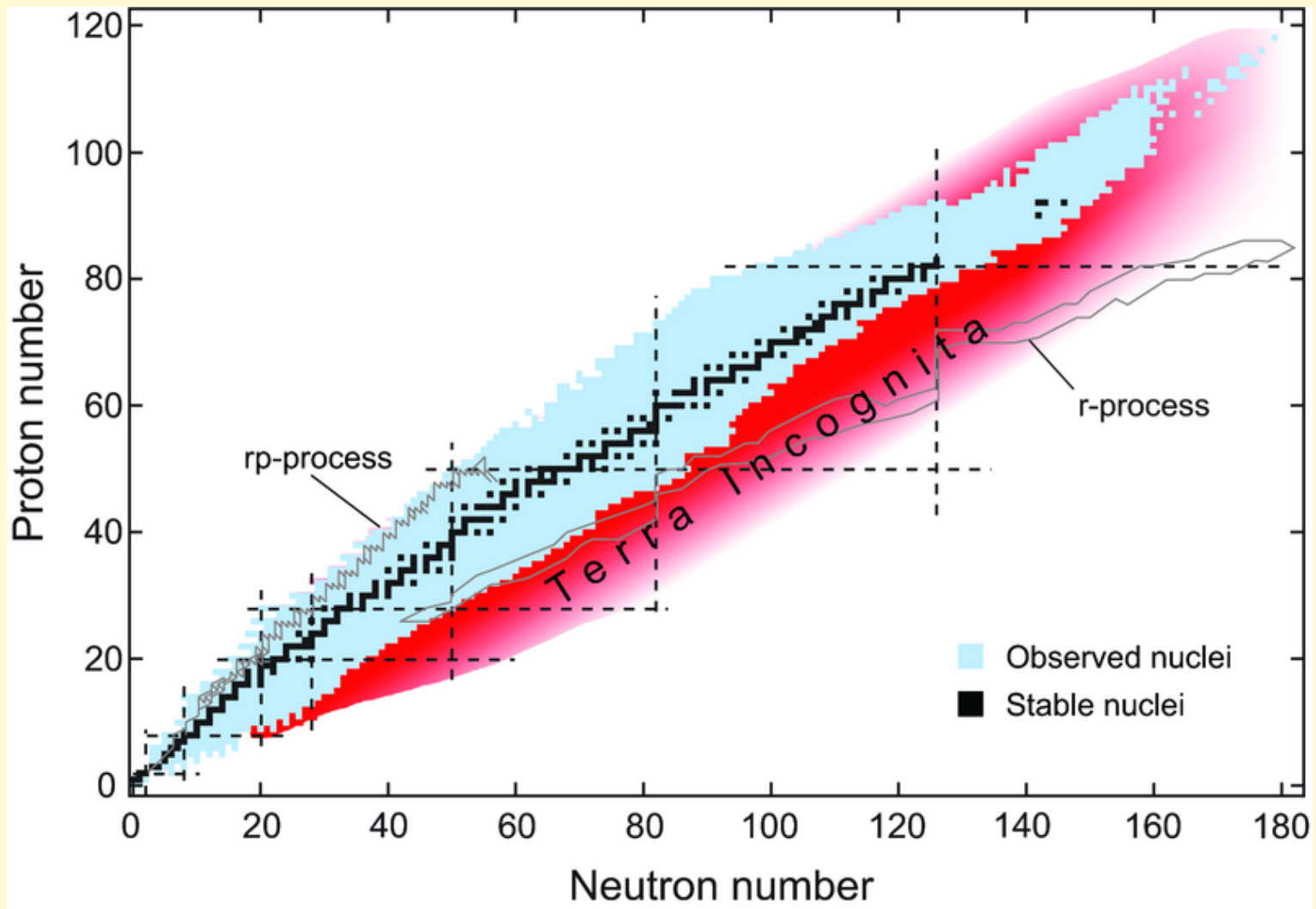
