

Superdense stars containing strange quark matter

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Strange quark matter

In pioneer work of V.A.Ambartsumian and G.S. Sahakian [1] it has been shown that degenerated nuclear plasma may contain, besides neutrons, protons and electrons, also strange baryons – hyperons. In [2] G.S. Sahakian and Yu.L.Vartanian for the first time have shown that taking into account the interaction between baryons makes possible the existence of hyperons in the central regions of stable neutron stars.

A new interest towards strange nuclear plasma has arisen when Witten [3] supposed, that quark-electron plasma with a strangeness -1 per baryon may be absolutely stable state of cold superdense matter.

V.A.Ambartsumian, G.S. Sahakian, *Sov.Astron.Zh.*, 37, 193, 1960.

G.S.Sahakian, Yu.L.Vartanian, *Nuovo Cimento*, 30, 82, 1963; *Sov.Astron.Zh.*, 41, 193, 1964.

E.Witten, *Phys.Rev.* D30, 272, 1984.

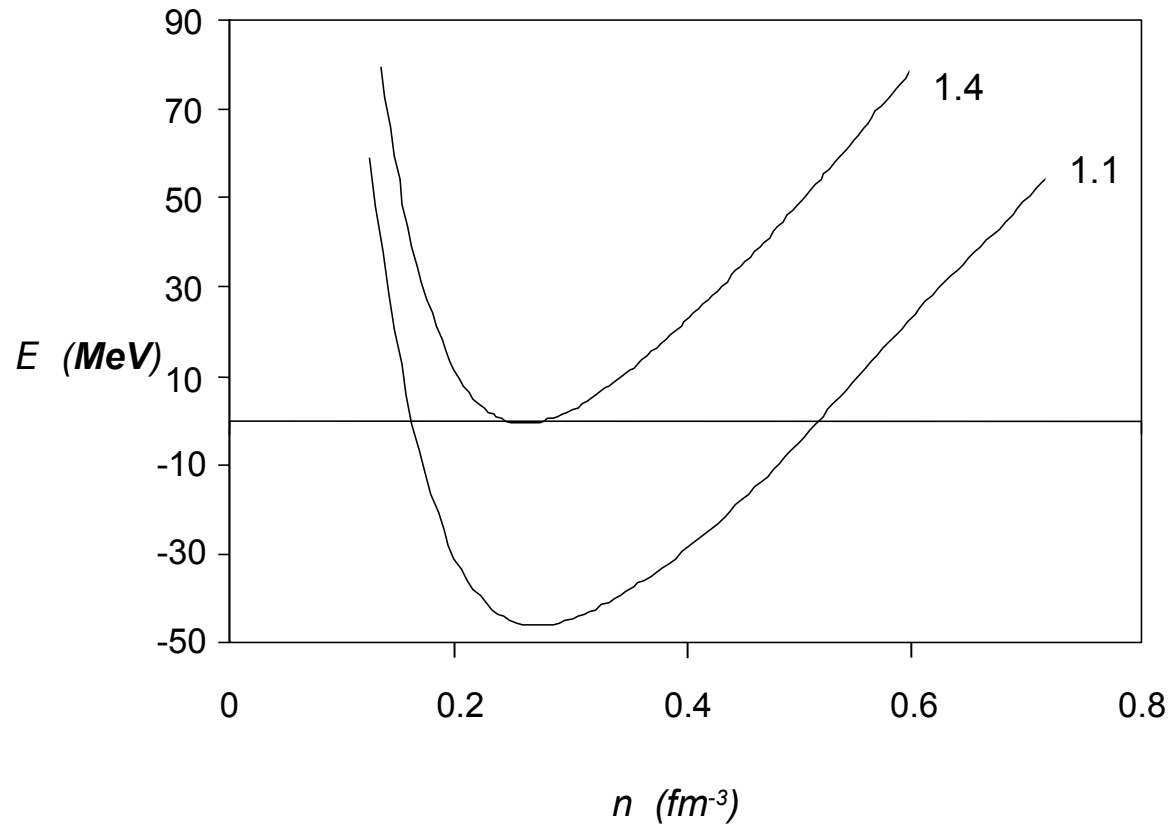
Strange Stars

**Yu.L.Vartanyan, A.R.Arutyunyan, A.K.Grigoryan,
Astrofizika, 37, 499, 1994**

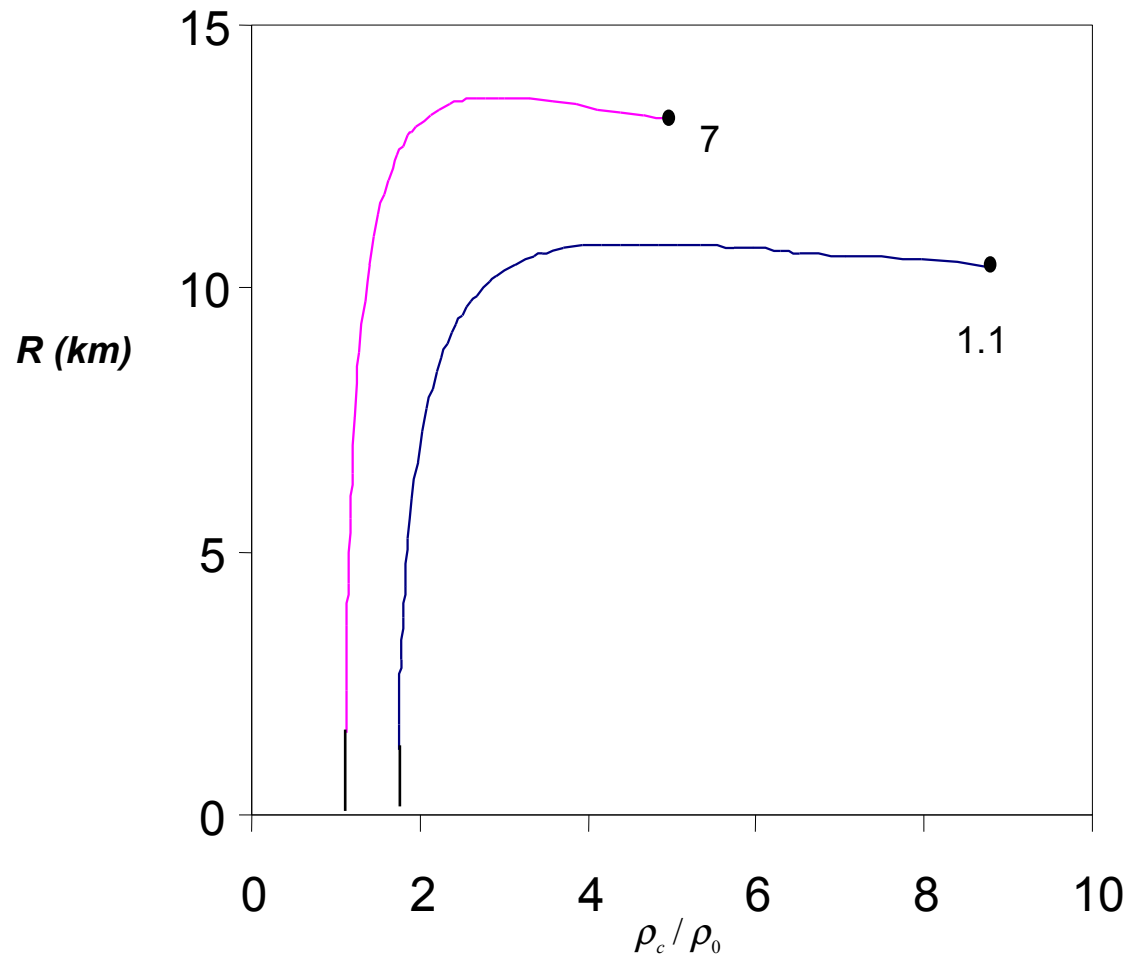
(Astrophysics, 37, 271, 1994);

