Stars with STIS/COS:

from

chemical evolution

to

cosmic-ray spallation and stellar mixing

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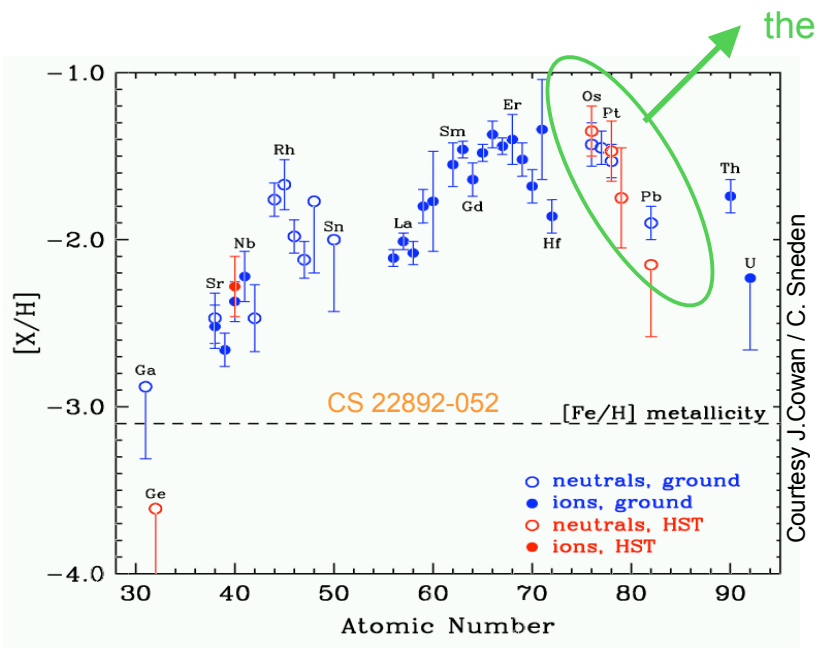
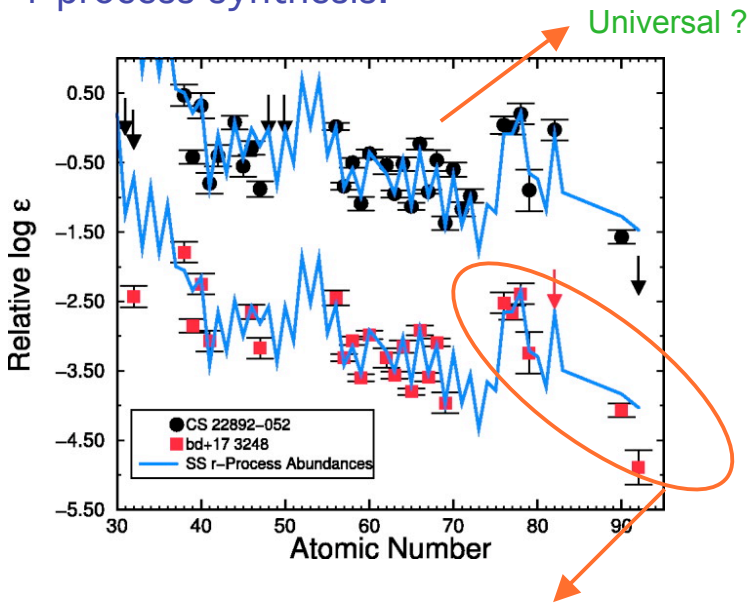
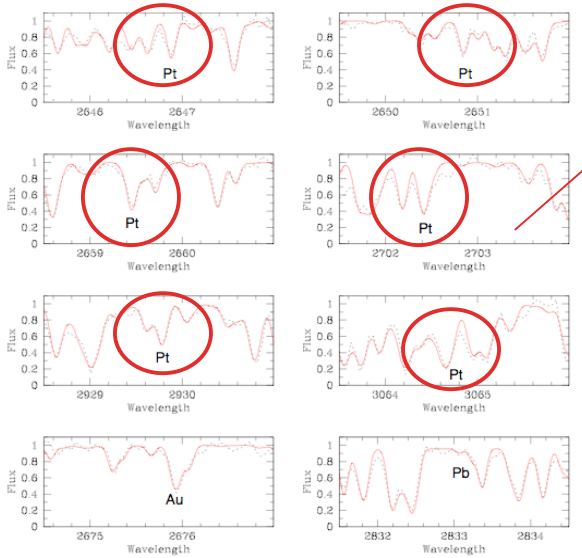
Why STIS/COS ?

