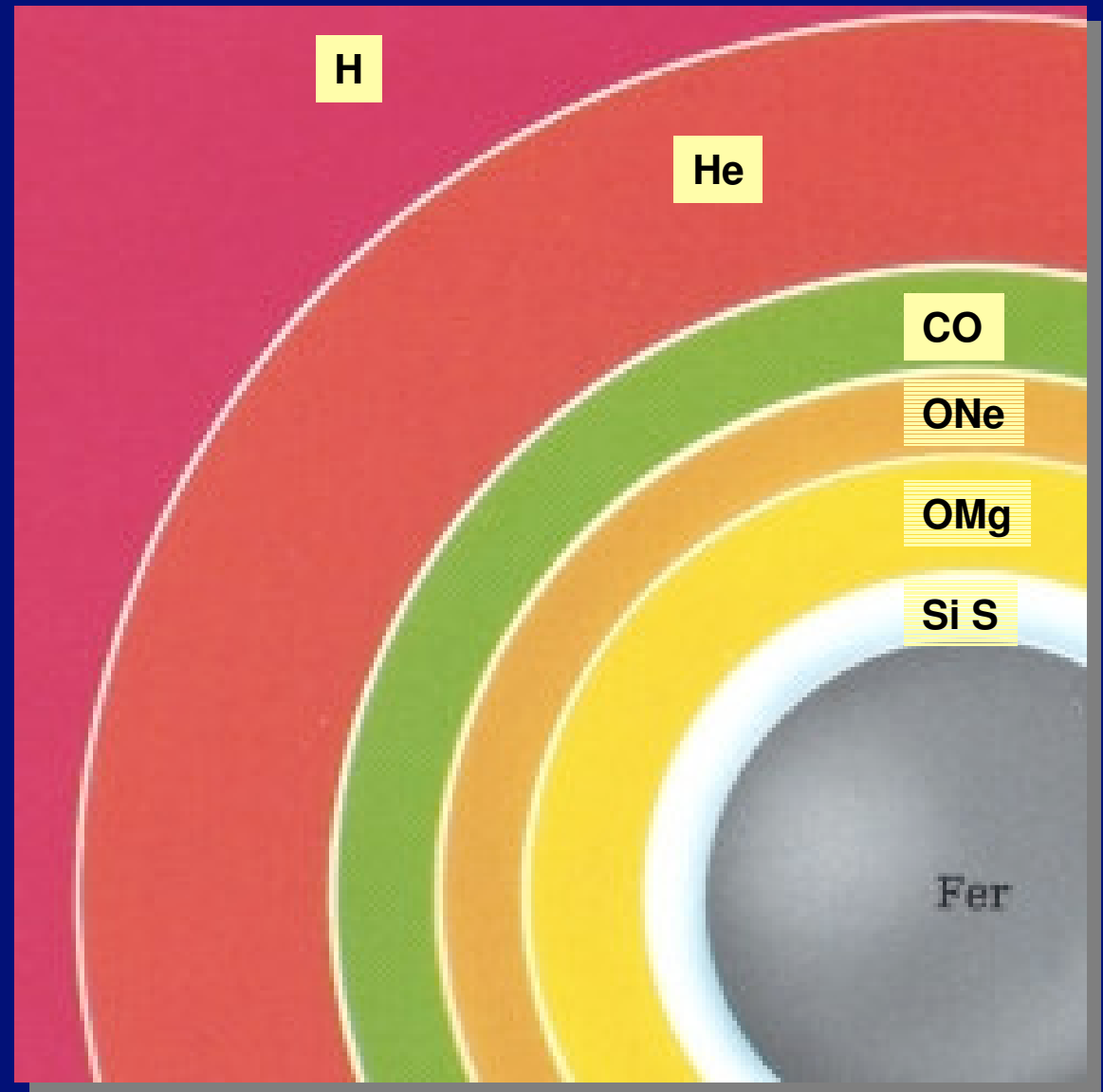
“Fusion” du silicium”