**Yu.L.Vartanyan, A.R.Arutyunyan, A.K.Grigoryan,
Astronomy Letters, 21, 122, 1995.**

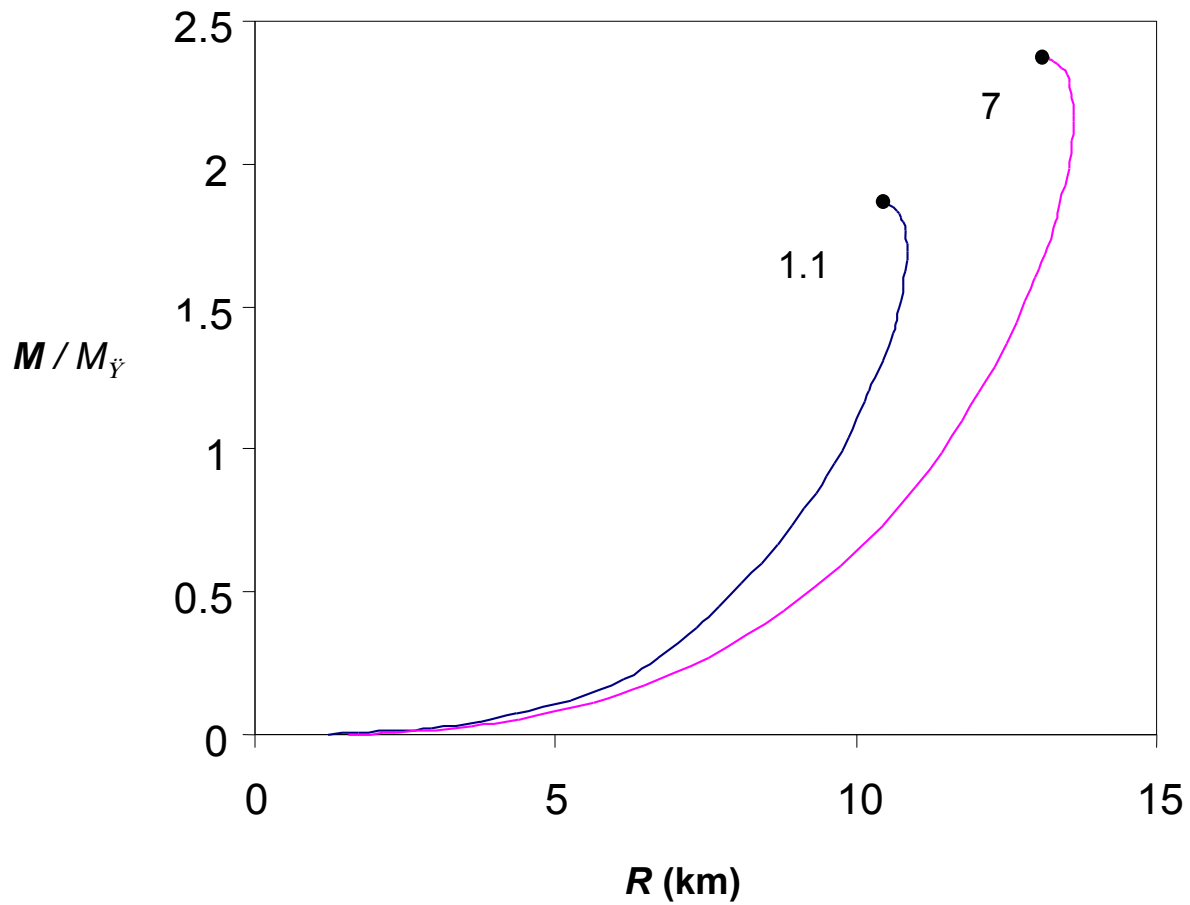
EoS for Strange Stars



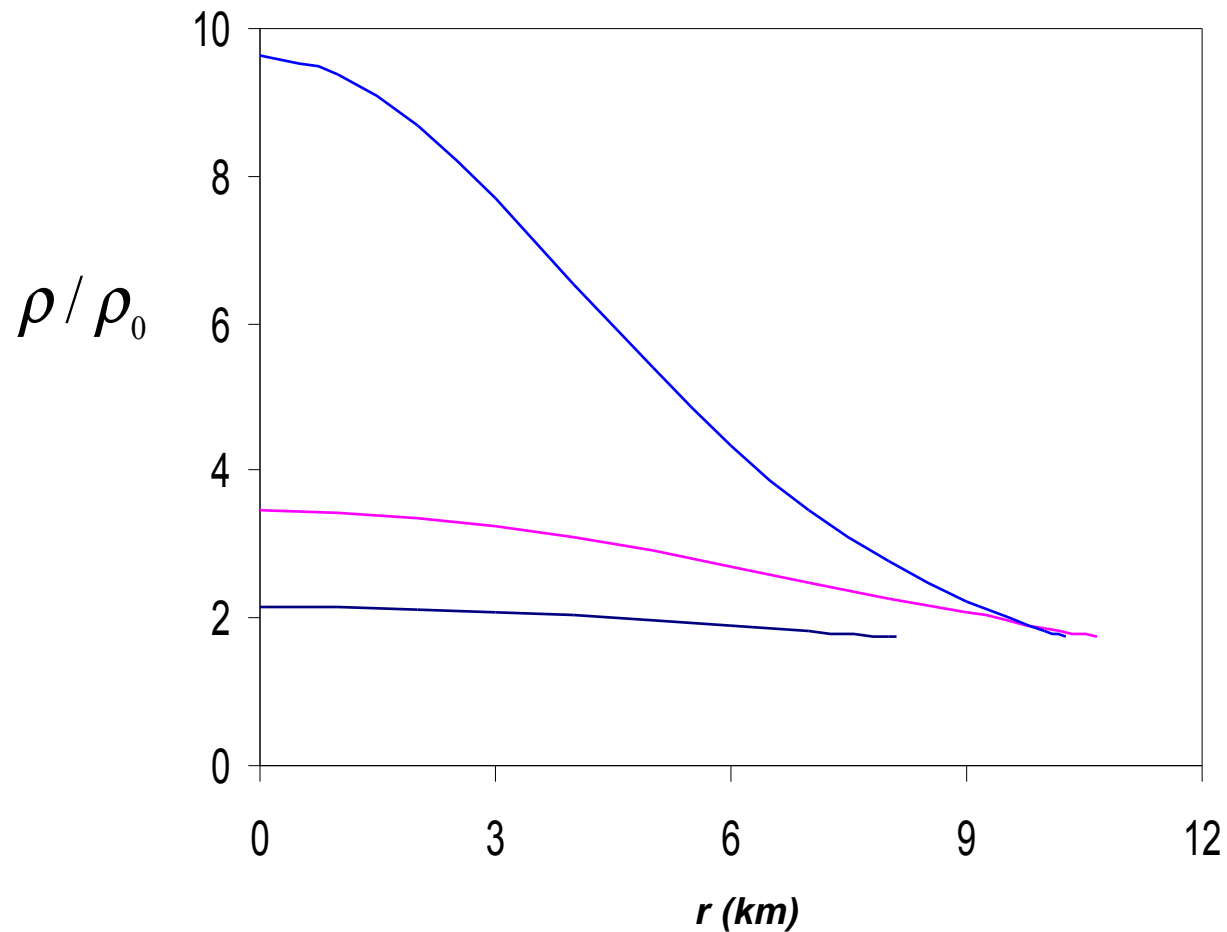
Radius-central density (SS)