Some neutron-capture elements, especially the heaviest stable ones of the "3rd n-capture peak", present strong transitions only in the UV.



Some very metal-poor stars are relatively rich in neutron-capture elements, and their abundance pattern indicates dominance of r-process synthesis.



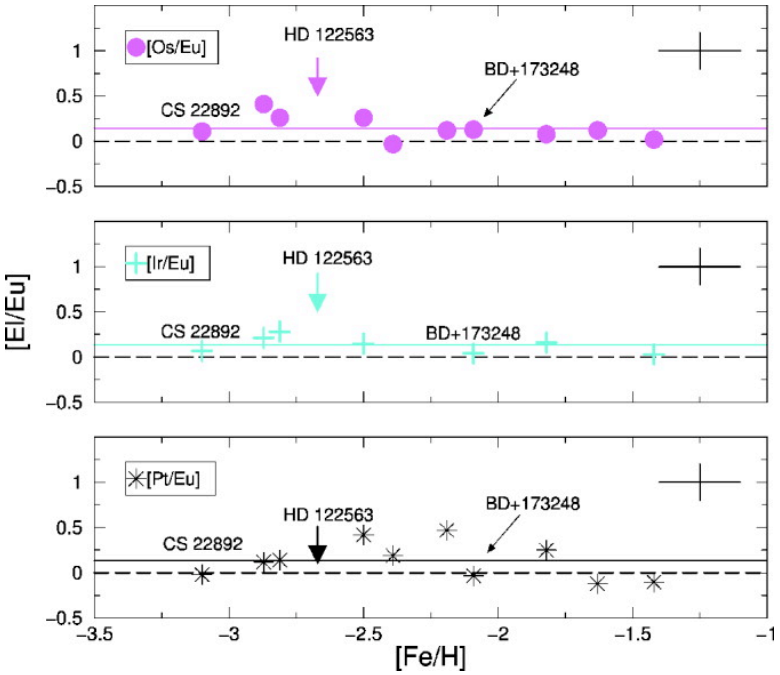


5 lines in the UV!

