

Nuclear matter Properties and Neutron Star Phenomenology Using the Finite Range Simple Effective Interaction

X. Viñas^{a,b}

^aUniversitat de Barcelona, Barcelona, Spain ^bInstitut Menorquí d'Estudis, Maó, Spain

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X. Viñas et al., Symmetry 16, 215 (2024) and references therein

Spherical nuclei

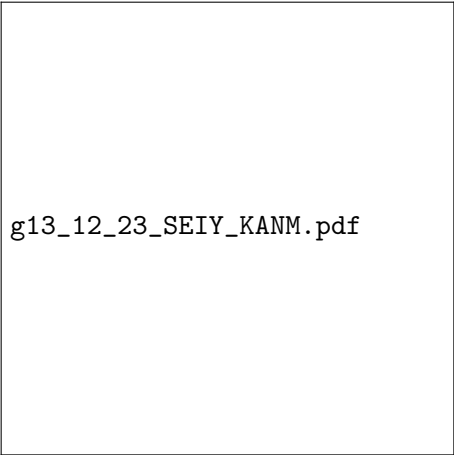
dft_SEIY.pdf

Slope of the incompressibility and Radius of Neutron star

R16_R14_M0_g12SEIY.pdf

$R_{1.4}$ of $1.4 M_0$ neutron stars and (b) Radii $R_{1.6}$ of $1.6 M_0$ neutron stars versus the slope of the incompressibility obtained using different EoS of SEI-Y having $\gamma=1/3, 1/2,$ and $2/3$.

Neutron star merger and incompressibility of ANM



g13_12_23_SEIY_KANM.pdf

(a) $K(\rho, \delta)$ as a function of density in NSM for the SEI-Y($\gamma = 1/3$), SEI-Y($\gamma = 1/2$), and SEI-Y($\gamma = 2/3$) EoS, (b) K_{max} as a function of the compactness of the heaviest NS for the three EoS of SEI-Y. Green diamonds are the 66 EoS results taken from [?].

Sound speed in Neutron Star Matter

Vel_L_ANM_SNM_g12_g23_SEIY.pdf

(a) Speed of sound in NSM as a function density for the three EoS corresponding to $\gamma = 1/3, 1/2,$ and $2/3$ of SEI-Y. The magenta and green line is the conformal and Casual limit respectively. (b) Speed of sound as a function of pressure at density $(1.85\rho_0)$ in NSM for SEI-Y (1/2 and 2/3) EoS compared with the results of Baucsein et al., 2012 [?]. The square speed of sound at the

Gravitational redshift (I)

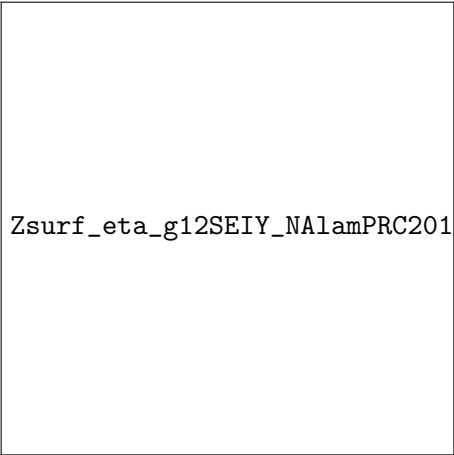
The gravitational redshift of a signal from the star surface is

$$Z_{surf} = \left(1 - \frac{2GM}{c^2 R}\right)^{-1/2} - 1$$

Zsurf_M_g12SEIY_Tang2020.pdf

Gravitational redshift at the neutron star surface as a function of the stellar gravitational mass for the SEI-Y ($\gamma = 1/2$) and SEI-Y ($\gamma = 2/3$) EoSs. **The extracted ranges for the three NSs, RBS 1223, RX J0720.4-3125, and RX J1856.5-3754 are shown in different shades.**

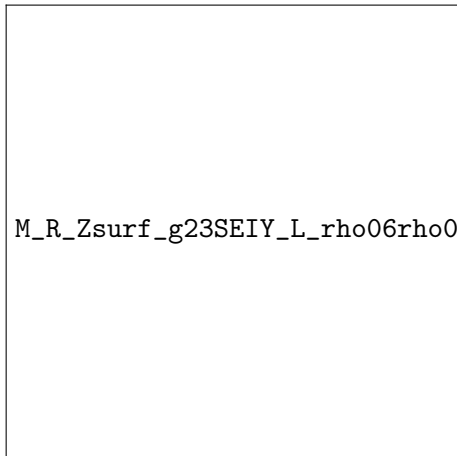
Gravitational redshift (II)



Zsurf_eta_g12SEIY_NAlamPRC2016.pdf

Z_{surf} as a function of η for $1.8 M_0$, $1.6 M_0$, and $1.4 M_0$ NS for SEI-Y ($\gamma = 1/2$) and SEI-Y ($\gamma = 2/3$) EoSs. Shaded region is the constrained value of η for PREX II [Blue], RCNP [magenta], and $S\pi$ RIT [yellow] [?]. The green diamonds are the data for the 44-EoSs of Ref.[?].

Gravitational redshift (III)



(a) Neutron star masses, (b) Neutron star radius (c) Z_{surf} corresponding to central densities of ρ_0 , $2\rho_0$, $3\rho_0$, $4\rho_0$, and $6\rho_0$ as a function of L .