

Relativistic description of dense matter equation of state and compatibility with neutron star observables: a Bayesian approach

TUHIN MALIK ¹, MÁRCIO FERREIRA ¹, B. K. AGRAWAL ^{2,3} AND CONSTANÇA PROVIDÊNCIA ¹

¹*CFisUC, Department of Physics, University of Coimbra, 3004-516 Coimbra, Portugal*

²*Saha Institute of Nuclear Physics, 1/AF Bidhannagar, Kolkata 700064, India.*

³*Homi Bhabha National Institute, Anushakti Nagar, Mumbai 400094, India.*

Keywords: Neutron Star — Dense matter — Equation of State — Bayesian Parameter Estimation

1. SUPPLEMENTAL MATERIAL

We are publicly releasing three tabulated EOS for the core of NS for densities ranging from 0.04 to 1.53 fm⁻³. The three EOS are from the D2 set and correspond to the NS maximum masses 2.009 M_⊙ (90 % CI lower), 2.134 M_⊙ (median) and 2.323 M_⊙ (90 % CI upper), namely DDH-D2L, DDH-D2M and DDH-D2U, respectively. The EOS tables are available at (https://github.com/tuhinucpt/DDH_EOS).

Corresponding author: Tuhin Malik
tuhin.malik@gmail.com, tuhin.malik@uc.pt
marcio.ferreira@uc.pt
bijay.agrawal@saha.ac.in
cp@uc.pt

Table 1. The nuclear matter properties along with few neutron star properties for models DDH-D2L, DDH-D2M and DDH-D2U.

Quantity		Units	DDH-D2L	DDH-D2M	DDH-D2U
NMP	ε_0		-16.17	-15.87	-16.00
	ρ_0		0.153	0.154	0.152
	K_0		234	222	245
	Q_0		-127	-136	-22
	Z_0	MeV	1160	1683	1670
	$J_{\text{sym},0}$		31.22	29.00	27.80
	$L_{\text{sym},0}$		44.00	48.17	46.26
	$K_{\text{sym},0}$		-110	-99	-82
	$Q_{\text{sym},0}$		826	610	632
	$Z_{\text{sym},0}$		-5627	-3367	-3804
NS	M_{max}	M_{\odot}	2.009	2.134	2.323
	$M_{\text{B,max}}$	M_{\odot}	2.362	2.544	2.804
	c_s^2		0.51	0.65	0.72
	ε_c	MeV fm^{-3}	1300	1299	1150
	ρ_c	fm^{-3}	1.045	1.021	0.902
	R_{max}		10.99	10.97	11.49
	$R_{1.4}$	km	12.49	12.48	12.78
	$R_{1.6}$		12.36	12.40	12.79
	$R_{2.0}$		11.23	11.88	12.61
	$\Lambda_{1.4}$		427	446	563
	$\Lambda_{1.6}$		173	186	250
	$\Lambda_{1.8}$	-	66	77	112
	$\tilde{\Lambda}_{q=1.0}$		500	521	653

2. EOS TABLE

M_{max}	DDH-D2L		DDH-D2M		DDH-D2U	
	2.008 M_{\odot}		2.134 M_{\odot}		2.322 M_{\odot}	
ρ	ε	P	ε	P	ε	P
[fm^{-3}]	[MeV. fm^{-3}]		[MeV. fm^{-3}]		[MeV. fm^{-3}]	
0.0400	3.778E+01	1.490E-01	3.771E+01	1.159E-01	3.771E+01	9.860E-02
0.0460	4.346E+01	1.847E-01	4.337E+01	1.511E-01	4.337E+01	1.268E-01
0.0520	4.914E+01	2.226E-01	4.904E+01	1.910E-01	4.903E+01	1.589E-01
0.0580	5.483E+01	2.631E-01	5.471E+01	2.359E-01	5.469E+01	1.954E-01
0.0639	6.052E+01	3.068E-01	6.038E+01	2.864E-01	6.036E+01	2.371E-01
0.0699	6.621E+01	3.545E-01	6.606E+01	3.430E-01	6.604E+01	2.848E-01
0.0759	7.191E+01	4.072E-01	7.175E+01	4.064E-01	7.172E+01	3.395E-01
0.0819	7.761E+01	4.658E-01	7.744E+01	4.776E-01	7.740E+01	4.023E-01
0.0879	8.332E+01	5.317E-01	8.314E+01	5.573E-01	8.309E+01	4.745E-01
0.0939	8.903E+01	6.061E-01	8.884E+01	6.466E-01	8.878E+01	5.574E-01
0.0998	9.475E+01	6.903E-01	9.455E+01	7.467E-01	9.448E+01	6.524E-01
0.1058	1.005E+02	7.859E-01	1.003E+02	8.585E-01	1.002E+02	7.610E-01
0.1118	1.062E+02	8.944E-01	1.060E+02	9.833E-01	1.059E+02	8.849E-01
0.1178	1.119E+02	1.017E+00	1.117E+02	1.122E+00	1.116E+02	1.026E+00
0.1238	1.177E+02	1.154E+00	1.174E+02	1.277E+00	1.173E+02	1.185E+00
0.1298	1.234E+02	1.306E+00	1.232E+02	1.448E+00	1.231E+02	1.365E+00