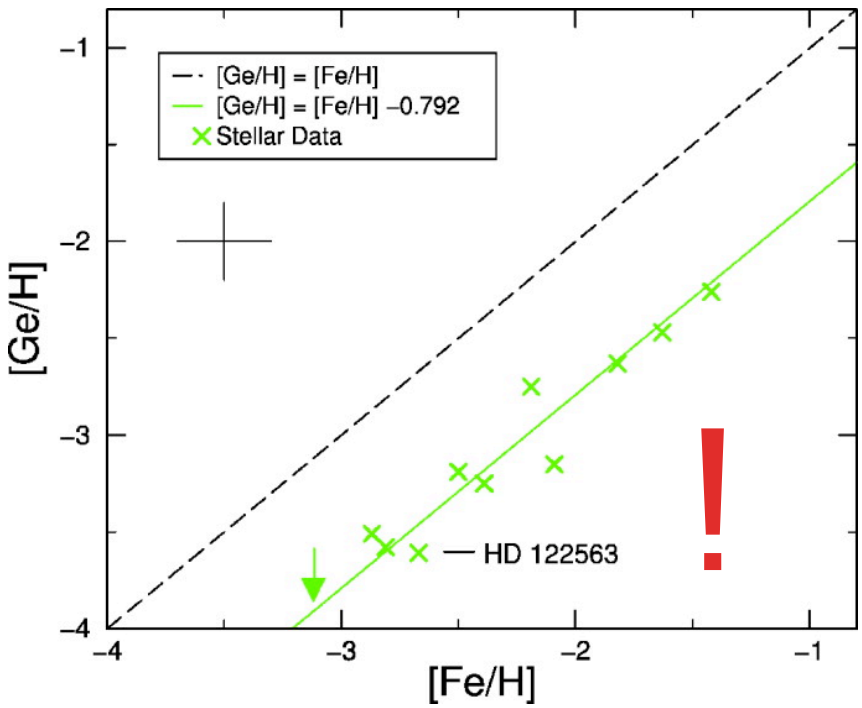
Nucleo-chronometry: U/Th, U/r, Th/r

$\Delta t = k\ (\log(X/Y)o - \log(X/Y)obs)$

Recent (old STIS) studies



Cowan et al 2005



Eu, Os, Ir, Pt: clear positive correlations → common nucleosynthesis origin

Ge: factors 4-5 lower! Either the r-process does not have anything to do with the creation of Ge, or these massive neutron blasts pushed all nuclei far beyond the Ge mass range.

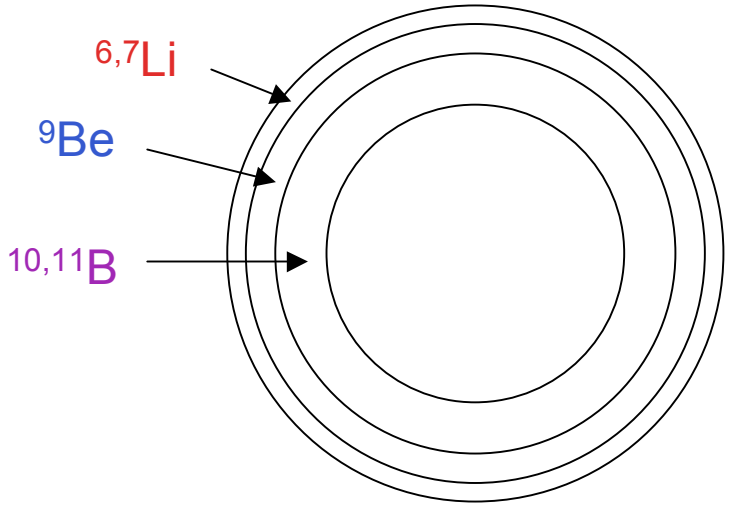
Lighter neutron-capture elements have different nucleosynthetic origins than the elements with Z > 55

