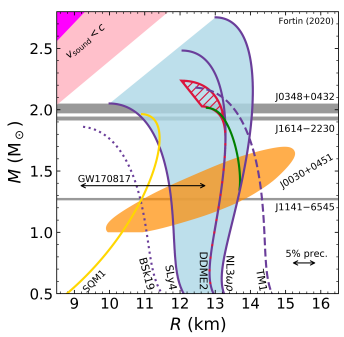
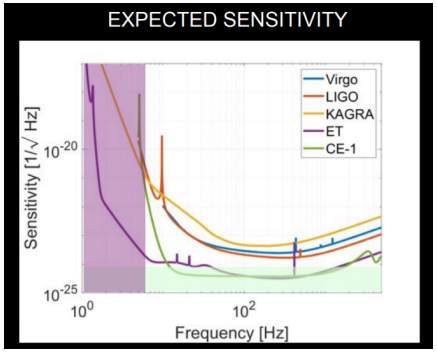
Theoretical Physics and Astrophysics @ USAL

- **Interested in ET and GW: modeling of matter properties relevant to continuous emission in NSs and compact binaries BNS, NSBH**
- Task force: C. Albertus, D. Barba (phd), M. A. Pérez García, A. Pérez Martínez
- Key: Equation of State (EoS) including ordinary/dark matter, localization complem. electromagnetic counterparts (Kilonovae) of BNS to constrain H_0, EoS, very intense electromagnetic fields and ultradense relativistic matter.
- BNS EM counterparts MAAT @ GTC, Magnetized matter high E, B fields in BNS: synergy with local ICTS : Centro Láseres



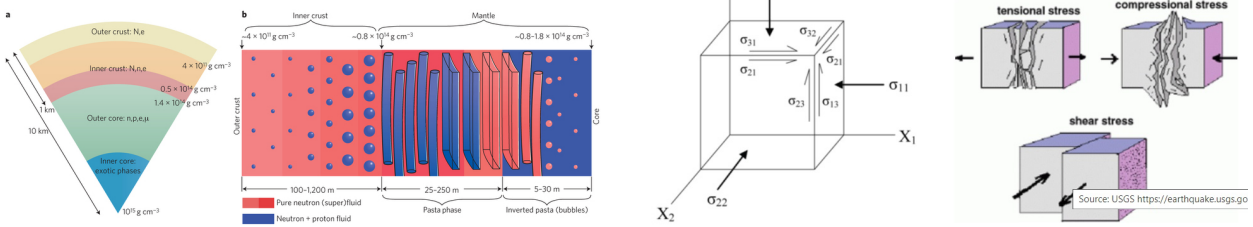


CLPU CENTRO DE LÁSERES PULSADOS

Theoretical Physics and Astrophysics @ USAL

- **GW continuous emission: elastic properties of relativistic ultradense matter: mountains, elipticity ϵ, low freq. modes, core deformation?**
- Under debate: max. breaking strain in crust ~ 0.1 MeV/fm^3, `Caplan et al., 2018.` but quoted $10^{-5} < \sigma_{\rm max} < 10^{-1}$. `Ushomirsky, Cutler et al. 2000`

$$\Phi_{22,\rm max} = 2.4 \times 10^{39} g\,{\rm cm}^2 \left(\frac{\sigma_{\rm max}}{10^{-1}}\right) \left(\frac{R}{10\,{\rm km}}\right)^{6.26} \left(\frac{1.4 M_\odot}{M}\right)^{1.2}$$



$$\sigma^{\rm tot}_{\alpha\beta} = \frac{1}{V} \sum_i M_i \dot{R}_{i\alpha} \dot{R}_{j\beta} + \sigma_{{\rm real},\alpha\beta} + \sigma_{\rm recip\ ,\alpha\beta}$$

- Microscopic models extracted form intense computer simulation $\rightarrow$ extract elastic properties $\rightarrow$ GW amplitude h_0.