M_{\max}	DDH-D2L		DDH-D2M		DDH-D2U	
	2.008 M_{\odot}		2.134 M_{\odot}		2.322 M_{\odot}	
	ρ	P	ϵ	P	ϵ	P
	[fm^{-3}]	[MeV. fm^{-3}]	[MeV. fm^{-3}]		[MeV. fm^{-3}]	
0.1357	1.292E+02	1.476E+00	1.289E+02	1.638E+00	1.288E+02	1.566E+00
0.1417	1.349E+02	1.667E+00	1.347E+02	1.844E+00	1.346E+02	1.792E+00
0.1477	1.407E+02	1.879E+00	1.405E+02	2.070E+00	1.403E+02	2.041E+00
0.1537	1.465E+02	2.115E+00	1.463E+02	2.317E+00	1.461E+02	2.316E+00
0.1597	1.523E+02	2.376E+00	1.520E+02	2.586E+00	1.519E+02	2.620E+00
0.1657	1.581E+02	2.664E+00	1.578E+02	2.881E+00	1.577E+02	2.954E+00
0.1716	1.639E+02	2.981E+00	1.637E+02	3.201E+00	1.635E+02	3.321E+00
0.1776	1.697E+02	3.327E+00	1.695E+02	3.550E+00	1.693E+02	3.723E+00
0.1836	1.756E+02	3.705E+00	1.753E+02	3.927E+00	1.752E+02	4.162E+00
0.1896	1.814E+02	4.116E+00	1.812E+02	4.335E+00	1.810E+02	4.640E+00
0.1956	1.873E+02	4.561E+00	1.870E+02	4.776E+00	1.869E+02	5.159E+00
0.2016	1.932E+02	5.041E+00	1.929E+02	5.249E+00	1.928E+02	5.720E+00
0.2076	1.990E+02	5.557E+00	1.988E+02	5.758E+00	1.987E+02	6.326E+00
0.2135	2.050E+02	6.112E+00	2.047E+02	6.303E+00	2.046E+02	6.979E+00
0.2195	2.109E+02	6.705E+00	2.106E+02	6.886E+00	2.105E+02	7.680E+00
0.2255	2.168E+02	7.337E+00	2.165E+02	7.507E+00	2.165E+02	8.431E+00
0.2315	2.228E+02	8.011E+00	2.225E+02	8.169E+00	2.225E+02	9.233E+00
0.2375	2.287E+02	8.725E+00	2.285E+02	8.872E+00	2.285E+02	1.009E+01
0.2435	2.347E+02	9.482E+00	2.345E+02	9.618E+00	2.345E+02	1.100E+01
0.2494	2.408E+02	1.028E+01	2.405E+02	1.041E+01	2.405E+02	1.197E+01
0.2554	2.468E+02	1.113E+01	2.465E+02	1.124E+01	2.466E+02	1.299E+01
0.2614	2.528E+02	1.201E+01	2.526E+02	1.212E+01	2.527E+02	1.408E+01
0.2674	2.589E+02	1.295E+01	2.586E+02	1.305E+01	2.588E+02	1.523E+01
0.2734	2.650E+02	1.392E+01	2.647E+02	1.402E+01	2.649E+02	1.644E+01
0.2794	2.711E+02	1.495E+01	2.708E+02	1.504E+01	2.711E+02	1.771E+01
0.2853	2.773E+02	1.602E+01	2.770E+02	1.612E+01	2.773E+02	1.904E+01
0.2913	2.834E+02	1.713E+01	2.831E+02	1.724E+01	2.836E+02	2.045E+01
0.2973	2.896E+02	1.829E+01	2.893E+02	1.841E+01	2.898E+02	2.192E+01
0.3033	2.958E+02	1.950E+01	2.955E+02	1.964E+01	2.961E+02	2.345E+01
0.3093	3.021E+02	2.075E+01	3.017E+02	2.092E+01	3.024E+02	2.506E+01
0.3153	3.083E+02	2.206E+01	3.080E+02	2.225E+01	3.088E+02	2.673E+01
0.3212	3.146E+02	2.340E+01	3.143E+02	2.363E+01	3.152E+02	2.848E+01
0.3272	3.209E+02	2.480E+01	3.206E+02	2.507E+01	3.216E+02	3.029E+01
0.3332	3.272E+02	2.624E+01	3.269E+02	2.656E+01	3.280E+02	3.218E+01
0.3392	3.336E+02	2.772E+01	3.333E+02	2.811E+01	3.345E+02	3.413E+01
0.3452	3.400E+02	2.926E+01	3.397E+02	2.971E+01	3.410E+02	3.616E+01
0.3512	3.464E+02	3.084E+01	3.461E+02	3.137E+01	3.476E+02	3.827E+01
0.3571	3.528E+02	3.246E+01	3.525E+02	3.309E+01	3.542E+02	4.044E+01
0.3631	3.593E+02	3.413E+01	3.590E+02	3.486E+01	3.608E+02	4.269E+01
0.3691	3.658E+02	3.585E+01	3.655E+02	3.668E+01	3.675E+02	4.501E+01
0.3751	3.723E+02	3.761E+01	3.720E+02	3.857E+01	3.742E+02	4.740E+01
0.3811	3.789E+02	3.941E+01	3.786E+02	4.050E+01	3.809E+02	4.987E+01
0.3871	3.855E+02	4.126E+01	3.852E+02	4.250E+01	3.877E+02	5.241E+01
0.3931	3.921E+02	4.316E+01	3.918E+02	4.455E+01	3.945E+02	5.503E+01
0.3990	3.987E+02	4.510E+01	3.985E+02	4.666E+01	4.014E+02	5.772E+01
0.4050	4.054E+02	4.708E+01	4.052E+02	4.883E+01	4.083E+02	6.048E+01