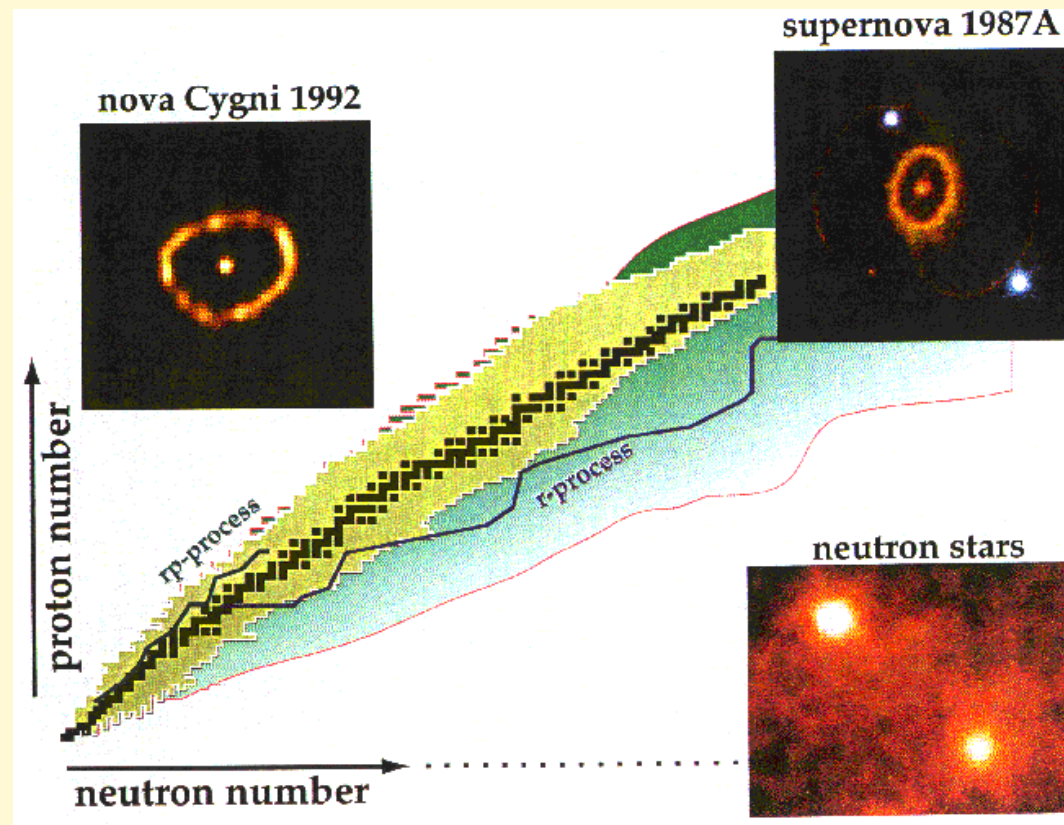


