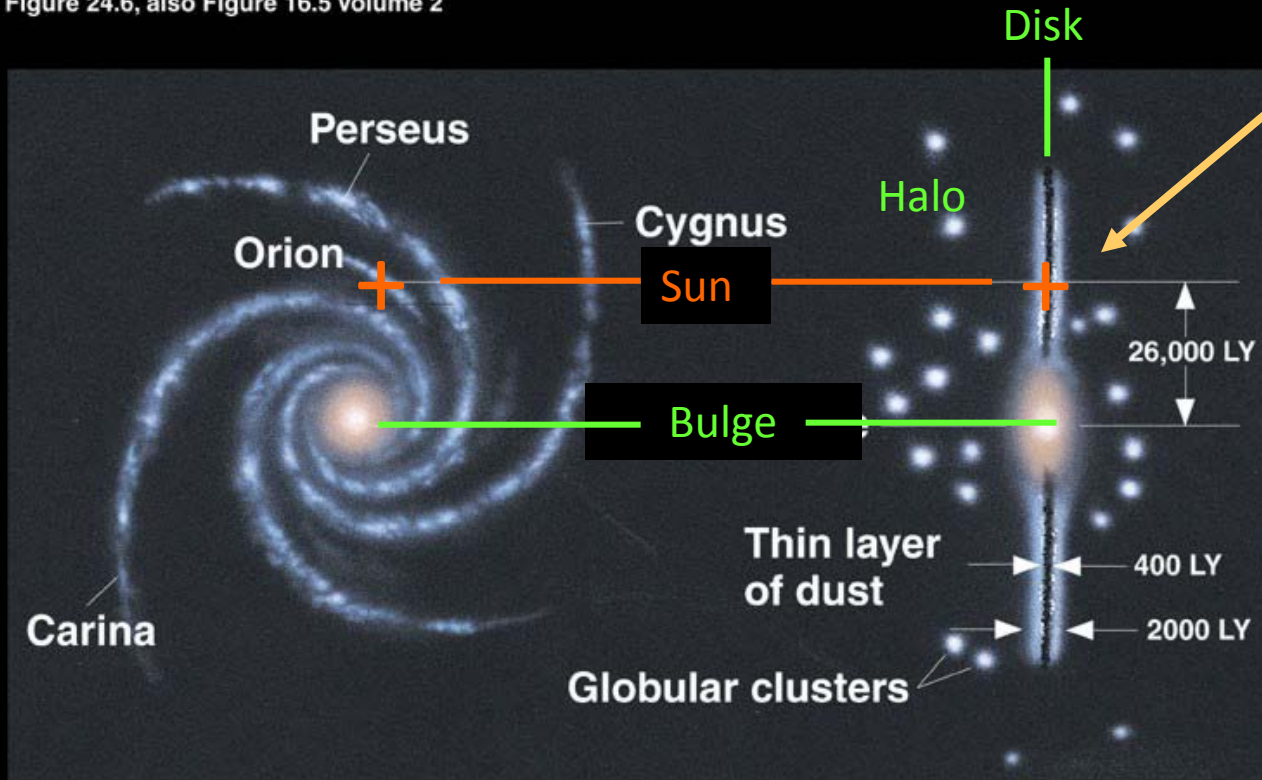


The solar abundance distribution

Fraknoi, Voyages Through the Universe, 2/e
Figure 24.6, also Figure 16.5 Volume 2



solar abundances:

Elemental
(and isotopic)
composition
of Galaxy at
location of solar
system at the time
of it's formation