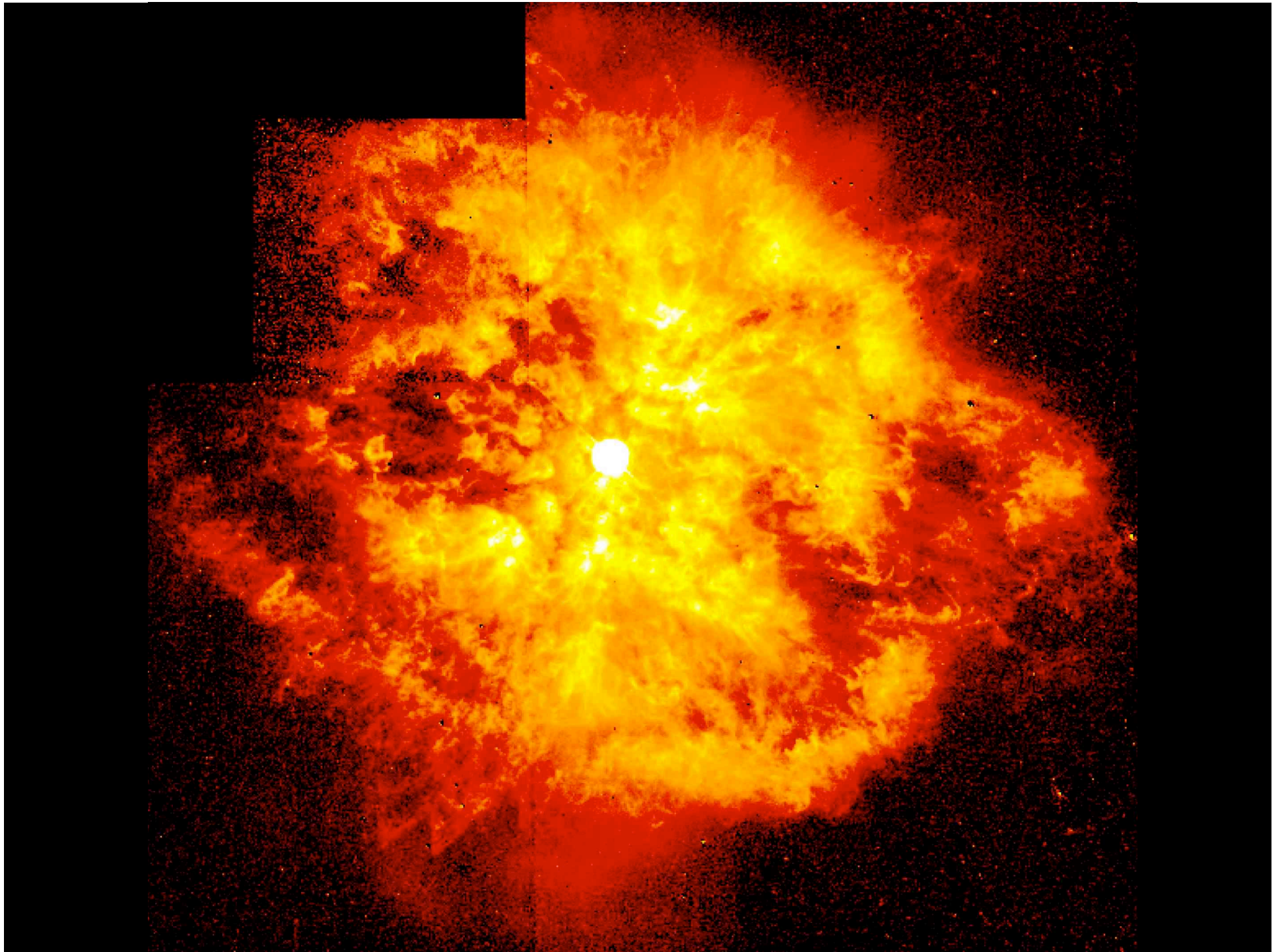
$T_c = 2.7$ milliards K

$\rho_c = 30$ milliards g/cm^3

Durée: 1 jour

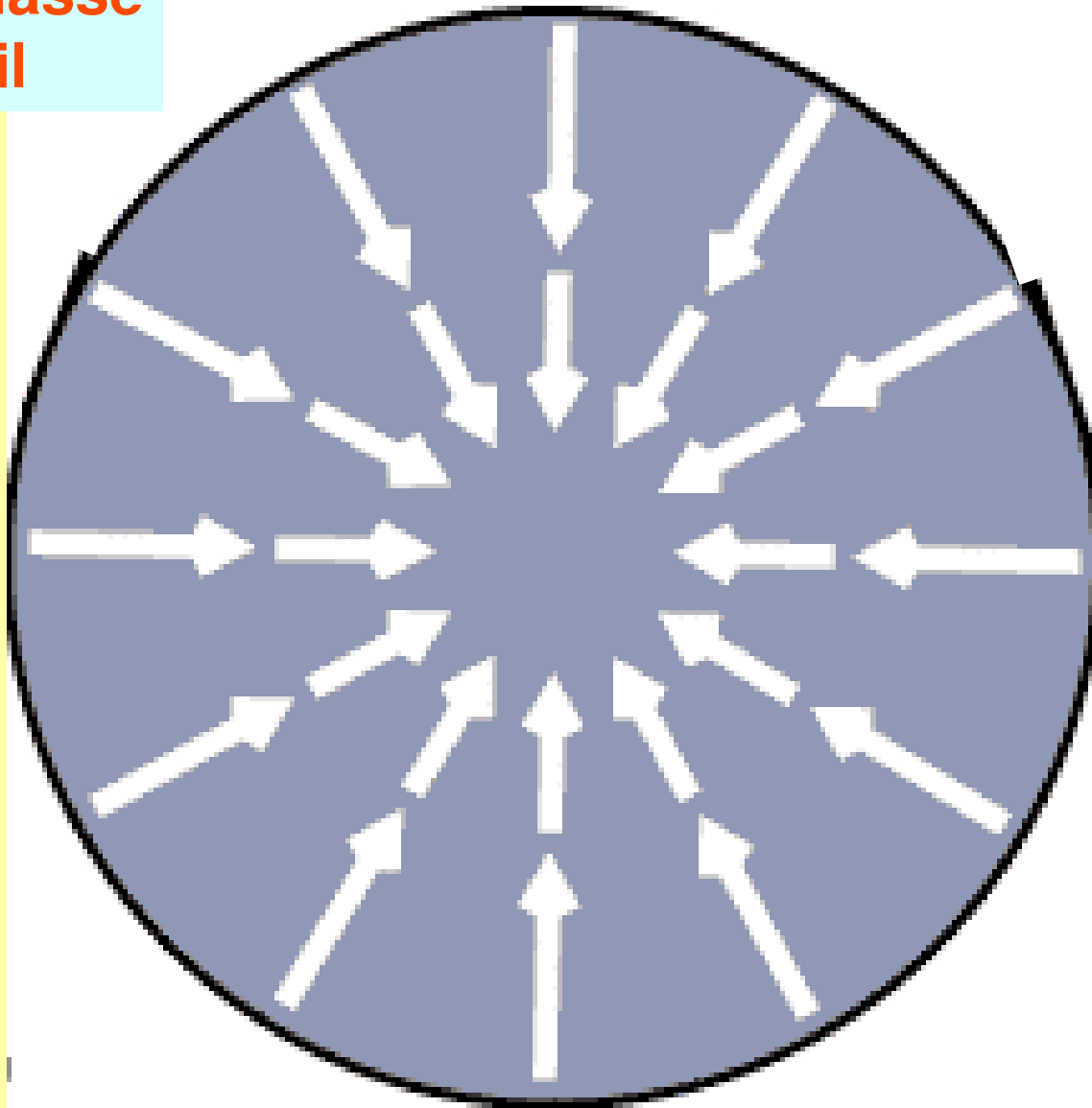