The Light Elements

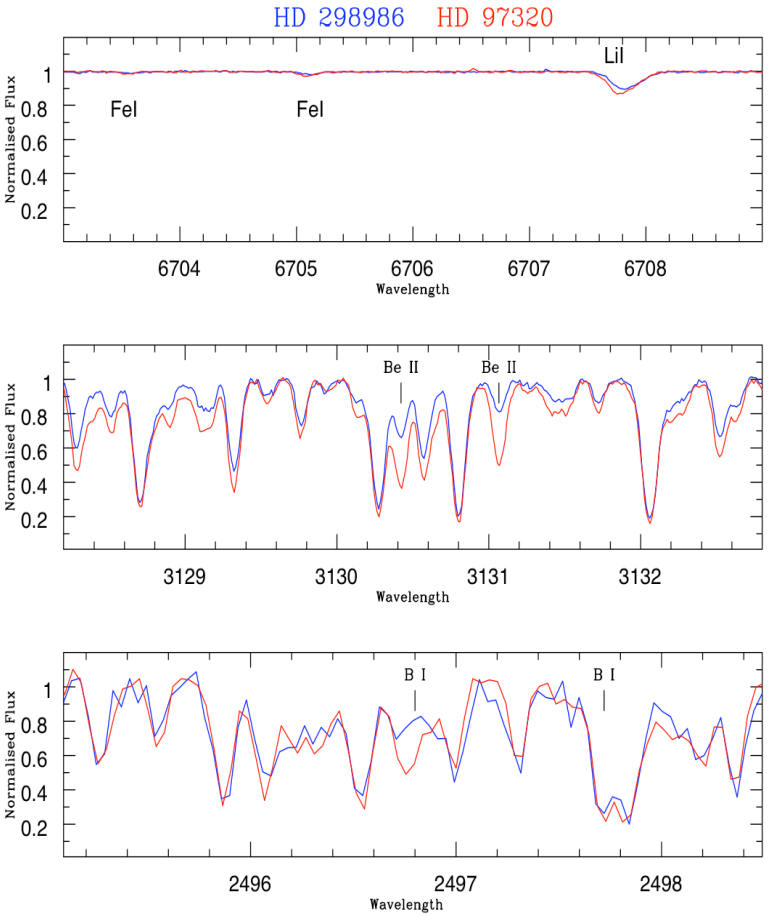
Lithium Beryllium Boron

670nm 313nm 250nm

- ☆ Cosmology BBN vs IBBN
  - The Big Bang gave us H, He, and a fraction of lithium!
- ☆ Cosmic-ray physics
  - classical, inverse, or neutrino spallation ?
- ☆ Stellar structure/interiors
  - Li T=2.5x10^{6}K
  - Be T=3.0x10^{6}K
  - B T=5.0x10^{6}K

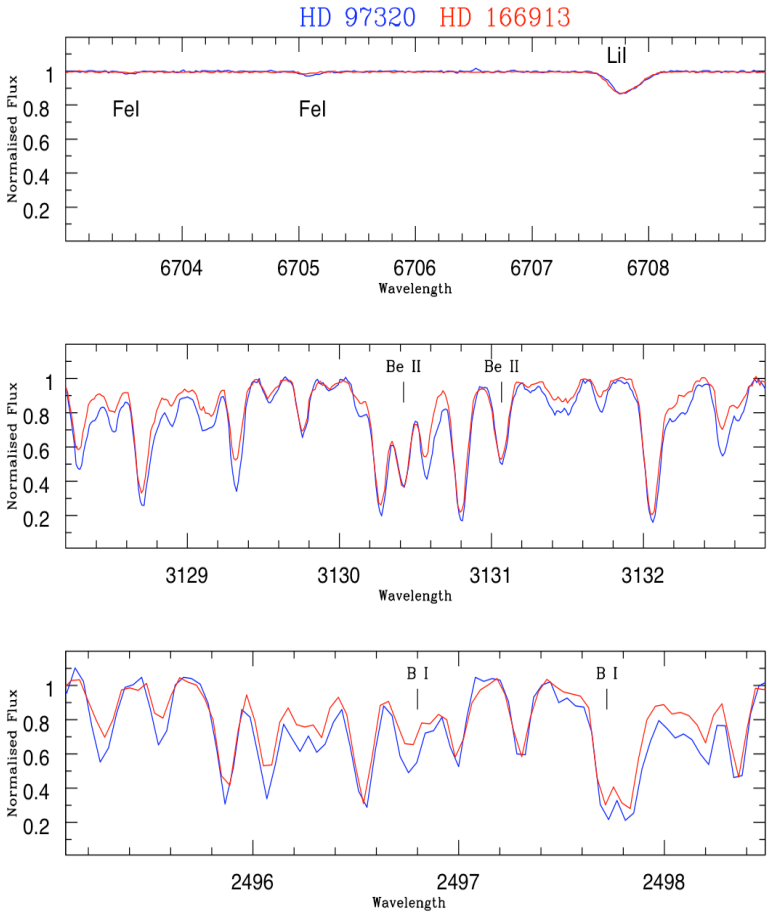


Stellar Mixing



same Li, but different Be and B:

