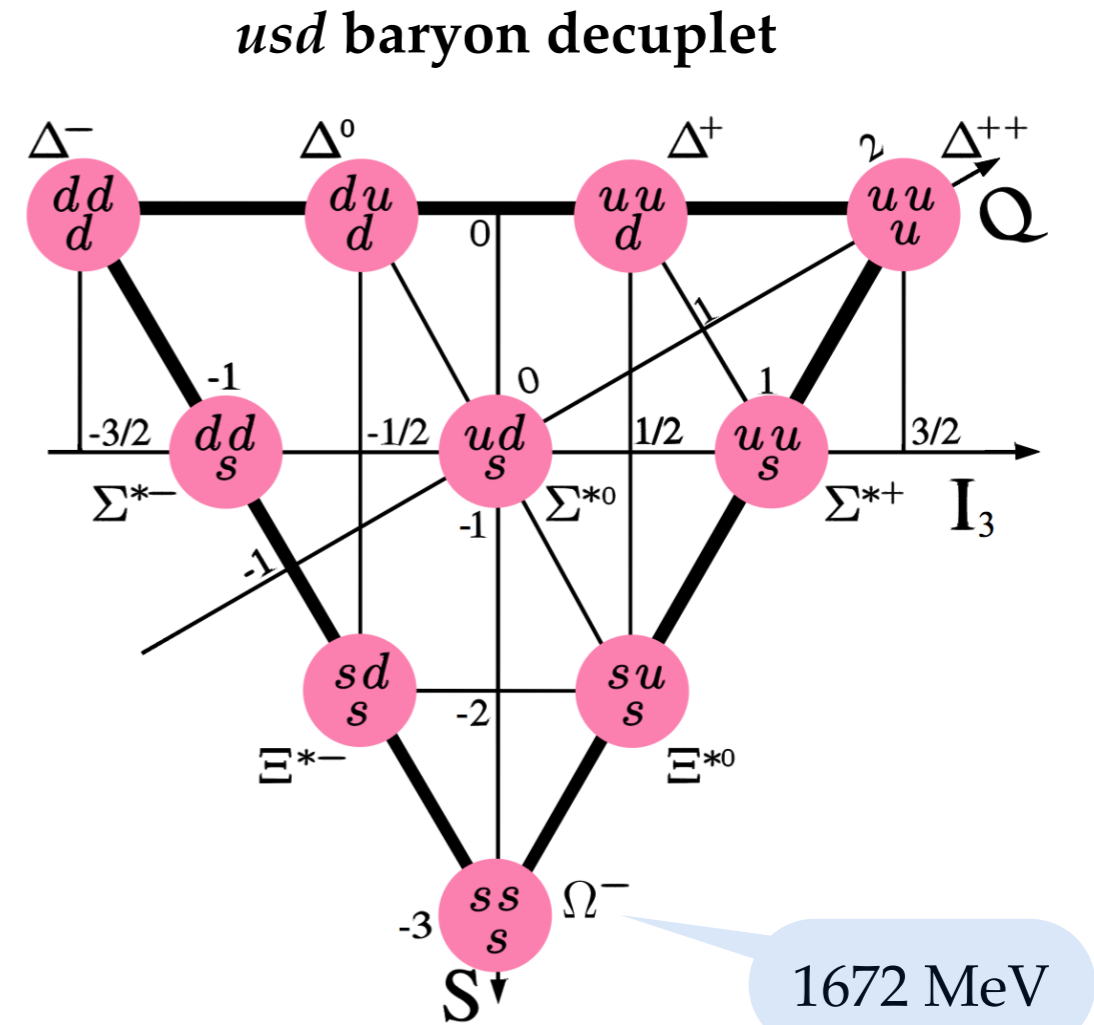
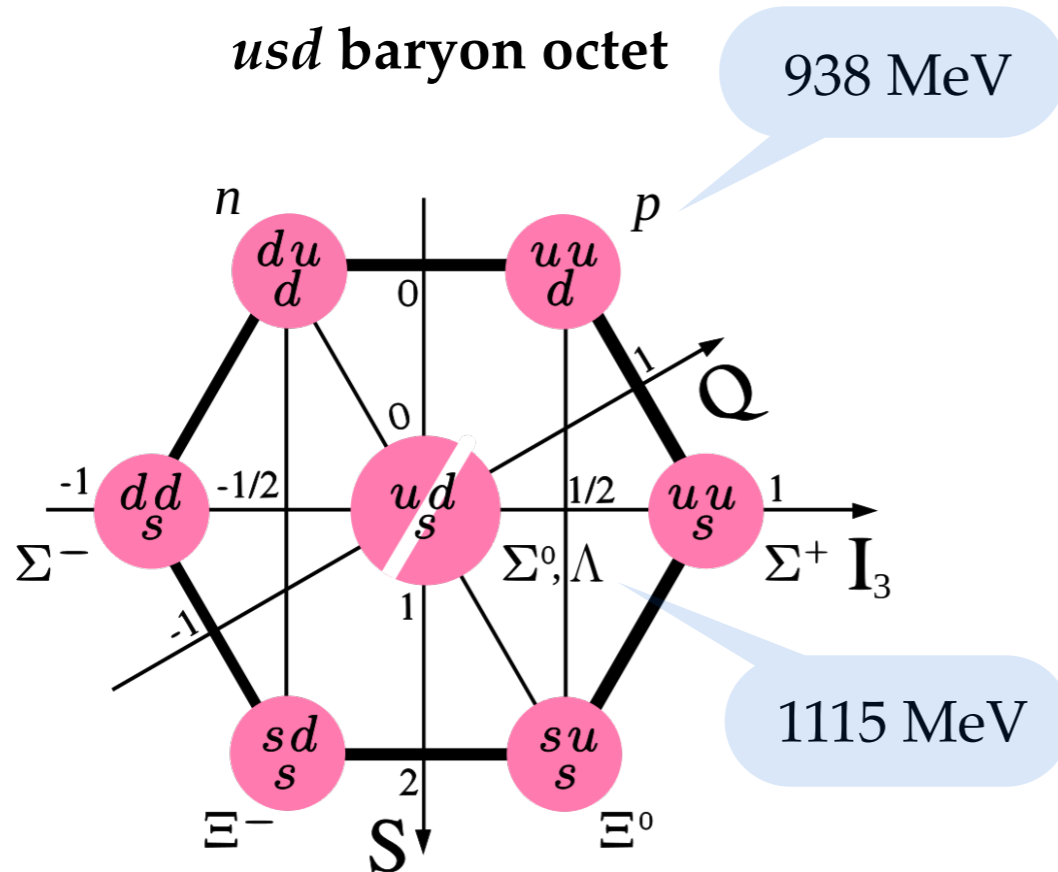


