# GM1 Y4

## EoS Submission Details

| | |
|---|---|
| EoS name | GM1 Y4 |
| category | hadronic |
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## Abstract

This EoS is the classical RMF parameterisation GM1 [1] for cold neutron star matter in $\beta$-equilibrium containing the baryon octet and electrons, see Ref. [2] for details of the parameterisation of hyperonic interactions. For the crust, the EoS by Douchin and Haensel [3] has been added below a density of $n_B = 10^{-3} \text{fm}^{-3}$. Hadronic charge fraction and compositional information is available for the core only.

## References to the original work

1. N. K. Glendenning and S. A. Moszkowski, Phys. Rev. Lett. **67**, 2414 (1991)

2. M. Oertel, C. Providência, F. Gulminelli, A. Raduta, arxiv:1412.4545.

3. F. Douchin, P. Haensel, Astronomy and Astrophysics **380**, 151 (2001).

## Nuclear Matter Properties[1]

|         | Quantity                                 | Unit       |       |
| ------- | ---------------------------------------- | ---------- | ----- |
| $n_S$   | saturation density in symmetric matter   | $fm^{-3}$  | 0.153 |
| $E_0$   | binding energy per baryon at saturation  | MeV        | 16.3  |
| $K$     | incompressibility                        | MeV        | 300   |
| $K'$    | skewness                                 | MeV        | 0.0   |
| $J$     | symmetry energy                          | MeV        | 32.5  |
| $L$     | symmetry energy slope parameter          | MeV        | 94    |
| $K_{sym}$ | symmetry incompressibility             | MeV        | 0.0   |

## Neutron Star Properties[1]

|              | Quantity                                        | Unit          |       |
| ------------ | ----------------------------------------------- | ------------- | ----- |
| $M_{max}$    | maximum mass                                    | $M_{sun}$     | 1.79  |
| $M_{DU,e}$   | mass at DUrca threshold (1/9) w/o $\mu^-$       | $M_{sun}$     | 1.19  |
| $R_{M_{max}}$ | radius at maximum NS mass                      | km            | 13.04 |
| $R_{1.4}$    | radius at 1.4 $M_{sun}$ NS mass                 | km            | 13.78 |

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

**eos.thermo**

eos.thermo and the three grid defining files are CompOSE standard data files and by definition available. eos.thermo does <u>not</u> necessarily provide all possible data.

| | | |
|---|---|---|
| table dimension | 1 | |
| table type | 1 | |
| total number of grid points | 301 | |

Range and density (#) of the grid parameters:

| | Quantity | Unit | min | max | # |
|---|---|---|---|---|---|
| T | Temperature | MeV | 0.0 | 0.0 | 1 |
| $n_b$ | Baryon Nr Density | fm$^{-3}$ | 7.92405959E-15 | 1.19773406E+00 | 301 |
| $Y_q$ | Charge Fraction | | 5.81464E-05 | 0.13231E+00 | 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 |
|---|---|
| 10 | n |
| 11 | p |
| 0 | $e^-$ |
| 100 | $\Lambda$ |
| 110 | $\Sigma^-$ |
| 111 | $\Sigma^0$ |
| 112 | $\Sigma^+$ |
| 120 | $\Xi^-$ |
| 121 | $\Xi^0$ |
| | - end of table - |

**eos.micro** : not available

## Description of Phases

The transitions in the crust and from the core to the crust are treated by simple matching of the different EoS at a given density.