Nuclear chart: “terra incognita” of neutron-rich isotopes

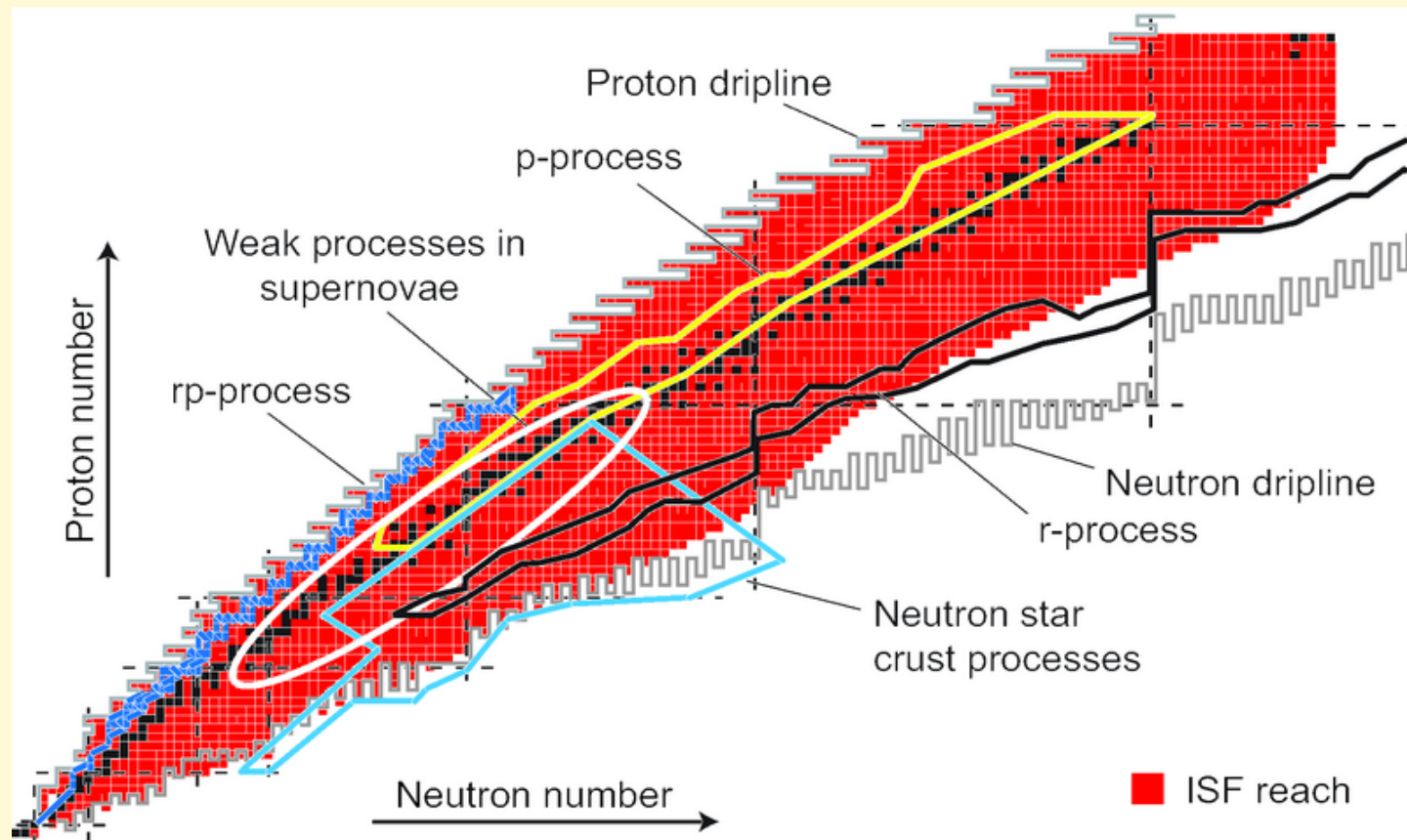


Nuclear astrophysics connection

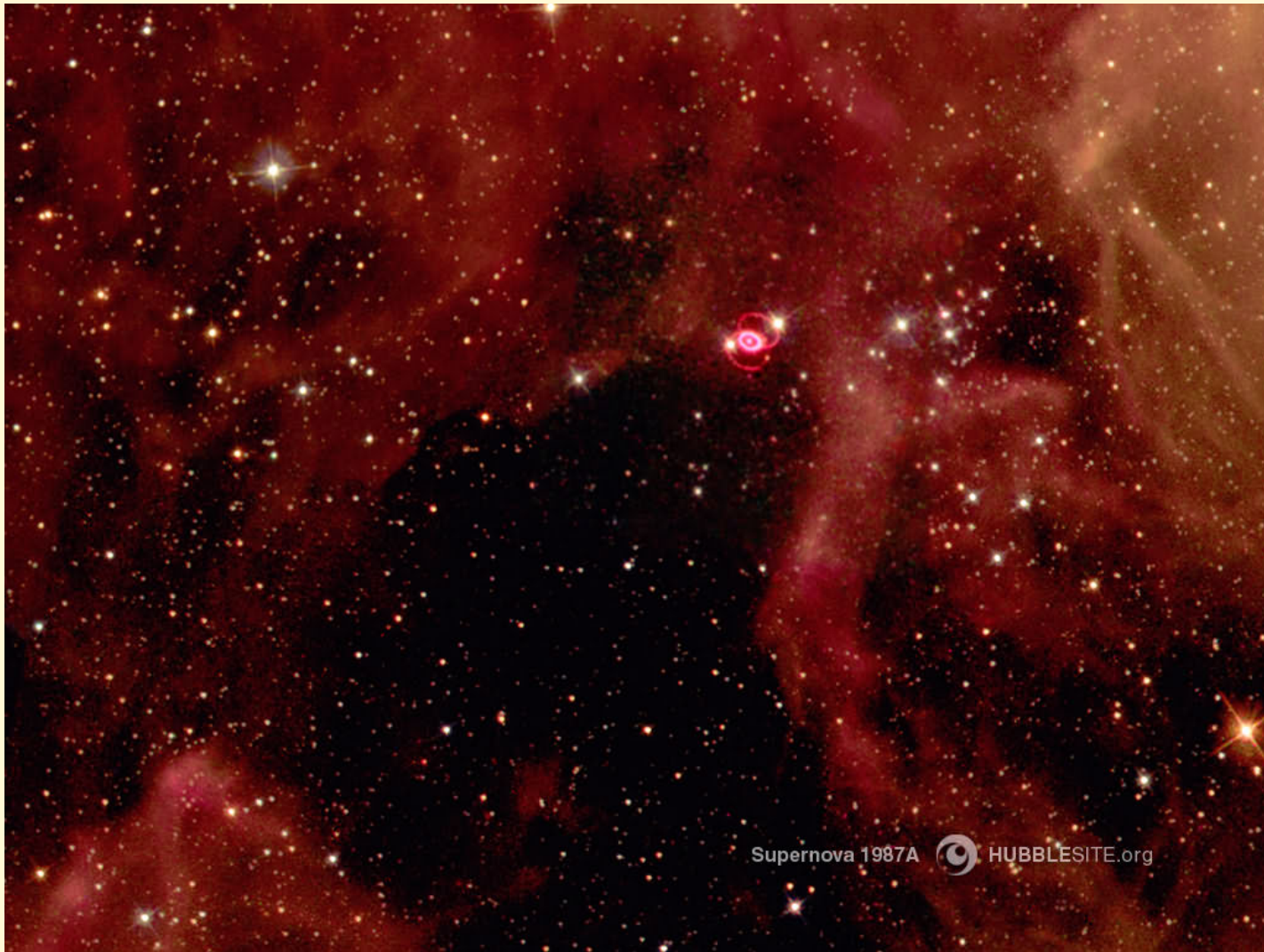
Rapid neutron capture process (= r-process) following supernova explosion goes through “terra incognita” of very neutron-rich nuclei



