

# Benchmarking Nuclear Equation of State for models and theories

- **Dipole polarizability:**  $n=0.31n_0$ ,  $S(n)=15.9\pm 1.0$  MeV  
PRC 92, 031301(R) (2015)
- **$^{208}\text{Pb}$  neutron skin (PREX-II):**  $n=0.67n_0$ ,  $P_{\text{sym}}=2.38\pm 0.75$  MeVfm $^{-3}$   
PRL 126, 172502 (2021); PRL 126, 172503 (2021)

- **Mass (Skyrme):**  $n=0.63n_0$ ;  $S(n)=24.7\pm 0.8$  MeV  
PRL 111, 232502 (2013); PRC 89, 011307(R) (2014)
- **Mass (DFT):**  $n=0.72n_0$ ;  $S(n)=25.4\pm 1.1$  MeV  
PRC 82, 024313 (2010); PRC 85, 024304 (2012)
- **Isobaric Analog States (IAS):**  $n=0.66n_0$ ;  $S(n)=25.5\pm 1.1$  MeV  
NPA 958, 147 (2017)

$$\Lambda (M = 1.4 M_{\odot}) = 190_{-120}^{+390}$$

PRL 119, 161101 (2017); PRL 121, 161101 (2018)

## PSR J0030+0451:

$$M = 1.34_{-0.16}^{+0.15} M_{\odot}; R = 12.71_{-1.19}^{+1.14} \text{ km}$$

Riley et al APL 887, L21 (2019)

$$M = 1.44_{-0.14}^{+0.15} M_{\odot}; R = 13.02_{-1.06}^{+1.24} \text{ km}$$

Miller et al APL 887, L24 (2019)

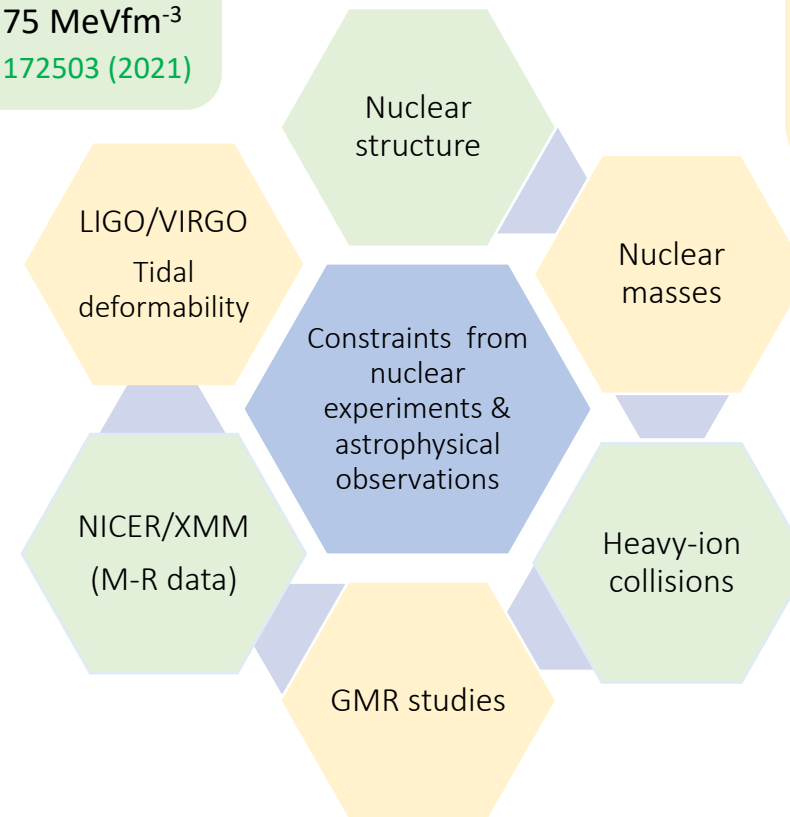
## PSR J0740+6620:

$$M = 2.07_{-0.07}^{+0.07} M_{\odot}; R = 12.39_{-0.98}^{+1.30} \text{ km}$$

Riley et al APL 918, L27 (2021)

$$M = 2.08_{-0.07}^{+0.07} M_{\odot}; R = 13.7_{-1.5}^{+2.6} \text{ km}$$

Miller et al APL 918, L28 (2021)