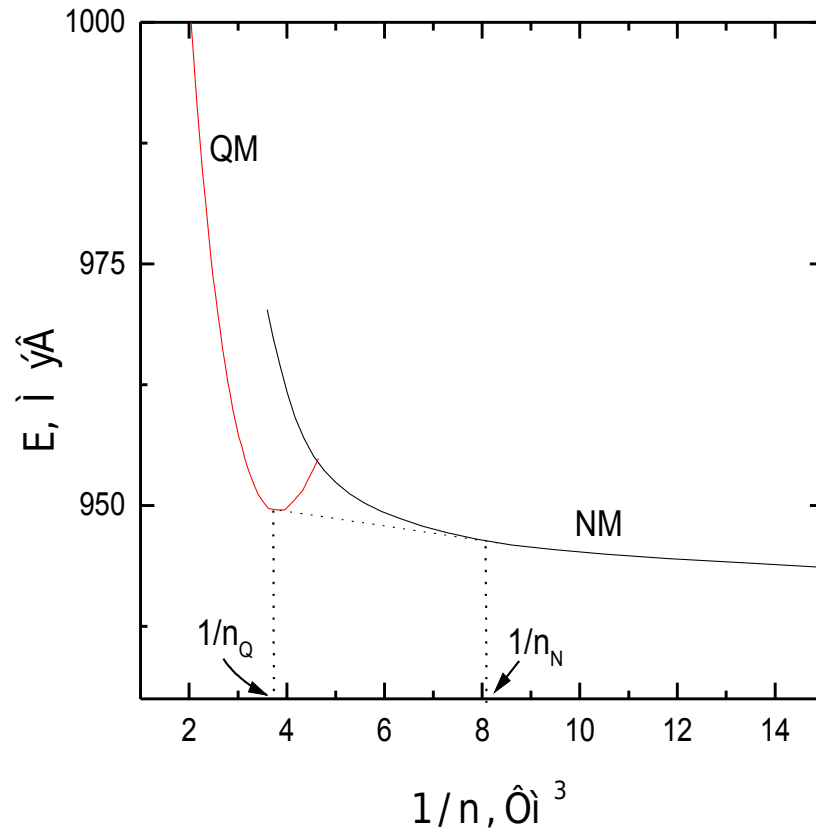
Mass-radius relationship (SS)



Total energy density-distance from star center:
1. $M=0.5M_{\text{sun}}$, 2. $M=1.44M_{\text{sun}}$, 3. $M=1.86M_{\text{sun}}$