Taille du noyau de fer ~ taille de la Terre, taille de l'étoile ~ orbite de Jupiter



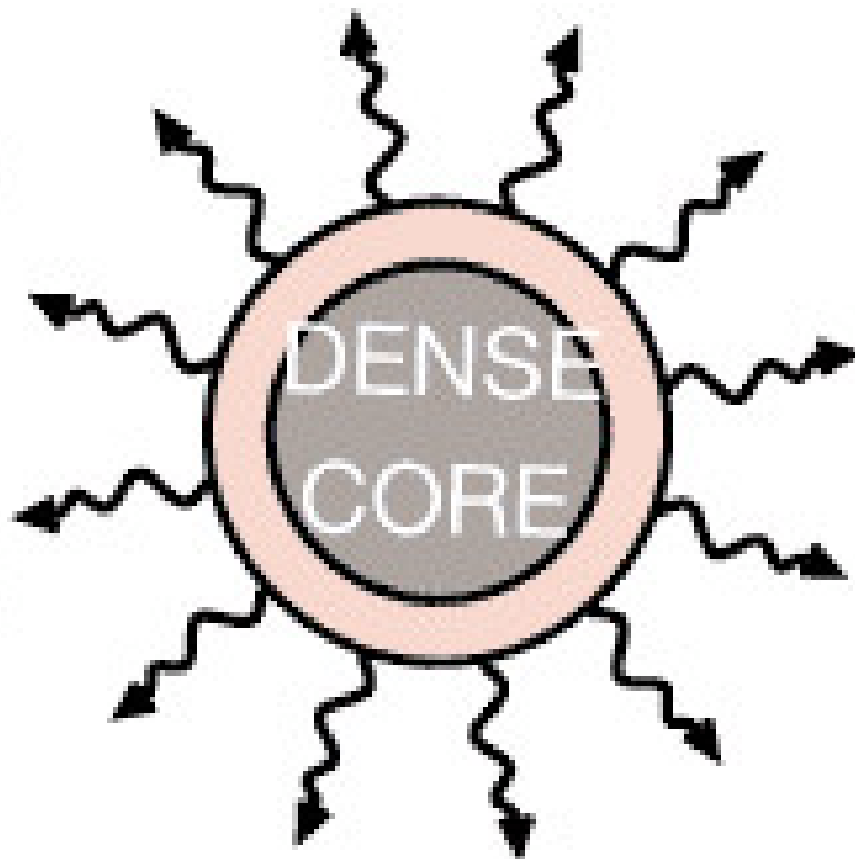
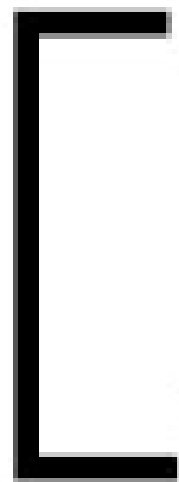
LE COEUR DE FER