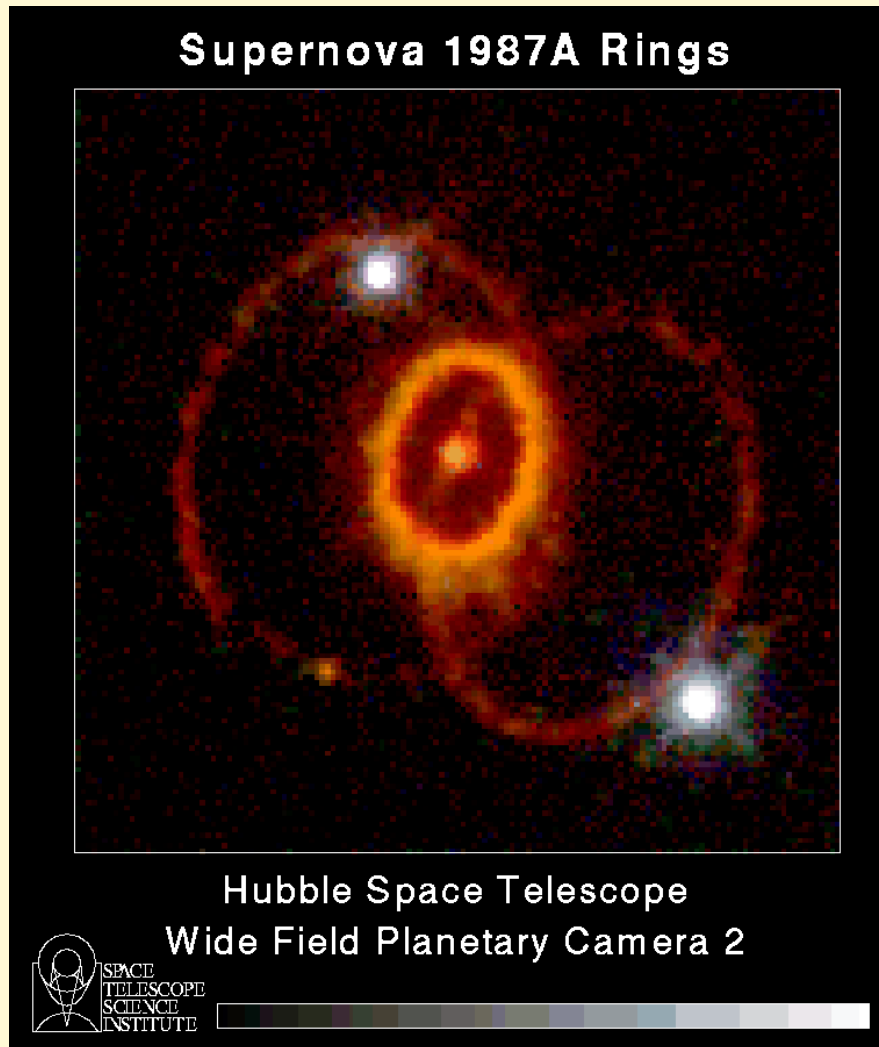
Paths of nuclear astrophysics processes



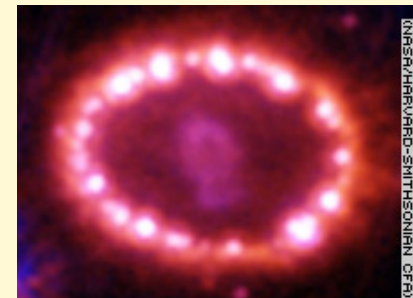
Supernova 1987a in Large Magellanic Cloud
distance = 169,000 light years, mass = 20 x Sun



