

## BHB $\Lambda\phi$ with kaon condensate and electrons

### EoS Submission Details

EoS name	BHB $\Lambda\phi$ with kaon condensate and electrons
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### Abstract

This is the EoS table of Ref. [1], which is based on the statistical model of Hempel and Schaffner-Bielich [2] with DD2 interactions [3] including  $\Lambda$ -hyperons[4]. The original model [4] has been extended to include K- mesons[1]. Information on effective masses and chemical potentials has been added and the present table contains the contributions of electrons and photons.

### References to the original work

1. T. Malik, S. Banik and D. Bandyopadhyay, *Astrophys. J.* 910 (2021) 96.
2. M. Hempel and J. Schaffner-Bielich, *Nucl. Phys. A* 837 (2010) 210.
3. S. Typel, G. Röpke, T. Klähn, D. Blaschke, and H.H. Wolter, *Phys. Rev. C* 81 (2010) 015803.
4. S. Banik, M. Hempel. D. Bandyopadhyay, *Astrophys. J. Suppl.* 214 (2014) 2.

## 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	-93.2

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

	Quantity	Unit	
$M_{max}$	maximum mass	$M_{sun}$	2.05
$M_{DU,e}$	mass at DUrca threshold (1/9) w/o $\mu^-$	$M_{sun}$	-
$R_{M_{max}}$	radius at maximum NS mass	km	11.63
$R_{1.4}$	radius at 1.4 $M_{sun}$ NS mass	km	13.22

## 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          3
table type               1
total number of grid points 1462860
```

Range and density (#) of the grid parameters:

	Quantity	Unit	min	max	#
T	Temperature	MeV	0.1E+00	0.15848932E+03	81
$n_b$	Baryon Nr Density	$\text{fm}^{-3}$	0.1E-11	0.1E+01	301
$Y_q$	Charge Fraction		0.10000000E-01	0.60000000E+00	60

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

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

### 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
4002	${}^2_4\text{He}$
3002	${}^2_3\text{He}$
3001	${}^1_3\text{H}$
2001	${}^1_2\text{H}$
100	$\Lambda$
424	thermal kaons
425	$K^-$ condensate
	- end of table -

The listed particle number fractions are net fractions, i.e., they are given by the difference between the corresponding particle and anti-particle fractions. Further particle sets are defined.

index	description
1	Average fraction, mass and proton number for all nuclei not listed above
	- end of table -

**eos.micro** : available

index	quantity	particle
420041	Kaon effective mass divided by particle mass $m_{K^-} = 493.7$ MeV	$K^-$
	- end of table -	