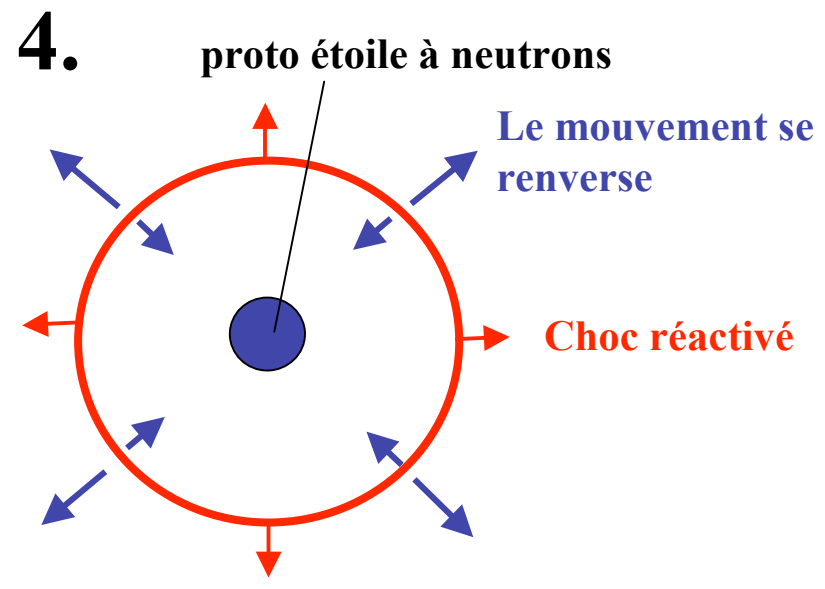
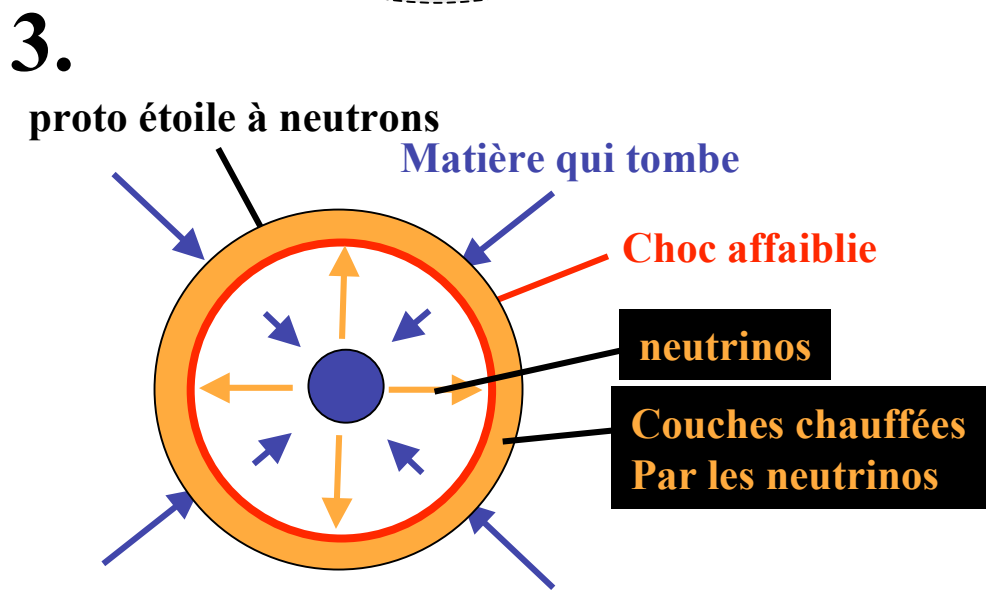
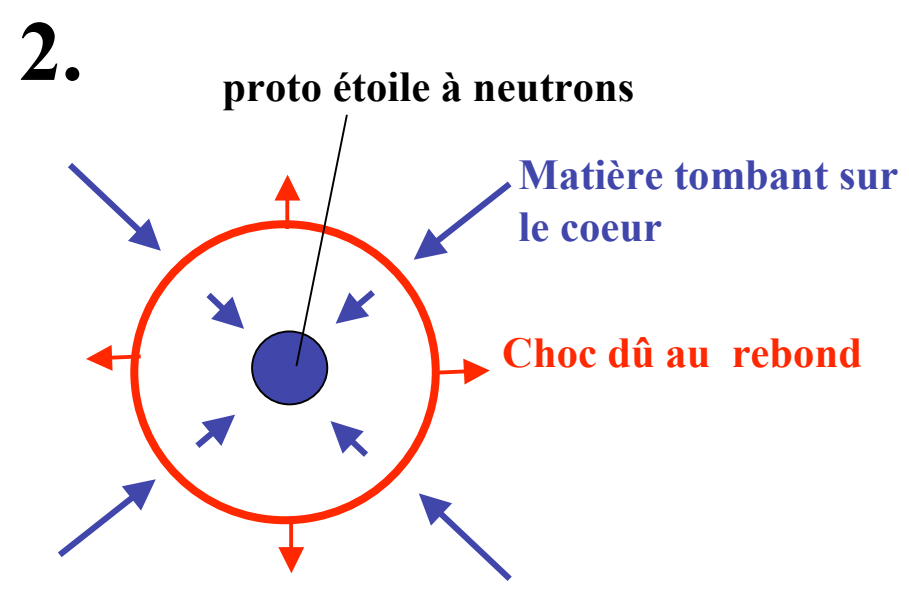
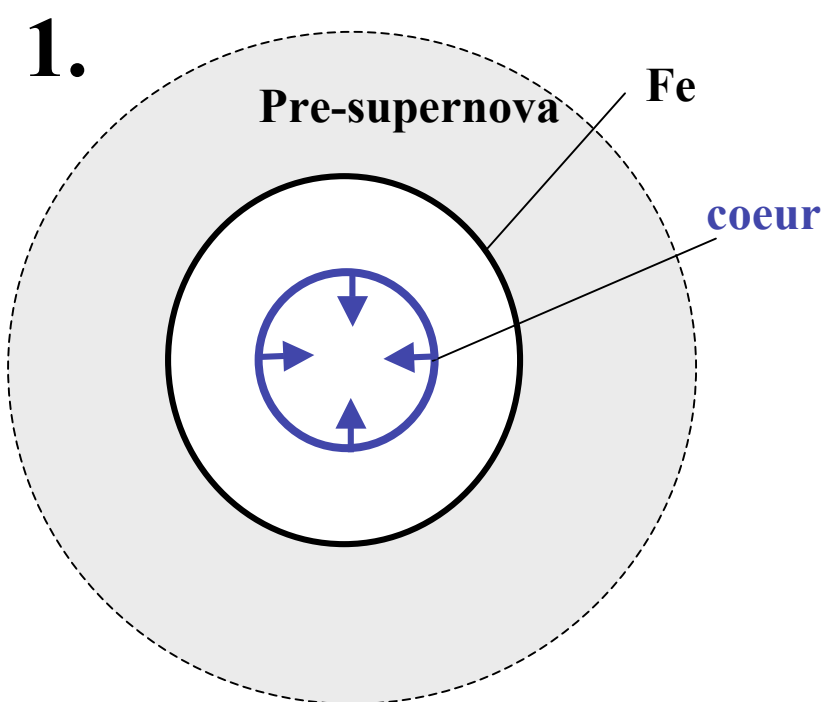
1.5 fois la masse
du Soleil