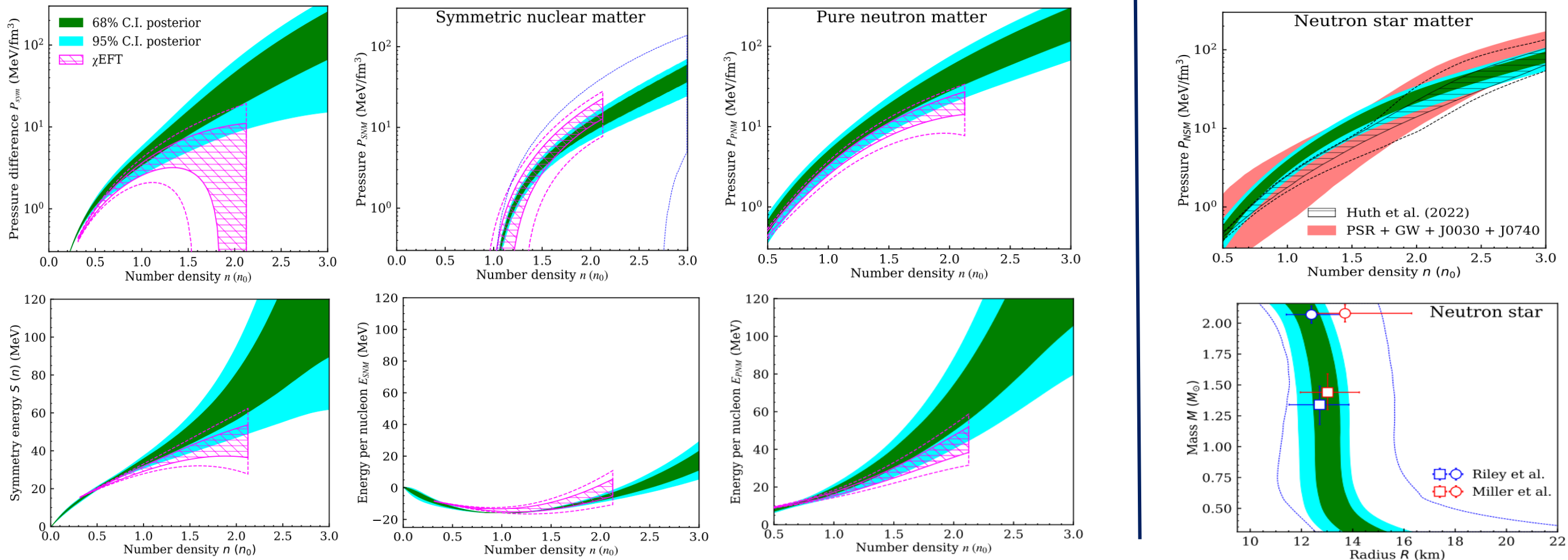


- **GMR:**  $n=n_0$ ;  $K_{\text{sat}}=230\pm 30$  MeV  
PRL 82, 691 (1999); PRC 85, 035201 (2012)

- **HIC flow:**  $n=2n_0$ ;  $P_{\text{SNM}}=10.1\pm 3.0$  MeVfm $^{-3}$   
 $n=2n_0$ ;  $P_{\text{SNM}}=10.3\pm 2.8$  MeVfm $^{-3}$   
Science 298, 1592 (2002); NPA 945, 112 (2016)
- **HIC Isospin diffusion:**  $n=0.22n_0$ ;  $S(n)=10.3\pm 1.0$  MeV  
PRL 102, 122701 (2009)
- **HIC n/p spectral ratio:**  $n=0.43n_0$ ;  $S(n)=16.8\pm 1.2$  MeV  
PLB 799, 135045 (2019)
- **HIC pion spectral ratios:**  $n=1.45n_0$ ;  $S(n)=52\pm 13$  MeV,  
 $P_{\text{sym}}=10.9\pm 8.7$  MeVfm $^{-3}$   
PRL 126, 162701 (2021)
- **HIC n/p flow:**  $n=1.50n_0$ ;  $P_{\text{sym}}=12.1\pm 8.4$  MeVfm $^{-3}$   
PRC 94, 034608 (2016); EPJ A 54, 40 (2018)

Lynch and Tsang, Phys. Lett. B 830,137098 (2022)

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## Comparisons with the Chiral Effective Field theory results

Drischler et al., PRL 125, 202702 (2020); PRC 102, 054315 (2020); PRL 122, 042501 (2019)

See also talk by Betty Tsang  
WG: Connecting Nuclei to the Cosmos, Part II