M_{\max}	DDH-D2L		DDH-D2M		DDH-D2U	
	2.008 M_{\odot}		2.134 M_{\odot}		2.322 M_{\odot}	
	ρ	P	ϵ	P	ϵ	P
	[fm $^{-3}$]	[MeV. fm $^{-3}$]	[MeV. fm $^{-3}$]		[MeV. fm $^{-3}$]	
0.4110	4.121E+02	4.910E+01	4.119E+02	5.105E+01	4.153E+02	6.332E+01
0.4170	4.188E+02	5.117E+01	4.187E+02	5.333E+01	4.222E+02	6.623E+01
0.4230	4.256E+02	5.328E+01	4.255E+02	5.567E+01	4.293E+02	6.921E+01
0.4290	4.324E+02	5.543E+01	4.323E+02	5.806E+01	4.364E+02	7.227E+01
0.4349	4.392E+02	5.763E+01	4.391E+02	6.051E+01	4.435E+02	7.540E+01
0.4409	4.460E+02	5.986E+01	4.460E+02	6.301E+01	4.506E+02	7.860E+01
0.4469	4.529E+02	6.214E+01	4.530E+02	6.557E+01	4.578E+02	8.187E+01
0.4529	4.598E+02	6.445E+01	4.599E+02	6.819E+01	4.651E+02	8.522E+01
0.4589	4.668E+02	6.681E+01	4.669E+02	7.086E+01	4.724E+02	8.864E+01
0.4649	4.738E+02	6.921E+01	4.739E+02	7.359E+01	4.797E+02	9.213E+01
0.4708	4.808E+02	7.164E+01	4.810E+02	7.637E+01	4.871E+02	9.569E+01
0.4768	4.878E+02	7.412E+01	4.881E+02	7.921E+01	4.945E+02	9.933E+01
0.4828	4.949E+02	7.663E+01	4.952E+02	8.211E+01	5.020E+02	1.030E+02
0.4888	5.020E+02	7.918E+01	5.024E+02	8.505E+01	5.095E+02	1.068E+02
0.4948	5.091E+02	8.177E+01	5.096E+02	8.806E+01	5.171E+02	1.106E+02
0.5008	5.163E+02	8.440E+01	5.169E+02	9.111E+01	5.247E+02	1.146E+02
0.5067	5.234E+02	8.706E+01	5.242E+02	9.422E+01	5.324E+02	1.185E+02
0.5127	5.307E+02	8.976E+01	5.315E+02	9.739E+01	5.401E+02	1.226E+02
0.5187	5.379E+02	9.250E+01	5.388E+02	1.006E+02	5.478E+02	1.267E+02
0.5247	5.452E+02	9.527E+01	5.462E+02	1.039E+02	5.556E+02	1.309E+02
0.5307	5.525E+02	9.808E+01	5.537E+02	1.072E+02	5.635E+02	1.352E+02
0.5367	5.599E+02	1.009E+02	5.611E+02	1.106E+02	5.714E+02	1.395E+02
0.5427	5.673E+02	1.038E+02	5.686E+02	1.140E+02	5.794E+02	1.439E+02
0.5486	5.747E+02	1.067E+02	5.762E+02	1.175E+02	5.874E+02	1.484E+02
0.5546	5.821E+02	1.097E+02	5.838E+02	1.210E+02	5.954E+02	1.529E+02
0.5606	5.896E+02	1.126E+02	5.914E+02	1.246E+02	6.035E+02	1.575E+02
0.5666	5.971E+02	1.157E+02	5.991E+02	1.282E+02	6.116E+02	1.621E+02
0.5726	6.047E+02	1.187E+02	6.068E+02	1.319E+02	6.198E+02	1.669E+02
0.5786	6.122E+02	1.218E+02	6.145E+02	1.357E+02	6.281E+02	1.717E+02
0.5845	6.199E+02	1.249E+02	6.223E+02	1.394E+02	6.364E+02	1.765E+02
0.5905	6.275E+02	1.280E+02	6.301E+02	1.433E+02	6.447E+02	1.814E+02
0.5965	6.352E+02	1.312E+02	6.380E+02	1.472E+02	6.531E+02	1.864E+02
0.6025	6.429E+02	1.344E+02	6.458E+02	1.511E+02	6.616E+02	1.915E+02
0.6085	6.506E+02	1.377E+02	6.538E+02	1.551E+02	6.701E+02	1.966E+02
0.6145	6.584E+02	1.410E+02	6.618E+02	1.591E+02	6.786E+02	2.018E+02
0.6204	6.662E+02	1.443E+02	6.698E+02	1.632E+02	6.872E+02	2.070E+02
0.6264	6.740E+02	1.476E+02	6.778E+02	1.674E+02	6.959E+02	2.123E+02
0.6324	6.819E+02	1.510E+02	6.859E+02	1.715E+02	7.046E+02	2.177E+02
0.6384	6.898E+02	1.544E+02	6.941E+02	1.758E+02	7.133E+02	2.231E+02
0.6444	6.977E+02	1.578E+02	7.022E+02	1.800E+02	7.221E+02	2.286E+02
0.6504	7.057E+02	1.612E+02	7.104E+02	1.844E+02	7.310E+02	2.342E+02
0.6563	7.137E+02	1.647E+02	7.187E+02	1.887E+02	7.399E+02	2.398E+02
0.6623	7.217E+02	1.682E+02	7.270E+02	1.932E+02	7.489E+02	2.455E+02
0.6683	7.297E+02	1.718E+02	7.353E+02	1.976E+02	7.579E+02	2.512E+02
0.6743	7.378E+02	1.754E+02	7.437E+02	2.021E+02	7.669E+02	2.570E+02
0.6803	7.459E+02	1.790E+02	7.521E+02	2.067E+02	7.760E+02	2.629E+02