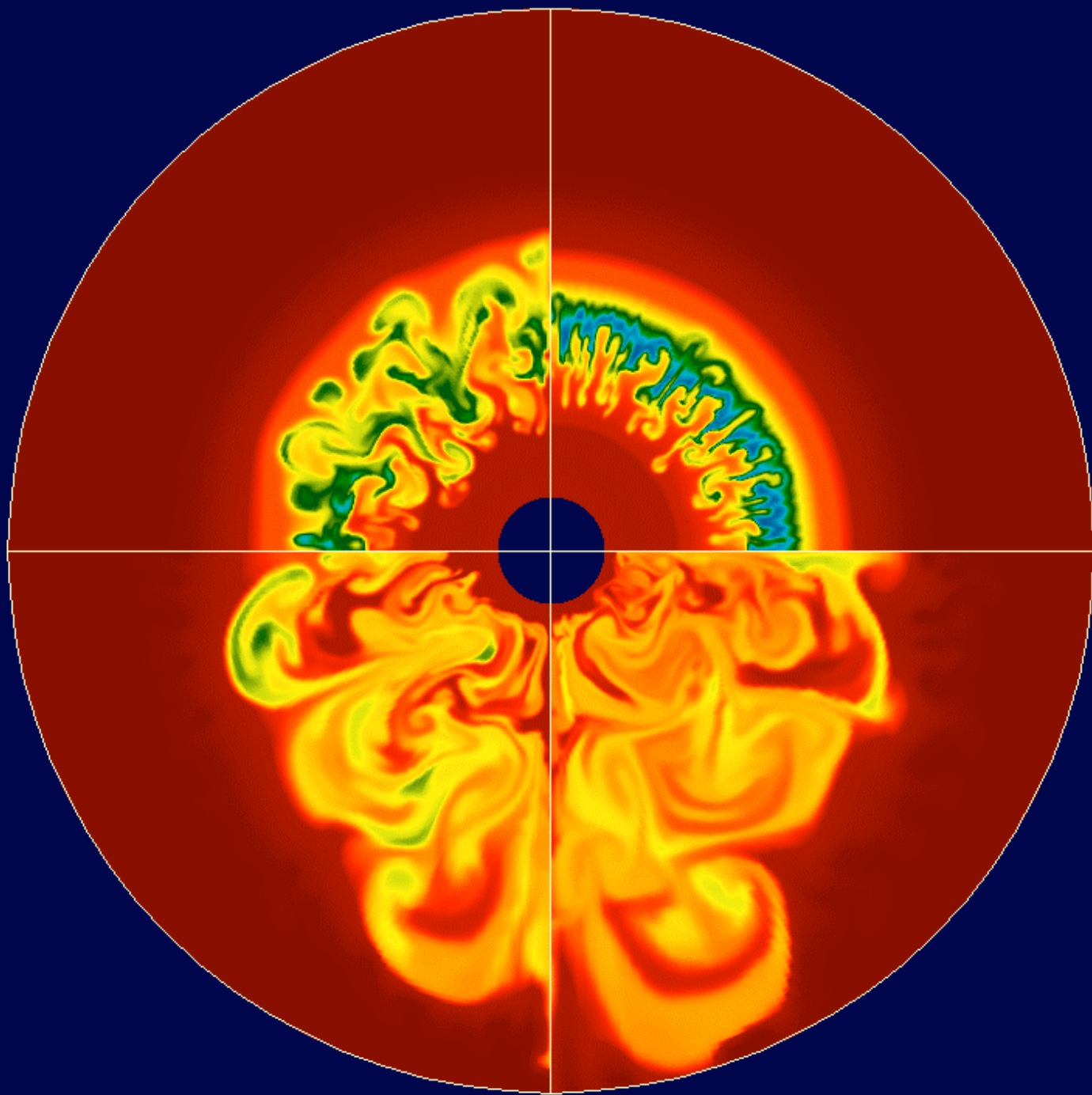




30 km

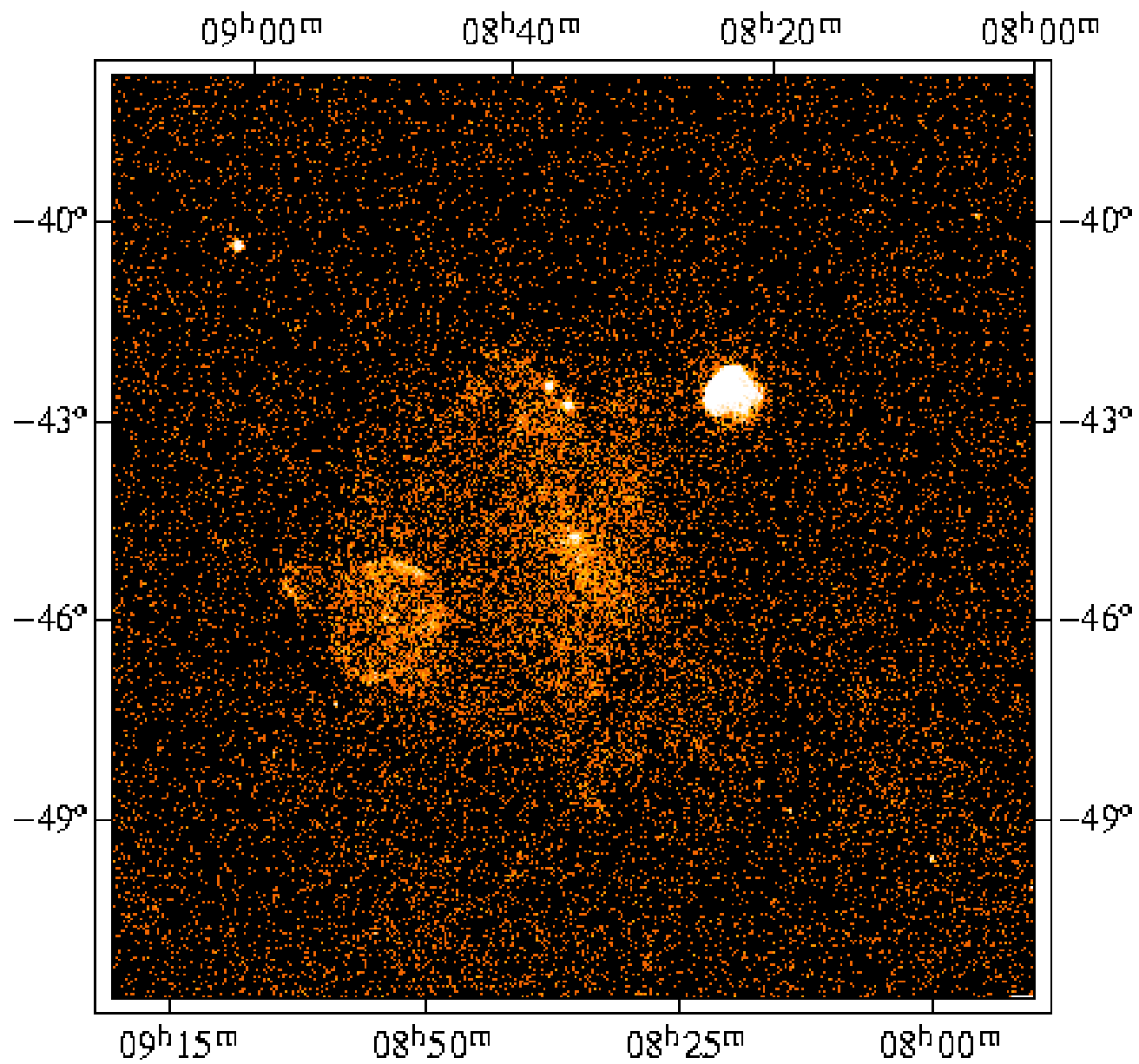






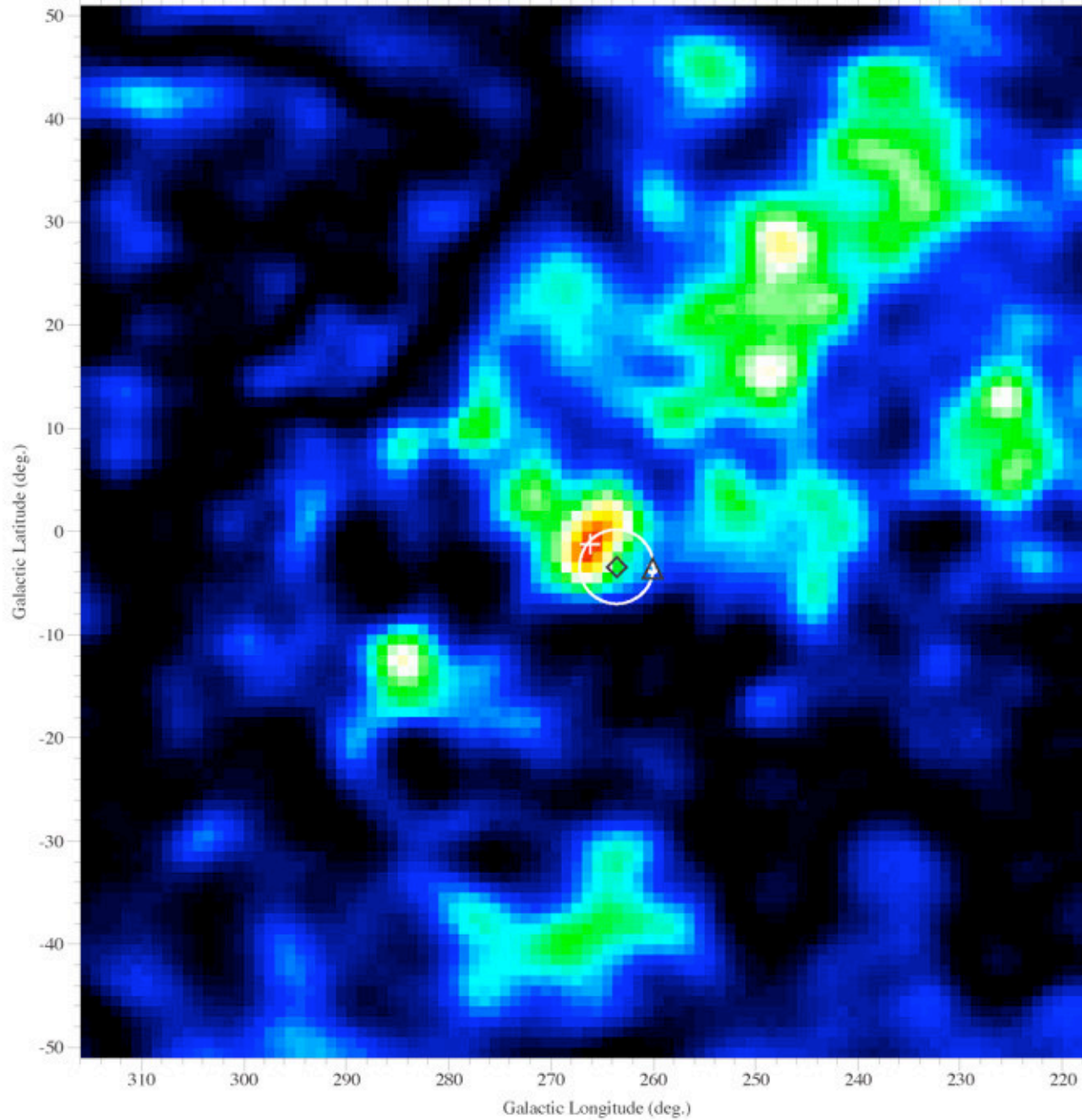


