Hempel–Schaffner-Bielich/SFHo

EoS Submission Details

EoS name	Hempel–Schaffner-Bielich/SFHo
category	hadronic
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Abstract

This is the zero electron faction EOS table with RMF interactions SFHo [1]. Contributions of neutrons, anti-neutrons, protons, anti-protons, electrons, positrons, and photons are included, whereas the net abundances of electrons and protons are always zero. The details of the underlying EOS model at finite Y_e can be found in Ref. [2], where the TMA interactions were used. The manual from the web page

`http://phys-merger.physik.unibas.ch/~hempel/eos.html`

gives further information about the table. Applications of HS EOS for various different RMF interactions in supernova simulations can be found in Refs. [1,3].

References to the original work

1. A.W. Steiner, M. Hempel, and T. Fischer (2012), arXiv:1207.2184.

2. M. Hempel and J. Schaffner-Bielich, Nucl. Phys. A **837** (2010) 210.

Further References

3. M. Hempel, T. Fischer, J. Schaffner-Bielich, and M. Liebendörfer, Astrophys. J. **748** (2012) 70.

Nuclear Matter Properties[1]

	Quantity	Unit	
n_S	saturation density in symmetric matter	fm^{-3}	0.1583
E_0	binding energy per baryon at saturation	MeV	16.19
K	incompressibility	MeV	245.4
K'	skewness	MeV	-467.8
J	symmetry energy	MeV	31.57
L	symmetry energy slope parameter	MeV	47.10
K_{sym}	symmetry incompressibility	MeV	-205.4

Neutron Star Properties[1]

	Quantity	Unit	
M_{max}	maximum mass	$\mathrm{M_{sun}}$	2.06
$M_{DU,e}$	mass at DUrca threshold (1/9) w/o μ^-	$\mathrm{M_{sun}}$	-
$R_{M_{max}}$	radius at maximum NS mass	km	10.32
$R_{1.4}$	radius at 1.4 $\mathrm{M_{sun}}$ NS mass	km	11.9

[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 not necessarily provide all possible data.

table dimension	2
table type	4
total number of grid points	24948

Range and density (#) of the grid parameters:

	Quantity	Unit	min	max	#
T	Temperature	MeV	0.10000000E+00	0.15848932E+03	81
n_b	Baryon Nr Density	fm^{-3}	0.10000000E-11	0.1905461E+01	308
Y_q	Charge Fraction		0.00000000E+00	0.00000000E+00	1

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

additional quantities in eos.thermo

none defined

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
	- end of table -

The listed particle number fraction of neutrons is the net fraction, i.e., it is given by the difference between the neutron and anti-neutron number density. The net particle number fractions of electrons and protons are always zero, and therefore they are not listed. Further particle sets are not defined.

eos.micro : available

index	quantity	particle
10041	Dirac effective mass divided by particle mass m_i^D/m_i	n
11041	Dirac effective mass divided by particle mass m_i^D/m_i	p
	- end of table -	

Description of Phases

Fill this part briefly, in particular if several phases occur. In this latter case characterize the transition(s).

PHASE INDEX #3:

pure RMF, i.e., only nucleons