

# Hybrid EoS DD2-FRG (2+1 flavors)

## EoS Submission Details

EoS name	Hybrid EoS DD2-FRG (2+1 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+1 flavor quark-meson truncation in the local potential approximation (LPA) [3].

## 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.

## Nuclear Matter Properties<sup>1</sup>

	Quantity	Unit	
$n_S$	saturation density in symmetric matter	fm <sup>-3</sup>	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

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<sup>1</sup>0-values indicate, that the corresponding data is not provided.

## Neutron Star Properties<sup>1</sup>

	Quantity	Unit	
$M_{max}$	maximum mass	$M_{\text{sun}}$	1.84
$M_{DU,e}$	mass at DUrca threshold (1/9) w/o $\mu^-$	$M_{\text{sun}}$	0
$R_{M_{max}}$	radius at maximum NS mass	km	12.8
$R_{1.4}$	radius at 1.4 $M_{\text{sun}}$ 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 230
```

Range and density (#) of the grid parameters:

	Quantity	Unit	min	max	#
T	Temperature	MeV	0	0	1
$n_b$	Baryon Nr Density	$\text{fm}^{-3}$	6.9E-10	0.89	230
$Y_q$	Charge Fraction		0	0	1

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