M_{\max}	DDH-D2L		DDH-D2M		DDH-D2U	
	2.008 M_{\odot}		2.134 M_{\odot}		2.322 M_{\odot}	
	ρ [fm $^{-3}$]	ϵ P [MeV. fm $^{-3}$]	ϵ P [MeV. fm $^{-3}$]	ϵ P [MeV. fm $^{-3}$]	ϵ P [MeV. fm $^{-3}$]	ϵ P [MeV. fm $^{-3}$]
0.6863	7.541E+02	1.826E+02	7.606E+02	2.113E+02	7.852E+02	2.688E+02
0.6922	7.623E+02	1.863E+02	7.691E+02	2.160E+02	7.944E+02	2.748E+02
0.6982	7.705E+02	1.899E+02	7.776E+02	2.207E+02	8.037E+02	2.808E+02
0.7042	7.787E+02	1.937E+02	7.862E+02	2.254E+02	8.130E+02	2.870E+02
0.7102	7.870E+02	1.974E+02	7.948E+02	2.302E+02	8.224E+02	2.931E+02
0.7162	7.953E+02	2.012E+02	8.034E+02	2.350E+02	8.318E+02	2.993E+02
0.7222	8.037E+02	2.050E+02	8.121E+02	2.399E+02	8.413E+02	3.056E+02
0.7282	8.120E+02	2.088E+02	8.209E+02	2.448E+02	8.508E+02	3.120E+02
0.7341	8.204E+02	2.126E+02	8.296E+02	2.498E+02	8.604E+02	3.184E+02
0.7401	8.289E+02	2.165E+02	8.385E+02	2.548E+02	8.700E+02	3.248E+02
0.7461	8.374E+02	2.204E+02	8.473E+02	2.599E+02	8.797E+02	3.314E+02
0.7521	8.458E+02	2.244E+02	8.562E+02	2.650E+02	8.895E+02	3.379E+02
0.7581	8.544E+02	2.283E+02	8.652E+02	2.701E+02	8.992E+02	3.446E+02
0.7641	8.629E+02	2.323E+02	8.741E+02	2.753E+02	9.091E+02	3.513E+02
0.7700	8.715E+02	2.363E+02	8.832E+02	2.805E+02	9.190E+02	3.580E+02
0.7760	8.802E+02	2.403E+02	8.922E+02	2.858E+02	9.289E+02	3.648E+02
0.7820	8.888E+02	2.444E+02	9.013E+02	2.911E+02	9.389E+02	3.717E+02
0.7880	8.975E+02	2.485E+02	9.105E+02	2.965E+02	9.490E+02	3.786E+02
0.7940	9.062E+02	2.526E+02	9.197E+02	3.019E+02	9.591E+02	3.856E+02
0.8000	9.150E+02	2.567E+02	9.289E+02	3.073E+02	9.693E+02	3.926E+02
0.8059	9.238E+02	2.609E+02	9.382E+02	3.128E+02	9.795E+02	3.997E+02