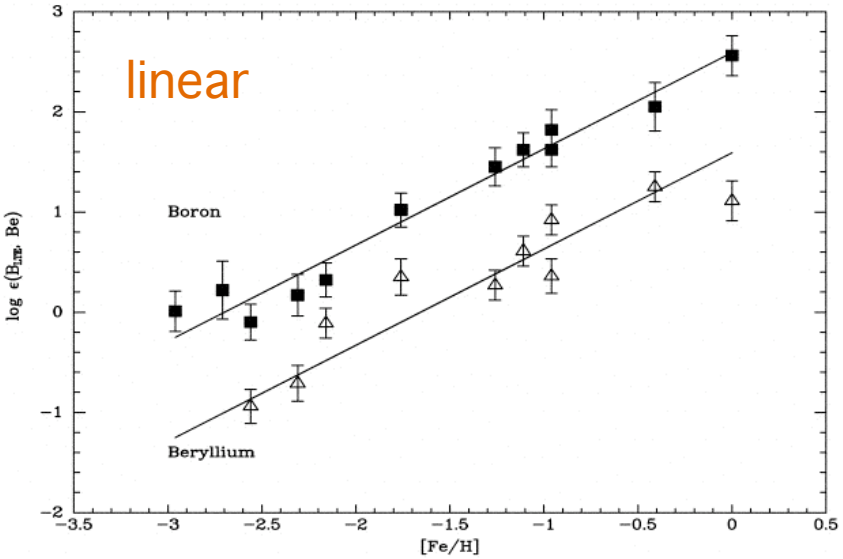
production or destruction ?



same Li and Be, but different B:

production ?

