Hybrid EoS DD2-FRG with vector interactions (2 flavors)

EoS Submission Details

EoS name	Hybrid EoS DD2-FRG with vector interactions (2 flavors)
category	Hybrid
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Abstract

The present hybrid EoS is constructed from the HS(DD2) EoS for hadronic matter [1,2] and quark matter is described by a non-perturbative functional renormalization group approach within a 2 flavor quark-meson truncation in the local potential approximation (LPA) [3] including vector interactions [4] with $g_v = 1$.

References to the original work

1. M. Hempel and J. Schaffner-Bielich, Nucl. Phys. A 837 (2010) 210.
2. S. Typel, G. Röpke, T. Klähn, D. Blaschke, and H.H. Wolter, Phys. Rev. C 81 (2010) 015803.
3. K. Otto, M. Oertel, B-J. Schaefer, Phys. Rev. D 101 (2020) 103021.
4. K. Otto, M. Oertel, B-J. Schaefer, Eur.Phys.J.ST 229 (2020) 3629.

Nuclear Matter Properties[1]

	Quantity	Unit	
n_S	saturation density in symmetric matter	fm^{-3}	0.149
E_0	binding energy per baryon at saturation	MeV	16.02
K	incompressibility	MeV	243
K'	skewness	MeV	169
J	symmetry energy	MeV	31.7
L	symmetry energy slope parameter	MeV	55
K_{sym}	symmetry incompressibility	MeV	0

[1] 0-values indicate, that the corresponding data is not provided.

Neutron Star Properties[1]

	Quantity	Unit	
M_{max}	maximum mass	M_{sun}	2.14
$M_{DU,e}$	mass at DUrca threshold (1/9) w/o μ^-	M_{sun}	0
$R_{M_{max}}$	radius at maximum NS mass	km	12.7
$R_{1.4}$	radius at 1.4 M_{sun} NS mass	km	13.2
$\tilde{\Lambda}$	tidal deformability GW170817 at $q = M_1/M_2 = 0.8$		795

eos.thermo

eos.thermo and the three grid defining files are CompOSE standard data files and by definition available.

table dimension	1
table type	1
total number of grid points	247

Range and density (#) of the grid parameters:

	Quantity	Unit	min	max	#
T	Temperature	MeV	0	0	1
n_b	Baryon Nr Density	fm^{-3}	6.9E-10	1.13	247
Y_q	Charge Fraction		0	0	1

T, n_b, and Y_q are stored in eos.t, eos.nb, and eos.yq, respectively.