0.8119	9.326E+02	2.651E+02	9.475E+02	3.184E+02	9.897E+02	4.069E+02
0.8179	9.414E+02	2.693E+02	9.568E+02	3.239E+02	1.000E+03	4.141E+02
0.8239	9.503E+02	2.735E+02	9.662E+02	3.296E+02	1.010E+03	4.214E+02
0.8299	9.592E+02	2.778E+02	9.756E+02	3.352E+02	1.021E+03	4.287E+02
0.8359	9.681E+02	2.821E+02	9.851E+02	3.409E+02	1.031E+03	4.361E+02
0.8418	9.771E+02	2.864E+02	9.946E+02	3.467E+02	1.042E+03	4.435E+02
0.8478	9.861E+02	2.907E+02	1.004E+03	3.524E+02	1.052E+03	4.510E+02
0.8538	9.951E+02	2.951E+02	1.014E+03	3.583E+02	1.063E+03	4.586E+02
0.8598	1.004E+03	2.995E+02	1.023E+03	3.641E+02	1.074E+03	4.662E+02
0.8658	1.013E+03	3.039E+02	1.033E+03	3.700E+02	1.085E+03	4.738E+02
0.8718	1.022E+03	3.083E+02	1.043E+03	3.760E+02	1.095E+03	4.815E+02
0.8778	1.032E+03	3.128E+02	1.053E+03	3.820E+02	1.106E+03	4.893E+02
0.8837	1.041E+03	3.173E+02	1.062E+03	3.880E+02	1.117E+03	4.971E+02
0.8897	1.050E+03	3.218E+02	1.072E+03	3.941E+02	1.128E+03	5.050E+02
0.8957	1.059E+03	3.263E+02	1.082E+03	4.002E+02	1.139E+03	5.130E+02
0.9017	1.068E+03	3.308E+02	1.092E+03	4.064E+02	1.150E+03	5.210E+02
0.9077	1.078E+03	3.354E+02	1.102E+03	4.125E+02	1.161E+03	5.290E+02
0.9137	1.087E+03	3.400E+02	1.112E+03	4.188E+02	1.172E+03	5.371E+02
0.9196	1.096E+03	3.446E+02	1.122E+03	4.251E+02	1.184E+03	5.453E+02
0.9256	1.106E+03	3.493E+02	1.132E+03	4.314E+02	1.195E+03	5.535E+02
0.9316	1.115E+03	3.539E+02	1.142E+03	4.377E+02	1.206E+03	5.617E+02
0.9376	1.125E+03	3.586E+02	1.152E+03	4.441E+02	1.218E+03	5.701E+02
0.9436	1.134E+03	3.633E+02	1.163E+03	4.505E+02	1.229E+03	5.784E+02
0.9496	1.144E+03	3.680E+02	1.173E+03	4.570E+02	1.241E+03	5.869E+02
0.9555	1.153E+03	3.728E+02	1.183E+03	4.635E+02	1.252E+03	5.954E+02

