

# STOS-TM1-v3-T0

## EoS Submission Details

EoS name	STOS-TM1-v3-T0
category	hadronic
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## Abstract

This table contains the zero-temperature EoS of H. Shen, F. Yang, H. Toki, K. Oyamatsu, and K. Sumiyoshi [1,2] with only baryonic contributions (no leptons or photons included) including  $\Lambda$  hyperons [3] using a non-linear relativistic mean-field model with the TM1 parametrization [4] of the effective interaction. Non-uniform nuclear matter is calculated in the single-nucleus Thomas-Fermi approximation with parametrized density distributions in spherical Wigner-Seitz cells. Only neutrons, protons,  $\alpha$  particles and a single heavy nucleus are considered. The present table was taken from the website <http://user.numazu-ct.ac.jp/~sumi/eos/> of K. Sumiyoshi.

**References to the original work**

1. H. Shen, H. Toki, K. Oyamatsu, K. Sumiyoshi, Prog. Theor. Phys. 100 (1998) 1013
2. H. Shen, H. Toki, K. Oyamatsu, K. Sumiyoshi, Nucl. Phys. A 637 (1998) 435
3. H. Shen, F. Yang, H. Toki, Prog. Theor. Phys. 115 (2006) 325

**Further References**

4. Y. Sugahara, H. Toki, Nucl. Phys. A 579 (1994) 557

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

	Quantity	Unit	
$n_S$	saturation density in symmetric matter	$\text{fm}^{-3}$	0.145
$E_0$	binding energy per baryon at saturation	MeV	16.26
$K$	incompressibility	MeV	281.16
$K'$	skewness	MeV	-285.22
$J$	symmetry energy	MeV	36.89
$L$	symmetry energy slope parameter	MeV	110.79
$K_{sym}$	symmetry incompressibility	MeV	33.62

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

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

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<sup>1</sup>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                2  
total number of grid points 7150

Range and density (#) of the grid parameters:

	Quantity	Unit	min	max	#
T	Temperature	MeV	0.00000000E+00	0.00000000E+00	1
$n_b$	Baryon Nr Density	$\text{fm}^{-3}$	0.75814210E-10	0.60221370E+01	110
$Y_q$	Charge Fraction		0.10000000E-01	0.65000000E+00	65

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
11	p
100	$\Lambda$
4002	${}^4_2\text{He}$
	- end of table -

Further particle sets are defined. One set of quadruples for an average heavy nucleus. See Table 7.2 of the CompOSE manual.

**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**

The different phase (uniform/non-uniform) in the description of the EoS are not distinguished.