Supernova 1987a: mysterious structure of 3 rings



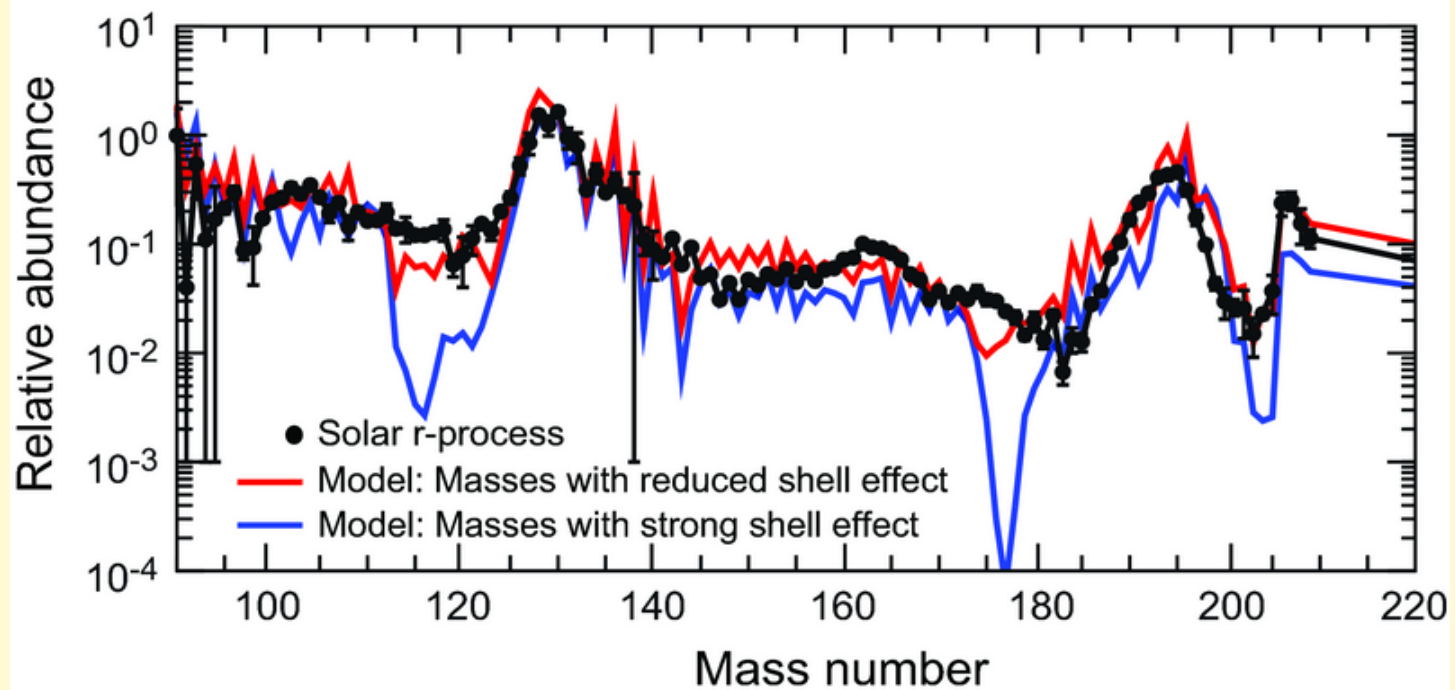
← 1994 picture



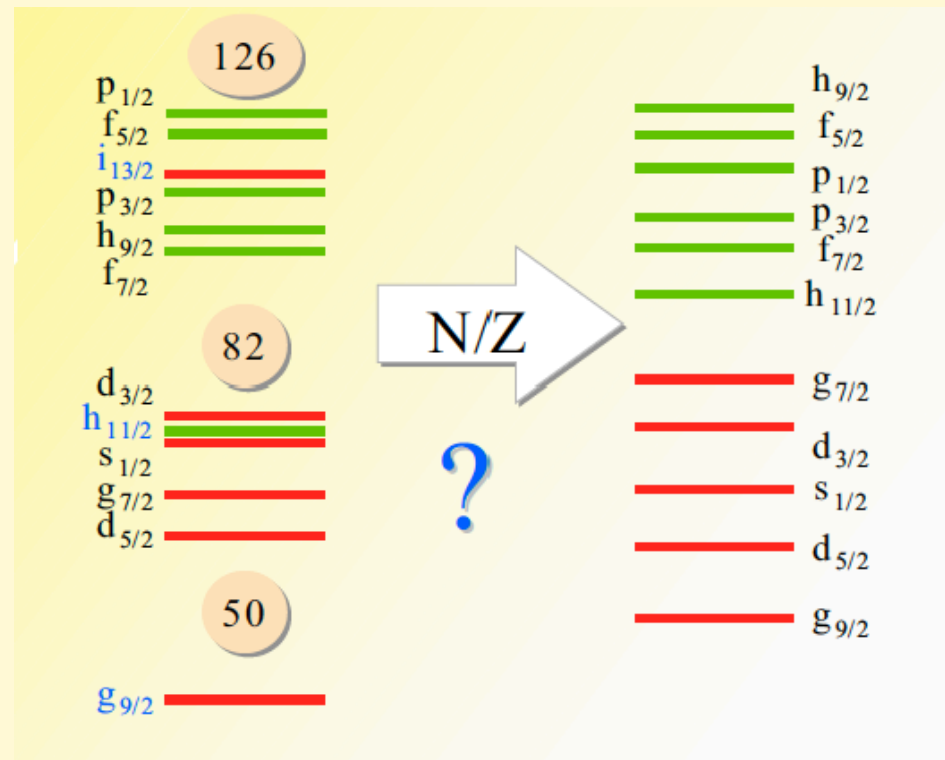
2003 picture:
central star has
faded while
bright spots in
the outer ring
are enhanced