M_{\max}	DDH-D2L		DDH-D2M		DDH-D2U	
	2.008 M_{\odot}		2.134 M_{\odot}		2.322 M_{\odot}	
	ρ	P	ϵ	P	ϵ	P
	[fm^{-3}]	[MeV. fm^{-3}]	[MeV. fm^{-3}]		[MeV. fm^{-3}]	
0.9615	1.163E+03	3.776E+02	1.194E+03	4.701E+02	1.264E+03	6.039E+02
0.9675	1.172E+03	3.824E+02	1.204E+03	4.767E+02	1.275E+03	6.125E+02
0.9735	1.182E+03	3.872E+02	1.214E+03	4.833E+02	1.287E+03	6.211E+02
0.9795	1.192E+03	3.920E+02	1.225E+03	4.900E+02	1.299E+03	6.298E+02
0.9855	1.201E+03	3.969E+02	1.235E+03	4.967E+02	1.311E+03	6.386E+02
0.9914	1.211E+03	4.018E+02	1.246E+03	5.034E+02	1.322E+03	6.474E+02
0.9974	1.221E+03	4.067E+02	1.256E+03	5.102E+02	1.334E+03	6.563E+02
1.0034	1.231E+03	4.116E+02	1.267E+03	5.170E+02	1.346E+03	6.652E+02
1.0094	1.240E+03	4.166E+02	1.278E+03	5.239E+02	1.358E+03	6.742E+02
1.0154	1.250E+03	4.215E+02	1.288E+03	5.308E+02	1.370E+03	6.832E+02
1.0214	1.260E+03	4.265E+02	1.299E+03	5.377E+02	1.383E+03	6.923E+02
1.0273	1.270E+03	4.316E+02	1.310E+03	5.447E+02	1.395E+03	7.014E+02
1.0333	1.280E+03	4.366E+02	1.321E+03	5.517E+02	1.407E+03	7.106E+02
1.0393	1.290E+03	4.417E+02	1.332E+03	5.588E+02	1.419E+03	7.198E+02
1.0453	1.300E+03	4.467E+02	1.342E+03	5.659E+02	1.432E+03	7.291E+02
1.0513	1.310E+03	4.518E+02	1.353E+03	5.730E+02	1.444E+03	7.385E+02
1.0573	1.320E+03	4.570E+02	1.364E+03	5.802E+02	1.456E+03	7.479E+02
1.0633	1.330E+03	4.621E+02	1.375E+03	5.874E+02	1.469E+03	7.573E+02
1.0692	1.340E+03	4.673E+02	1.386E+03	5.947E+02	1.482E+03	7.669E+02
1.0752	1.350E+03	4.725E+02	1.398E+03	6.019E+02	1.494E+03	7.764E+02
1.0812	1.360E+03	4.777E+02	1.409E+03	6.093E+02	1.507E+03	7.860E+02
1.0872	1.371E+03	4.829E+02	1.420E+03	6.166E+02	1.520E+03	7.957E+02
1.0932	1.381E+03	4.881E+02	1.431E+03	6.240E+02	1.532E+03	8.054E+02
1.0992	1.391E+03	4.934E+02	1.442E+03	6.315E+02	1.545E+03	8.152E+02
1.1051	1.401E+03	4.987E+02	1.454E+03	6.389E+02	1.558E+03	8.250E+02
1.1111	1.412E+03	5.040E+02	1.465E+03	6.465E+02	1.571E+03	8.349E+02
1.1171	1.422E+03	5.093E+02	1.476E+03	6.540E+02	1.584E+03	8.448E+02
1.1231	1.432E+03	5.147E+02	1.488E+03	6.616E+02	1.597E+03	8.548E+02
1.1291	1.443E+03	5.201E+02	1.499E+03	6.692E+02	1.610E+03	8.649E+02
1.1351	1.453E+03	5.255E+02	1.511E+03	6.769E+02	1.623E+03	8.749E+02
1.1410	1.464E+03	5.309E+02	1.522E+03	6.846E+02	1.636E+03	8.851E+02
1.1470	1.474E+03	5.363E+02	1.534E+03	6.923E+02	1.650E+03	8.953E+02
1.1530	1.485E+03	5.418E+02	1.546E+03	7.001E+02	1.663E+03	9.055E+02
1.1590	1.495E+03	5.472E+02	1.557E+03	7.079E+02	1.676E+03	9.158E+02
1.1650	1.506E+03	5.527E+02	1.569E+03	7.158E+02	1.690E+03	9.262E+02
1.1710	1.516E+03	5.582E+02	1.581E+03	7.236E+02	1.703E+03	9.366E+02
1.1769	1.527E+03	5.638E+02	1.593E+03	7.316E+02	1.717E+03	9.471E+02
1.1829	1.537E+03	5.693E+02	1.604E+03	7.395E+02	1.730E+03	9.576E+02
1.1889	1.548E+03	5.749E+02	1.616E+03	7.475E+02	1.744E+03	9.681E+02
1.1949	1.559E+03	5.805E+02	1.628E+03	7.556E+02	1.758E+03	9.787E+02
1.2009	1.570E+03	5.861E+02	1.640E+03	7.636E+02	1.771E+03	9.894E+02
1.2069	1.580E+03	5.917E+02	1.652E+03	7.717E+02	1.785E+03	1.000E+03
1.2129	1.591E+03	5.974E+02	1.664E+03	7.799E+02	1.799E+03	1.011E+03
1.2188	1.602E+03	6.031E+02	1.676E+03	7.881E+02	1.813E+03	1.022E+03
1.2248	1.613E+03	6.088E+02	1.688E+03	7.963E+02	1.827E+03	1.033E+03
1.2308	1.624E+03	6.145E+02	1.701E+03	8.045E+02	1.841E+03	1.044E+03