Hyperons

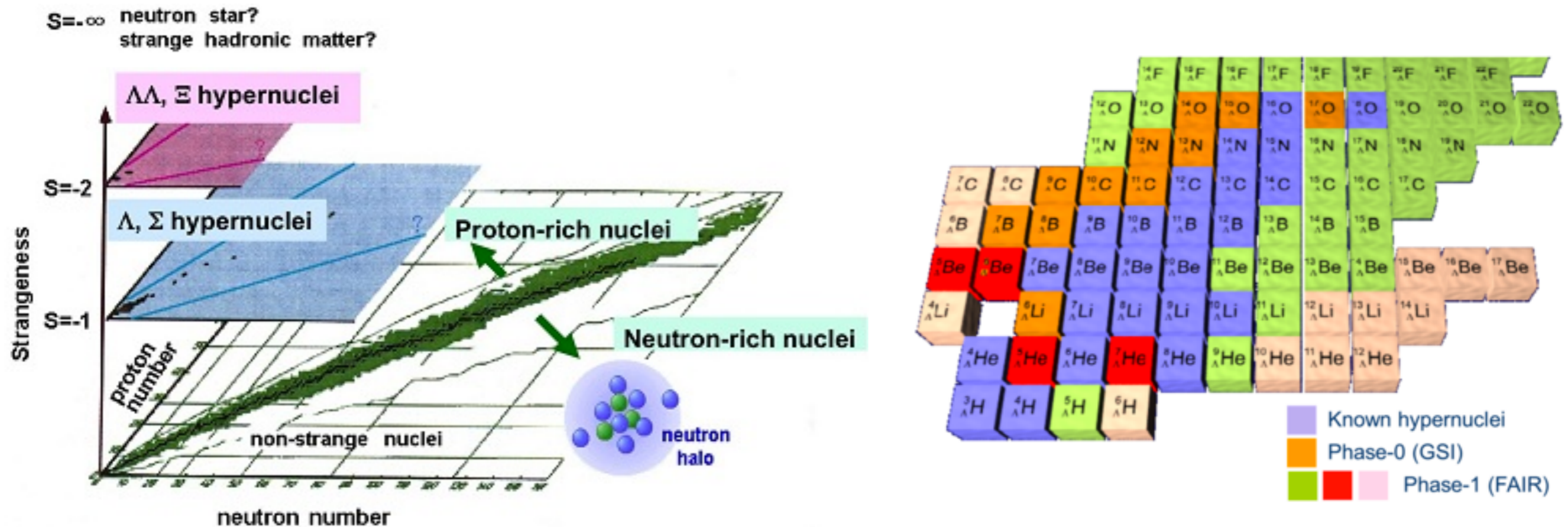
- **Hyperon:** a baryon containing one, two or three s quarks in addition to u and d quarks



- New quantum number: strangeness
- Hyperons decay weakly (strangeness conserved by strong and EM interactions)
- Can they form bound states with nucleons?