Cosmic-ray physics

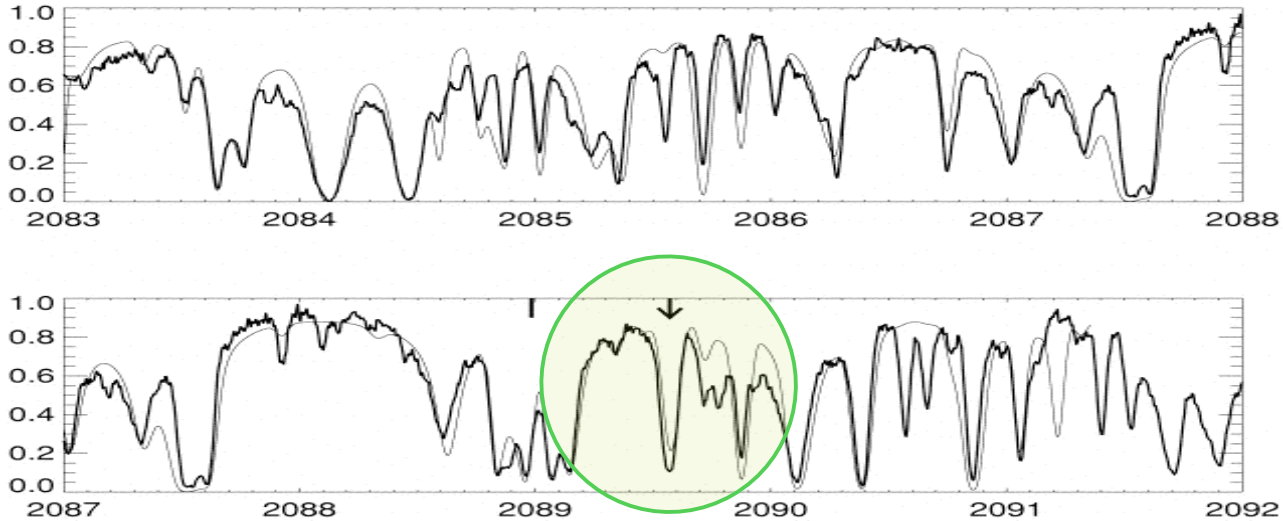


~~BBN~~: A=5 and A=8 divides

~~Stars~~: too low T_b

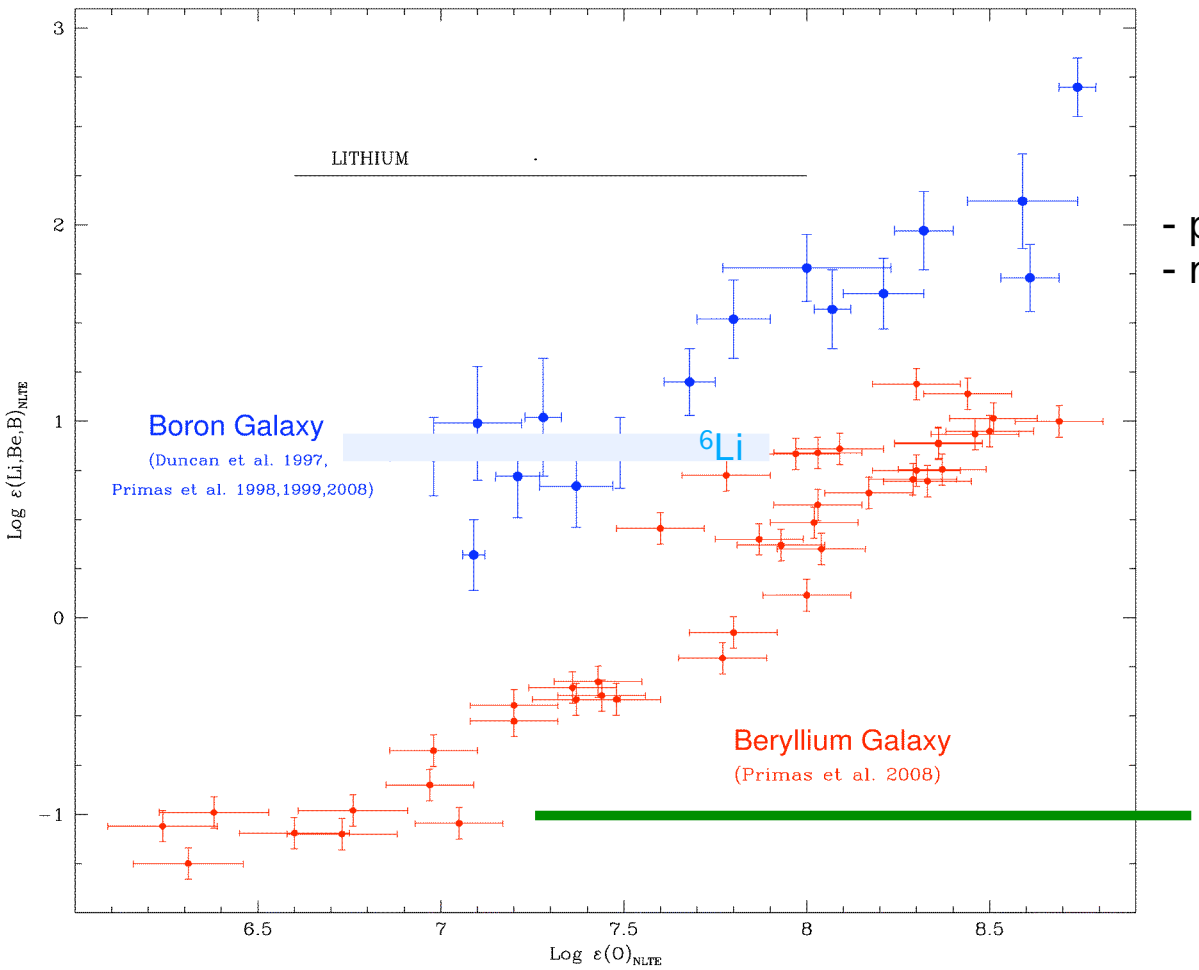
x-process: spallation GCR-ISM

$^{11}B/^{10}B=2.5$ (4!) ----> LECR



R~90,000 @ 208.9 nm !

BBN vs IBBN ...



… or CBBN ?

- primordial production of A>7
- metastable charged X^- particles