Solar r-process: cosmic element abundance

Ref: RIA 2000 Whitepaper



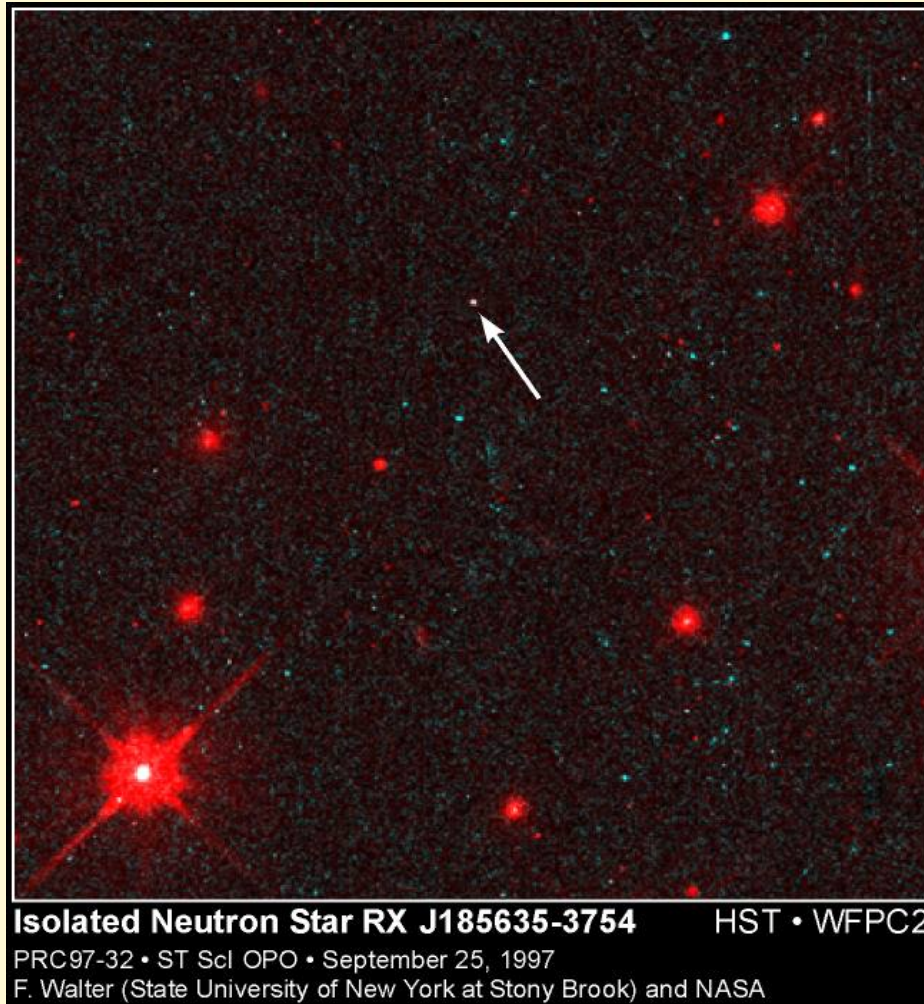
Solar r-process abundance: evidence of quenching of nuclear shell structure in neutron-rich nuclei



near stability line:
pronounced shell gaps

n-rich nuclei : shell gaps
suppressed due to
reduced LS coupling

Neutron star (1997, Hubble Space Telescope)



Evidence for neutron star:

star is very hot (1.2 million degrees Fahrenheit at the surface)

diameter = 28 km

very dim (below 25th magnitude)