Results for solar abundance distribution

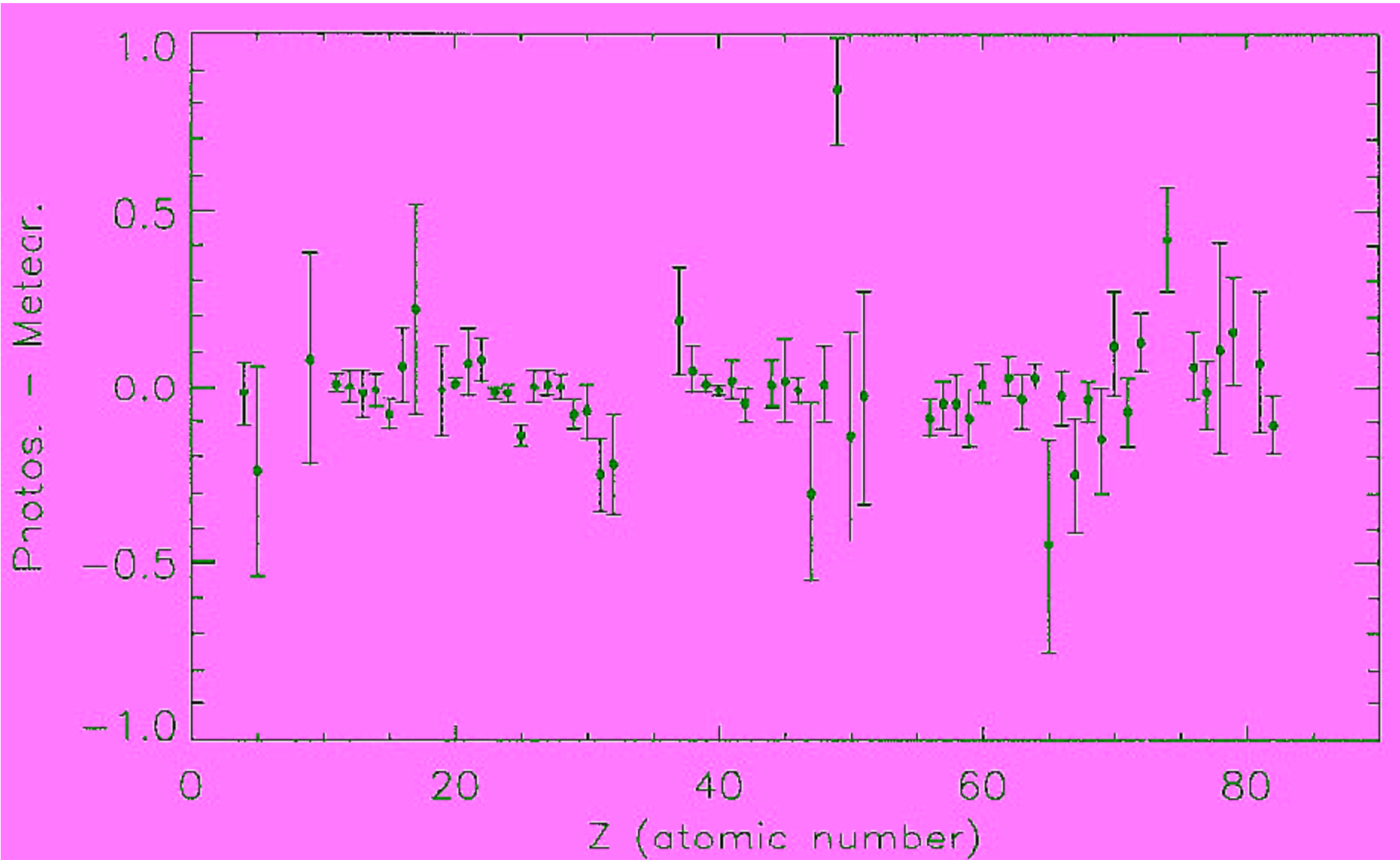
Part of Tab. 1, Grevesse & Sauval, Space Sci. Rev. 85 (1998) 161

Element Abundances in the Solar photosphere and in Meteorites

El.	Photosphere*	Meteorites	Ph-Met	El.	Photosphere*	Meteorites	Ph-Met
01 H	12.00	—	—	42 Mo	1.92 ±0.05	1.97 ±0.02	-0.05
02 He	[10.93 ±0.004]	—	—	44 Ru	1.84 ±0.07	1.83 ±0.04	+0.01
03 Li	1.10 ±0.10	3.31 ±0.04	-2.21	45 Rh	1.12 ±0.12	1.10 ±0.04	+0.02
04 Be	1.40 ±0.09	1.42 ±0.04	0.02	46 Pd	1.69 ±0.04	1.70 ±0.04	-0.01
05 B	(2.55 ±0.30)	2.79 ±0.05	(-0.24)	47 Ag	(0.94 ±0.25)	1.24 ±0.04	(-0.30)
06 C	8.52 ±0.06	—	—	48 Cd	1.77 ±0.11	1.76 ±0.04	+0.01
07 N	7.92 ±0.06	—	—	49 In	(1.66 ±0.15)	0.82 ±0.04	(+0.84)
08 O	8.83 ±0.06	—	—	50 Sn	2.0 ±(0.3)	2.14 ±0.04	-0.14
09 F	[4.56 ±0.3]	4.48 ±0.06	+0.08	51 Sb	1.0 ±(0.3)	1.03 ±0.07	-0.03
10 Ne	[8.08 ±0.06]	—	—	52 Te	—	2.24 ±0.04	—
11 Na	6.33 ±0.03	6.32 ±0.02	+0.01	53 I	—	1.51 ±0.08	—
12 Mg	7.58 ±0.05	7.58 ±0.01	0.00	54 Xe	—	2.17 ±0.08	—
13 Al	6.47 ±0.07	6.49 ±0.01	-0.02	55 Cs	—	1.13 ±0.02	—
14 Si	7.55 ±0.05	7.56 ±0.01	-0.01	56 Ba	2.13 ±0.05	2.22 ±0.02	-0.09
15 P	5.45 ±(0.04)	5.56 ±0.06	-0.11	57 La	1.17 ±0.07	1.22 ±0.02	-0.05
16 S	7.33 ±0.11	7.20 ±0.06	+0.13	58 Ce	1.58 ±0.09	1.63 ±0.02	-0.05
17 Cl	[5.5 ±0.3]	5.28 ±0.06	0.22	59 Pr	0.71 ±0.08	0.80 ±0.02	-0.09