M_{\max}	DDH-D2L		DDH-D2M		DDH-D2U	
	2.008 M_{\odot}		2.134 M_{\odot}		2.322 M_{\odot}	
	ρ	ϵ P	ϵ P	ϵ P	ϵ P	ϵ P
	[fm^{-3}]	[MeV. fm^{-3}]	[MeV. fm^{-3}]	[MeV. fm^{-3}]	[MeV. fm^{-3}]	[MeV. fm^{-3}]
1.2368	1.635E+03	6.202E+02	1.713E+03	8.128E+02	1.855E+03	1.055E+03
1.2428	1.645E+03	6.260E+02	1.725E+03	8.211E+02	1.869E+03	1.066E+03
1.2488	1.656E+03	6.317E+02	1.737E+03	8.295E+02	1.883E+03	1.077E+03
1.2547	1.667E+03	6.375E+02	1.750E+03	8.379E+02	1.897E+03	1.088E+03
1.2607	1.678E+03	6.433E+02	1.762E+03	8.463E+02	1.911E+03	1.099E+03
1.2667	1.689E+03	6.492E+02	1.774E+03	8.548E+02	1.926E+03	1.110E+03
1.2727	1.700E+03	6.550E+02	1.787E+03	8.633E+02	1.940E+03	1.122E+03
1.2787	1.712E+03	6.609E+02	1.799E+03	8.719E+02	1.955E+03	1.133E+03
1.2847	1.723E+03	6.667E+02	1.812E+03	8.805E+02	1.969E+03	1.144E+03
1.2906	1.734E+03	6.727E+02	1.824E+03	8.891E+02	1.984E+03	1.156E+03
1.2966	1.745E+03	6.786E+02	1.837E+03	8.977E+02	1.998E+03	1.167E+03
1.3026	1.756E+03	6.845E+02	1.850E+03	9.064E+02	2.013E+03	1.179E+03
1.3086	1.767E+03	6.905E+02	1.862E+03	9.151E+02	2.027E+03	1.190E+03
1.3146	1.779E+03	6.965E+02	1.875E+03	9.239E+02	2.042E+03	1.202E+03
1.3206	1.790E+03	7.025E+02	1.888E+03	9.327E+02	2.057E+03	1.214E+03
1.3265	1.801E+03	7.085E+02	1.901E+03	9.415E+02	2.072E+03	1.226E+03
1.3325	1.813E+03	7.145E+02	1.913E+03	9.504E+02	2.087E+03	1.237E+03
1.3385	1.824E+03	7.206E+02	1.926E+03	9.593E+02	2.102E+03	1.249E+03
1.3445	1.835E+03	7.266E+02	1.939E+03	9.683E+02	2.117E+03	1.261E+03
1.3505	1.847E+03	7.327E+02	1.952E+03	9.772E+02	2.132E+03	1.273E+03
1.3565	1.858E+03	7.388E+02	1.965E+03	9.862E+02	2.147E+03	1.285E+03
1.3625	1.870E+03	7.450E+02	1.978E+03	9.953E+02	2.162E+03	1.297E+03
1.3684	1.881E+03	7.511E+02	1.991E+03	1.004E+03	2.177E+03	1.309E+03
1.3744	1.893E+03	7.573E+02	2.004E+03	1.014E+03	2.193E+03	1.321E+03
1.3804	1.904E+03	7.635E+02	2.018E+03	1.023E+03	2.208E+03	1.334E+03
1.3864	1.916E+03	7.697E+02	2.031E+03	1.032E+03	2.223E+03	1.346E+03
1.3924	1.927E+03	7.759E+02	2.044E+03	1.041E+03	2.239E+03	1.358E+03
1.3984	1.939E+03	7.821E+02	2.057E+03	1.050E+03	2.254E+03	1.371E+03