Hypernuclei

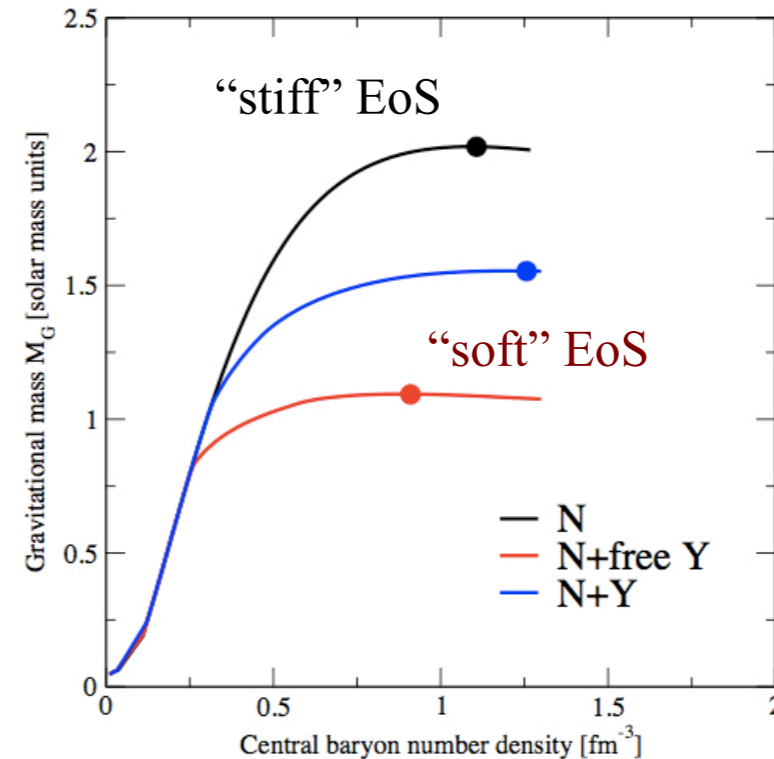
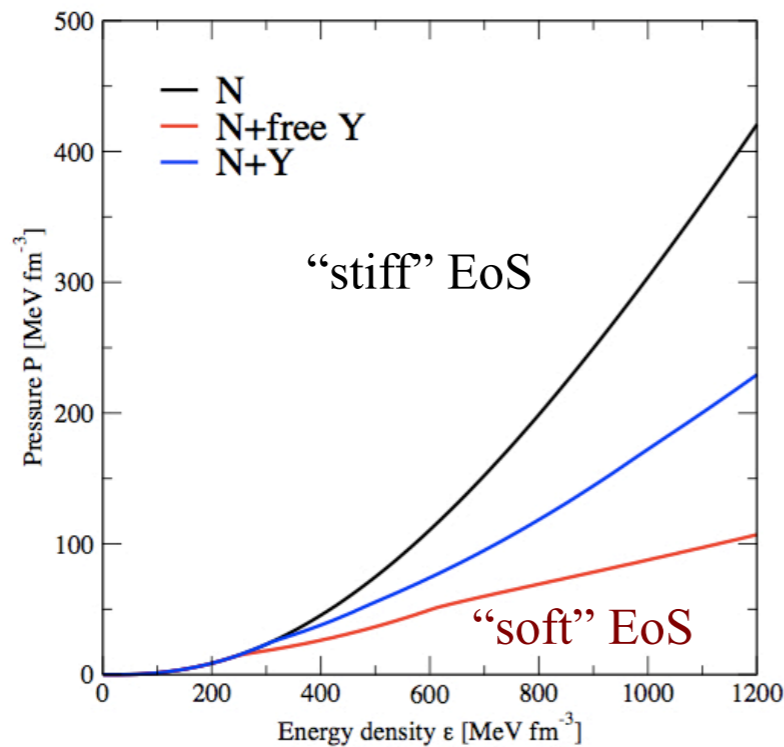
◎ **Hypernucleus:** a nucleus with at least one hyperon in addition to protons and neutrons



- About 40 hypernuclei produced and measured
- Motivation: could give additional insight into nuclear structure
- Theoretical description: NY and YY interactions not very well known (not to mention 3BFs)

Hyperons in neutron stars

- ⊙ Hyperons could appear in the core of a neutron star
 - Density high enough to make $n+n \rightarrow n + \Lambda$ energetically favourable
- ⊙ If hyperons do appear, the EoS is softened \rightarrow incompatible with experimental observations
 - \rightarrow **Hyperon puzzle**



- ⊙ Possible solutions:
 - Poor knowledge of NY, YY, NNY, NYY, YYY interactions
 - Critical density not reached
 - Transition to quark matter in the neutron star interior

Literature

- ⊙ Review (experiment & theory)

- A. Gal *et al.*, Rev. Mod. Phys. **88** 035004 (2016)

- ⊙ Theory

- D. Lonardonì *et al.*, Phys. Rev. Lett. **114** 092301 (2015)
- D. Gazda, A. Gal, Phys. Rev. Lett. **116** 122501 (2016)
- L. Contessi *et al.*, Phys. Rev. Lett. **121** 102502 (2018)