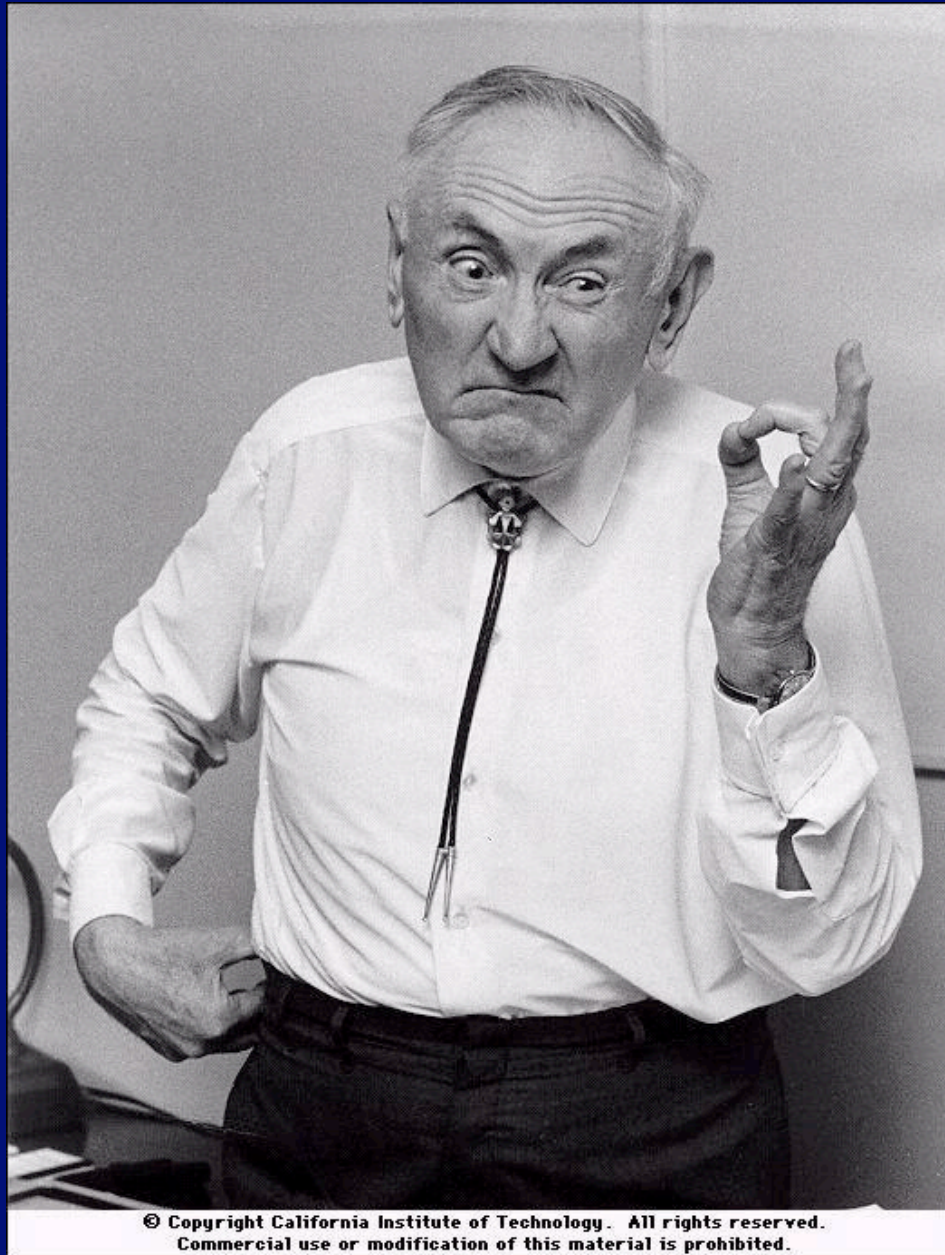
Declination (2000.0)



Right Ascension (2000.0)

Vela Region, $E=1.156$ MeV, VP 0.1-531





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- **Astronome suisse Fritz Zwicky**