1.4043	1.951E+03	7.884E+02	2.071E+03	1.060E+03	2.270E+03	1.383E+03
1.4103	1.962E+03	7.947E+02	2.084E+03	1.069E+03	2.285E+03	1.396E+03
1.4163	1.974E+03	8.010E+02	2.097E+03	1.078E+03	2.301E+03	1.408E+03
1.4223	1.986E+03	8.073E+02	2.111E+03	1.088E+03	2.317E+03	1.421E+03
1.4283	1.998E+03	8.136E+02	2.124E+03	1.097E+03	2.332E+03	1.433E+03
1.4343	2.009E+03	8.200E+02	2.138E+03	1.107E+03	2.348E+03	1.446E+03
1.4402	2.021E+03	8.263E+02	2.151E+03	1.116E+03	2.364E+03	1.459E+03
1.4462	2.033E+03	8.327E+02	2.165E+03	1.126E+03	2.380E+03	1.472E+03
1.4522	2.045E+03	8.391E+02	2.179E+03	1.135E+03	2.396E+03	1.484E+03
1.4582	2.057E+03	8.456E+02	2.192E+03	1.145E+03	2.412E+03	1.497E+03
1.4642	2.069E+03	8.520E+02	2.206E+03	1.155E+03	2.428E+03	1.510E+03
1.4702	2.081E+03	8.585E+02	2.220E+03	1.164E+03	2.444E+03	1.523E+03
1.4761	2.093E+03	8.649E+02	2.234E+03	1.174E+03	2.460E+03	1.536E+03
1.4821	2.105E+03	8.714E+02	2.247E+03	1.184E+03	2.477E+03	1.549E+03
1.4881	2.117E+03	8.779E+02	2.261E+03	1.194E+03	2.493E+03	1.563E+03
1.4941	2.129E+03	8.845E+02	2.275E+03	1.203E+03	2.509E+03	1.576E+03
1.5001	2.141E+03	8.910E+02	2.289E+03	1.213E+03	2.526E+03	1.589E+03
1.5061	2.153E+03	8.976E+02	2.303E+03	1.223E+03	2.542E+03	1.602E+03

M_{\max}	DDH-D2L			DDH-D2M		DDH-D2U	
	2.008 M_{\odot}			2.134 M_{\odot}		2.322 M_{\odot}	
ρ	ε	P	ε		P	ε	P
[fm^{-3}]	[MeV. fm^{-3}]		[MeV. fm^{-3}]			[MeV. fm^{-3}]	
1.5120	2.165E+03	9.042E+02	2.317E+03	1.233E+03		2.558E+03	1.616E+03
1.5180	2.177E+03	9.108E+02	2.331E+03	1.243E+03		2.575E+03	1.629E+03
1.5240	2.189E+03	9.174E+02	2.345E+03	1.253E+03		2.592E+03	1.643E+03
1.5300	2.202E+03	9.240E+02	2.359E+03	1.263E+03		2.608E+03	1.656E+03

This work was partially supported by national funds from FCT (Fundação para a Ciência e a Tecnologia, I.P, Portugal) under the Projects No. UID/FIS/04564/2019, No. UIDP/04564/2020, No. UIDB/04564/2020, and No. POCI-01-0145-FEDER-029912 with financial support from Science, Technology and Innovation, in its FEDER component, and by the FCT/MCTES budget through national funds (OE).