units: given is $A = \log(n/n_H) + 12$ (log of number of atoms per 10^{12} H atoms)
 (often also used: number of atoms per 10^6 Si atoms)

log of photosphere abundance/ meteoritic abundance



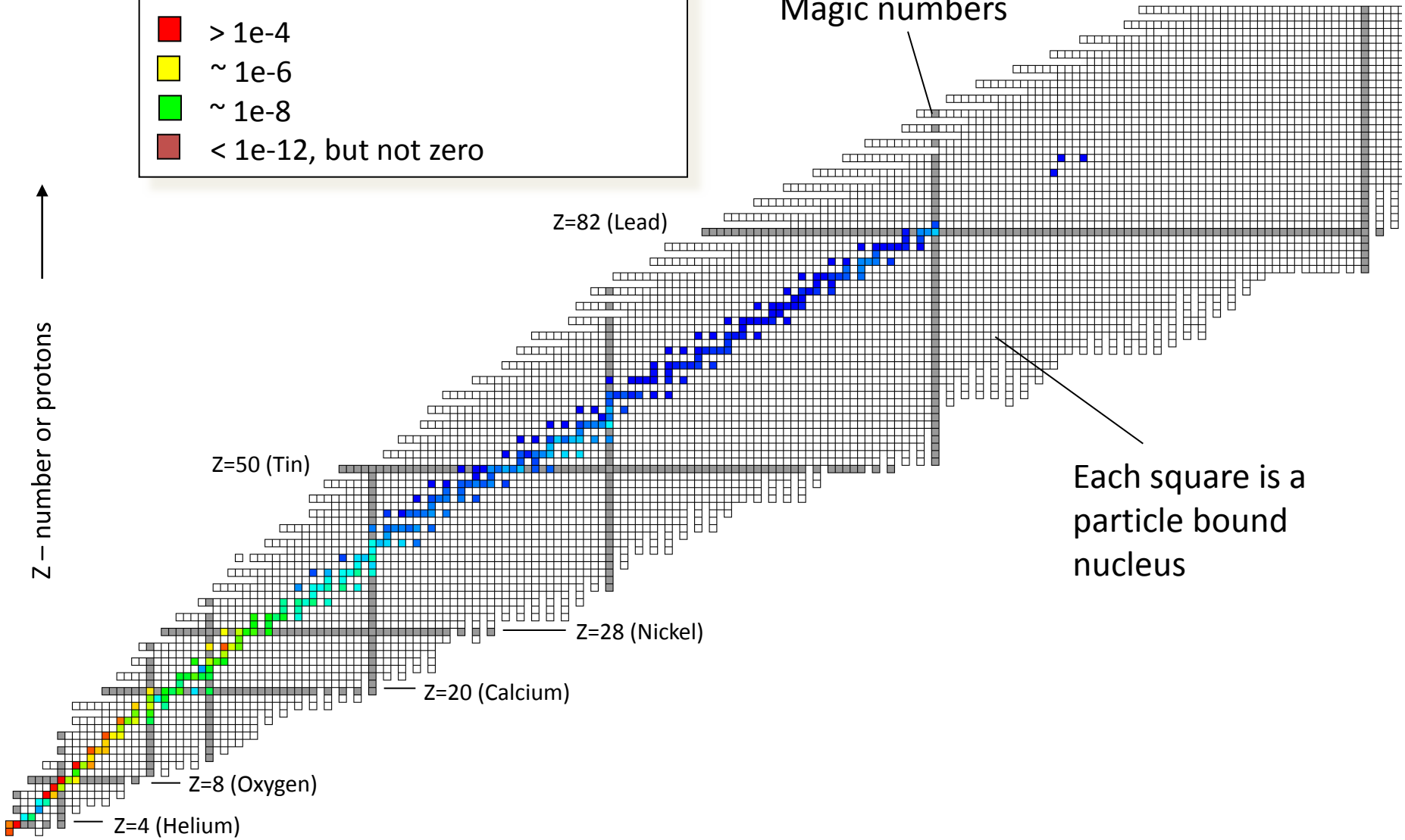
generally good agreement

Abundances of nuclei on the chart of nuclides:

Color scheme is abundance on log scale:

- $> 1e-4$
- $\sim 1e-6$
- $\sim 1e-8$
- $< 1e-12$, but not zero

Z – number of protons



Magic numbers

Z=82 (Lead)

Z=50 (Tin)

Z=28 (Nickel)

Z=20 (Calcium)

Z=8 (Oxygen)

Z=4 (Helium)

Each square is a particle bound nucleus

N-number of neutrons

Hydrogen mass fraction	$X = 0.711$
Helium mass fraction	$Y = 0.274$
Metallicity (mass fraction of everything else)	$Z = 0.015$
Heavy Elements (beyond Nickel) mass fraction	$4E-6$