ORIGINE DES ELEMENTS

Big Bang

Etoiles

PERIODIC CHART OF THE ELEMENTS

IA	IIA	IIIB	IVB	VB	VIB	VIIA	VIII	IB	IIB	IIIA	IVA	VA	VIA	VIIA	VIIIA	GASES	
1 H 1.00794														1 H 1.00794	2 He 4.00260		
3 Li 6.941	4 Be 9.0122									5 B 10.811	6 C 12.011	7 N 14.0064	8 O 15.9994	9 F 18.9984	10 Ne 20.183		
11 Na 22.9898	12 Mg 24.305									13 Al 26.9815	14 Si 28.0855	15 P 30.9738	16 S 32.06	17 Cl 35.453	18 Ar 39.948		
19 K 39.102	20 Ca 40.08	21 Sc 44.956	22 Ti 47.88	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.847	27 Co 58.933	28 Ni 58.71	29 Cu 63.54	30 Zn 65.37	31 Ga 69.72	32 Ge 72.59	33 As 74.9216	34 Se 78.96	35 Br 79.904	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.905	40 Zr 91.22	41 Nb 92.906	42 Mo 95.94	43 Tc 99	44 Ru 101.07	45 Rh 102.905	46 Pd 106.4	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.75	52 Te 127.6	53 I 126.904	54 Xe 131.29
55 Cs 132.905	56 Ba 137.34	57 La 138.91	72 Hf 178.49	73 Ta 180.948	74 W 183.85	75 Re 186.2	76 Os 190.2	77 Ir 192.22	78 Pt 195.08	79 Au 196.967	80 Hg 200.59	81 Tl 204.37	82 Pb 207.19	83 Bi 208.98	84 Po 209	85 At 210	86 Rn 222
87 Fr 223	88 Ra 226	89 Ac 227	104 Rf 261	105 Db 262	106 Sg 263	107 Bh 264	108 Hs 265	109 Mt 266	110 ? 267	111 ? 268	112 ? 269						

Numbers in parentheses are atomic numbers of most stable or most common isotopes.

Atomic weights are corrected to conform to the 1963 values of the Commission on Atomic Weights.

The group designations are set here as the former Chemical Abstract Service numbers.

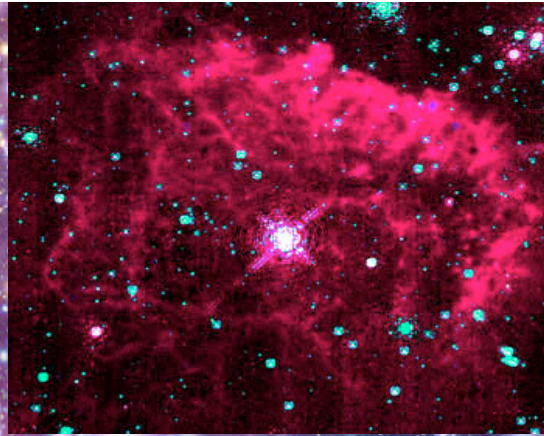
Lanthanide Series

58 Ce 140.12	59 Pr 140.907	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.928	66 Dy 162.50	67 Ho 164.930	68 Er 167.26	69 Tm 168.934	70 Yb 173.05	71 Lu 174.967
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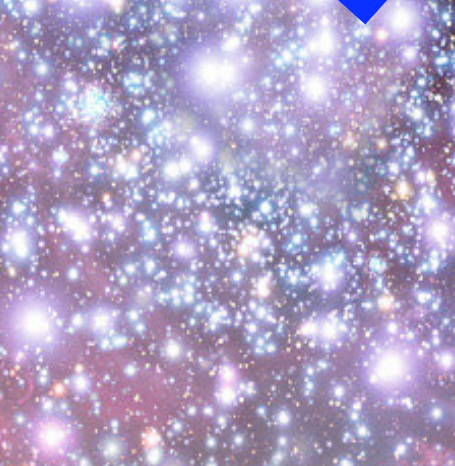
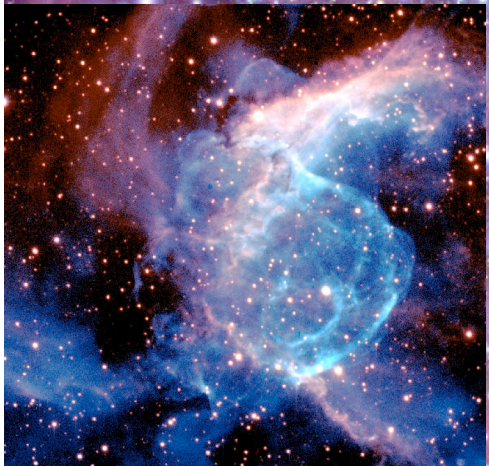
Actinide Series

88 Th 232.038	89 Pa (231)	90 U 238.03	91 Np (237)	92 Pu (244)	93 Am (243)	94 Cm (247)	95 Bk (247)	96 Cf (251)	97 Es (252)	98 Fm (257)	99 Md (258)	100 No (259)	101 Lr (260)
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Supernovae



Corps humain



H	0.61
O	0.26
C	0.11
N	0.02

L'évolution du monde peut être comparée à un feu d'artifice qui vient de se terminer: quelques mèches rouges, des cendres et de la fumée. Debout sur une escarbille mieux refroidie, nous voyons s'éteindre doucement les soleils et cherchons à reconstituer l'éclat disparu de la formation des mondes.

Georges Lemaître (1931)



A composite image showing the Earth and the Moon in space. The Earth is on the left, showing its blue oceans and white clouds. The Moon is on the right, showing its dark, cratered surface. The background is a dark field of stars.

SN1987A

→ Pendant quelques secondes, un flux de 50 milliards de neutrinos par cm^2 a traversé la Terre

Une vingtaine ont été captés sur Terre