Note on the TM1m model

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A. RMF parameters and saturation properties

The new parameter set TM1m, which has a relatively large effective mass $M^*/M \sim 0.8$, has been fitted. The parameters and saturation properties of the TM1m model are given in Tables I and II, while those from other models are listed for comparison.

TABLE I: Parameter sets in the RMF framework.

	NL3	IUFSU	BigApple	TM1	TM1e	**TM1m**
M	939	939	939		**938.0**	
m_σ	508.194	491.5	492.73		**511.198**	
m_ω	782.501	782.5	782.5		**783.0**	
m_ρ	763.0	763.0	763.0		**770.0**	
g_σ	10.217	9.9713	9.670	10.029	10.029	**7.93528**
g_ω	12.868	13.032	12.316	12.614	12.614	**8.63169**
g_ρ	8.948	13.590	14.162	9.264	13.971	**11.51296**
g_2 (fm^{-1})	-10.431	-8.493	-11.921	-7.233	-7.232	**-11.51628**
g_3	-28.885	0.4877	-31.680	0.618	0.618	**54.88715**
c_3	0.0	144.220	2.684	71.3075	71.307	**0.00025**
Λ_v	0.0	0.046	0.0475	0.000	0.04292	**0.09326**

TABLE II: Saturation properties of nuclear matter.

	NL3	IUFSU	BigApple	TM1	TM1e	**TM1m**
ρ_0	0.148	0.155	0.155	0.1452	0.1452	**0.145**
E/A	-16.23	-16.397	-16.34	-16.263	-16.263	**-16.267**
K	271.76	231.333	227.001	281.08	281.08	**281.07**
$E_{\rm sym}$	37.4	31.296	31.315	36.89	31.38	**31.379**
L	118.2	47.205	39.79	110.78	40.00	**40.000**
M^*/M	0.60	0.61	0.61	0.634	0.634	**0.793**

B. Neutron star properties

We constructed the EOS for neutron-star matter by combining the TM1m EOS at high densities with the crust EOS using the TM1e model.

- The properties of $1.4\,M_\odot$ neutron star are as follows:
  - $R_{1.4} = 12.45\,\mathrm{km}$
  - $\Lambda_{1.4} = 424$
- The properties of the maximum-mass neutron star are as follows:
  - $R_{\rm max} = 10.71\,\mathrm{km}$
  - $M_{\rm max} = 2.008\,M_\odot$