

**R(DD2Y $\Delta$ )**  $x_{\sigma\Delta} = 1.2$ ;  $x_{\omega\Delta} = 1.1$ ;  $x_{\rho\Delta} = 1.0$ ;

### EoS Submission Details

EoS name	R(DD2Y $\Delta$ ) $x_{\sigma\Delta} = 1.2$ ; $x_{\omega\Delta} = 1.1$ ; $x_{\rho\Delta} = 1.0$ ;
category	Hadronic
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### Abstract

This hadronic EOS table accounts for hyperons and  $\Delta(1232)$  resonances in addition to nucleons [1,2]. The nucleonic RMF effective interaction is DD2 [3]. The coupling constants of exotic species to different mesonic fields are provided in the table nearby. For densities below  $n_B = 0.08 \text{ fm}^{-3}$  we have used the crust EoS of [4] corresponding to DM1 Gogny interaction.

### References to the original work

1. Ad. R. Raduta *et al.*, in preparation (2022).
2. Ad. R. Raduta, M. Oertel, A. Sedrakian, MNRAS 499 (2020) 914-931.
3. S. Typel, G. Ropke, T. Klahn, D. Blaschke, and H.H. Wolter, Phys. Rev. C 81 (2010) 015803.
4. X. Vinas, C. Gonzalez-Boquera, M. Centelles, C. Mondal and L. M. Robledo, Symmetry 13 (2021) 1613.

### Coupling constants of exotic species to meson fields

expressed in terms of the coupling constants of the nucleons  $N$  to the meson fields,  
 $x_{mB} = g_{mB}/g_{mN}$ .

coupling constant	value
$x_{\sigma\Lambda}$	0.6154
$x_{\sigma\Sigma}$	0.3259
$x_{\sigma\Delta}$	0.4740
$x_{\omega\Lambda}$	1.2000
$x_{\omega\Sigma}$	2/3
$x_{\omega\Delta}$	1/3
$x_{\rho\Lambda}$	2/3
$x_{\rho\Sigma}$	1.1000
$x_{\rho\Delta}$	0
$x_{\phi\Lambda}$	1
$x_{\phi\Sigma}$	2
$x_{\phi\Delta}$	1
$x_{\sigma\Lambda}$	$-\sqrt{2}/3$
$x_{\sigma\Sigma}$	$-\sqrt{2}/3$
$x_{\sigma\Delta}$	$-2\sqrt{2}/3$
$x_{\omega\Lambda}$	0
$x_{\omega\Sigma}$	- end of table -
$x_{\omega\Delta}$	

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

	Quantity	Unit	
$n_S$	saturation density in symmetric matter	$\text{fm}^{-3}$	0.1491
$E_0$	binding energy per baryon at saturation	MeV	16.02
$K$	incompressibility	MeV	242.7
$K'$	skewness	MeV	168.7
$J$	symmetry energy	MeV	31.67
$L$	symmetry energy slope parameter	MeV	55.03
$K_{sym}$	symmetry incompressibility	MeV	-93.23

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

	Quantity	Unit	
$M_{max}$	maximum mass	$M_{sun}$	2.052
$M_{DU,e}$	mass at DUrca threshold (1/9) w/o $\mu^-$	$M_{sun}$	0.55
$R_{M_{max}}$	radius at maximum NS mass	km	10.98
$R_{1.4}$	radius at 1.4 $M_{sun}$ NS mass	km	12.31
$\tilde{\Lambda}$	tidal deformability for GW170817 at a mass ratio of $q = 0.8$		450

### eos.thermo

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

### additional quantities in eos.thermo

none defined

table dimension	1
table type	1
total number of grid points	1792

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

Range and density (#) of the grid parameters:

	Quantity	Unit	min	max	#
T	Temperature	MeV	0	0	1
$n_b$	Baryon Nr Density	$\text{fm}^{-3}$	$6.8 \cdot 10^{-13} \text{ fm}^{-3}$	$1.2 \text{ fm}^{-3}$	1792
$Y_q$	Charge Fraction		0	0	1

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

### Further Available Data Files

Files and quantities listed in the following are provided beyond CompOSE's core requirements as outlined in Sec.4.2. of the CompOSE manual.

#### eos.compo: available

index	particle
0	e
10	n
11	p
20	$\Delta^-$
21	$\Delta^0$
22	$\Delta^+$
23	$\Delta^{++}$
100	$\Lambda$
110	$\Sigma^-$
111	$\Sigma^0$
112	$\Sigma^+$
120	$\Xi^-$
121	$\Xi^0$
4002	${}^4_2\text{He}$
3002	${}^3_2\text{He}$
3001	${}^3_1\text{H}$
2001	${}^2_1\text{H}$
	- end of table -

further particle sets are defined. One set of quadruples for the heavy nucleus, see Table 7.2 of the manual.

index	particle
999	the heavy nucleus in the crust
	- end of table -

**eos.micro: not available**

**eos.mr: available**

This file provides the gravitational and baryonic masses (in solar masses), the radius (in km), the tidal deformability and the central baryonic number density (in  $\text{fm}^{-3}$ ) of a family of stars computed for this EoS model.

### **Description of Phases**

Fill this part briefly, in particular if several phases occur.

PHASE INDEX #1:

outer crust

PHASE INDEX #2:

inner crust

PHASE INDEX #3:

homogeneous matter in the core