EoS for Neutron Stars with a Strange Quark Core



Neutron Stars with a Strange Quark Core

Yu.L.Vartanian, A.R.Harutyunian, G.B.Alaverdyan, in the Plenary Lectures and Contributed Papers, GR 15, Pune, India, December 16-21, 1997, p.159;

G.B.Alaverdyan, A.R.Harutyunyan, Yu.L.Vartanyan, Spacetime and Substance, 2, 3(8), 129, 2000;

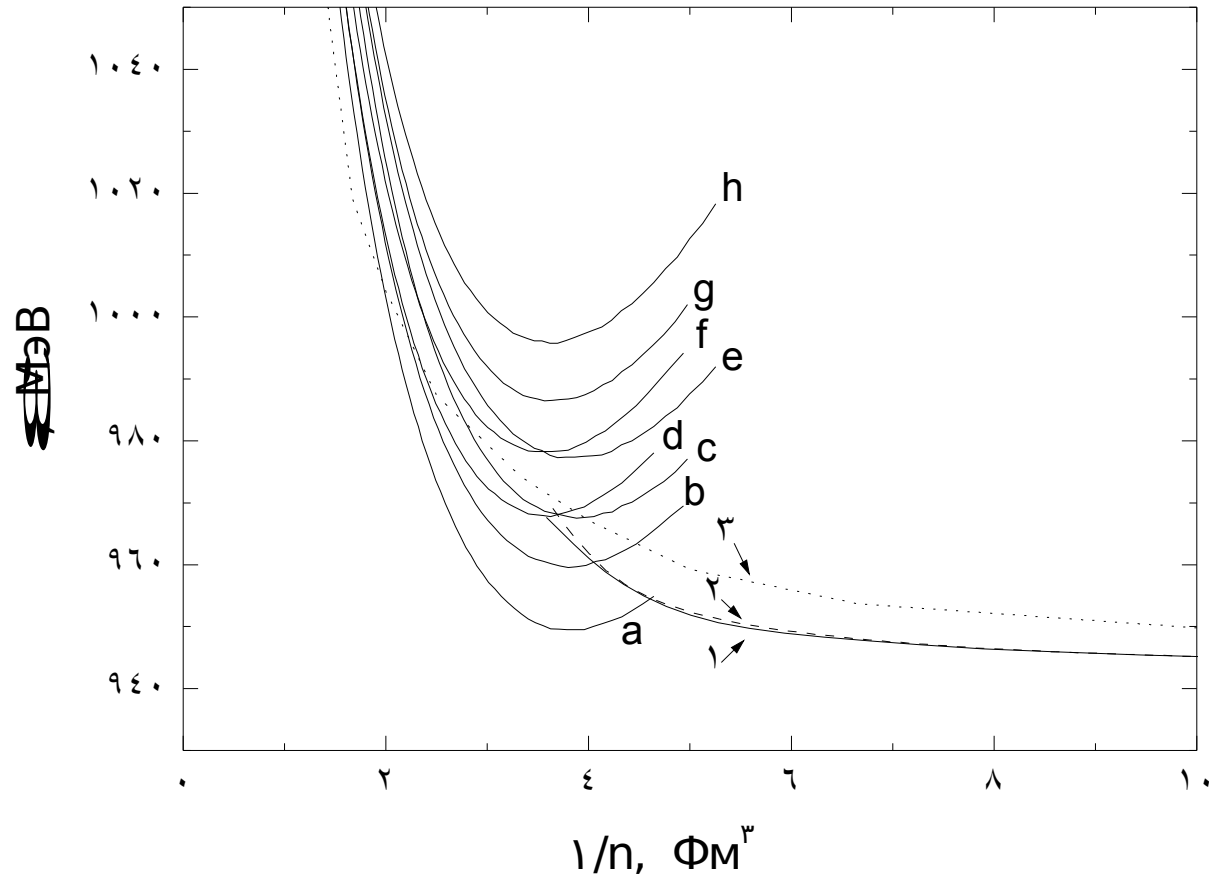
G.B.Alaverdyan, A.R.Harutyunyan, Yu.L.Vartanyan, Astrophysics, 44, 265, 2001;

G.B.Alaverdyan, A.R.Arutyunyan, Yu.L.Vartanyan, Astronomy Letters, 28, 24, 2002;

A.R.Harutyunyan, Astrophysics, 45, 248, 2002;

G.B.Alaverdyan, A.R.Harutyunyan, Yu.L.Vartanyan, Astrofizika, 46, 445, 2003.

First-order phase transition



EoS for NS with a quark core

