CV (大西　明)

学部: 京都大学 (1983.4-1987.3)

卒業研究: **P4, Time-Reversal**

大学院: 京都大学 (1987.4-1992.3)

核反応: 重イオン衝突の輸送模型、分子動力学

Post Doc: RCNP (学振, 1992.4-1993.3)

波束の統計力学

北海道大学 (1993.4-2008.3)

重イオン反応、ハイパー核物理、(核構造)、状態方程式、格子**QCD**

京都大学基礎物理学研究所 **(2008.4-)**

RMF with Chiral Symmetry: Chiral Collapse

Naïve Chiral RMF models → Chiral collapse at low ρ *(Lee-Wick 1974)*

$$L = \frac{1}{2}\left(\partial_\mu \sigma \partial^\mu \sigma + \partial_\mu \pi \partial^\mu \pi\right) - \frac{\lambda}{4}\left(\sigma^2 + \pi^2\right)^2 + \frac{\mu^2}{2}\left(\sigma^2 + \pi^2\right) + c\sigma + \overline{N} i \partial_\mu \gamma^\mu N - g_\sigma \overline{N}\left(\sigma + i\pi\tau\gamma_5\right) N$$

Prescriptions

σω coupling (too stiff EOS)
(Boguta 1983, Ogawa et al. 2004)

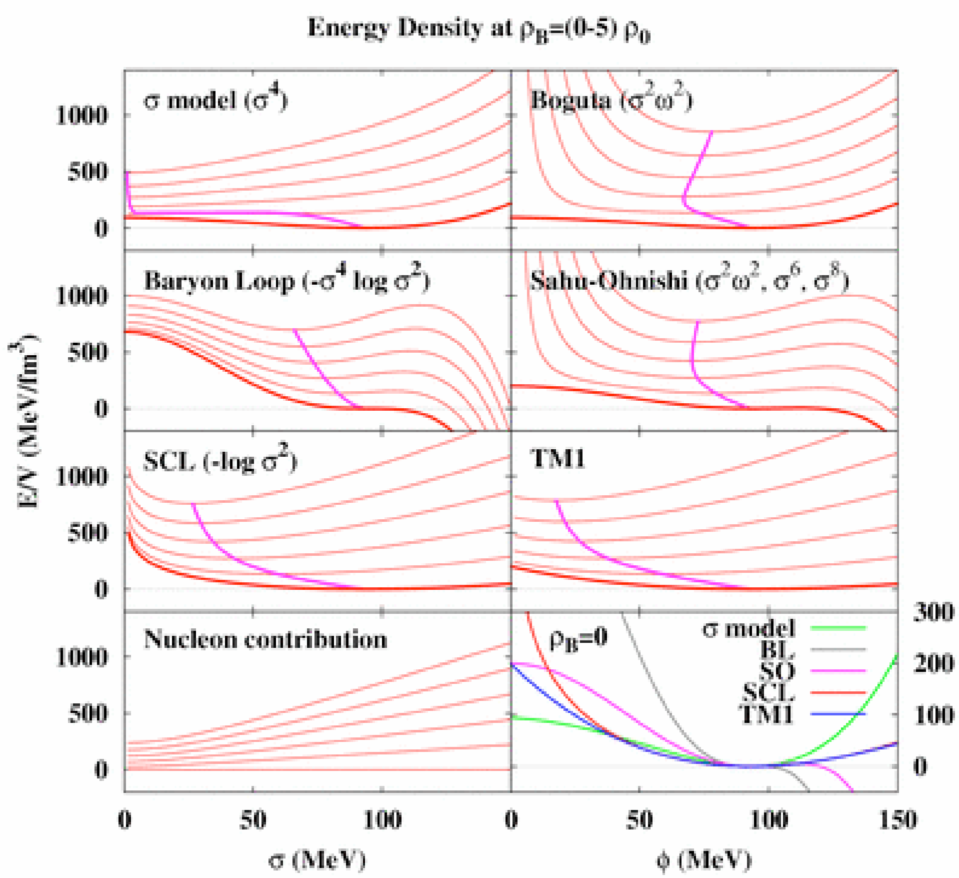
Loop effects (unstable at large σ)
(Matsui-Serot, 1982, Glendenning 1988, Prakash-Ainsworth 1987,Tamenaga et al. 2006)

Higher order terms (unstable at large σ)
(Hatsuda-Prakash 1989, Sahu-Ohnishi 2000)

Dielectric (Glueball) Field representing scale anomaly
(Furnstahl-Serot 1993,Heide-Rudaz-Ellis 1994, Papazoglou et al.(SU(3)) 1998)

Different Chiral partner assignment
(DeTar-Kunihiro 1989, Hatsuda-Prakash 1989, Harada-Yamawaki 2001, Zschiesche-Tolos-Schaffner-Bielich-Pisarski, nucl-th/0608044) → $SU_f(3)$ extention ?

Nucleon Structure
(Saito-Thomas 1994, Bentz-Thomas 2001)

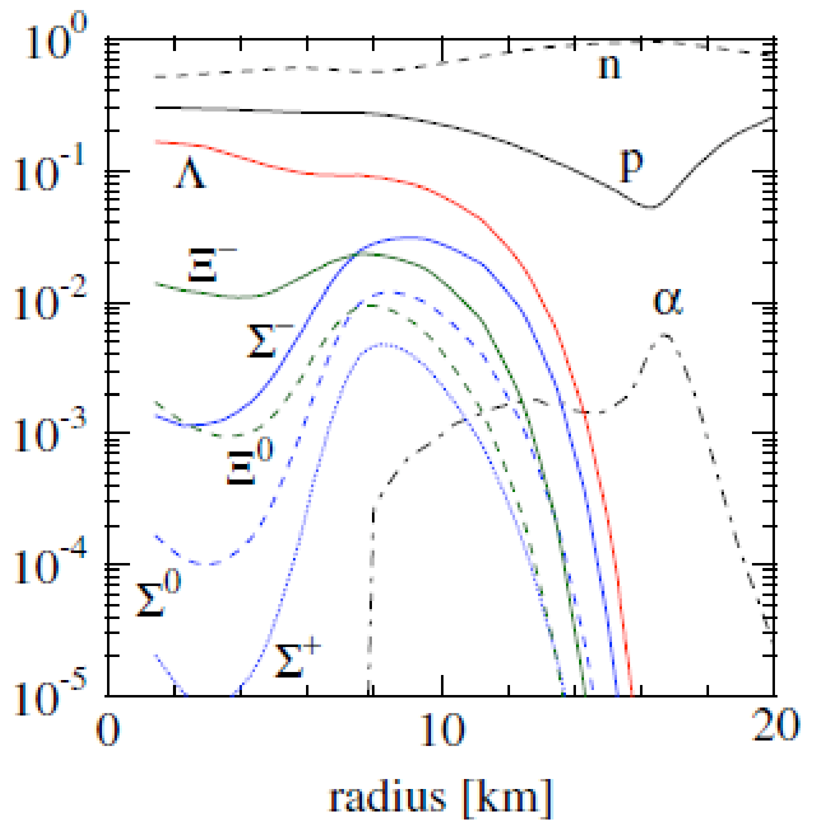


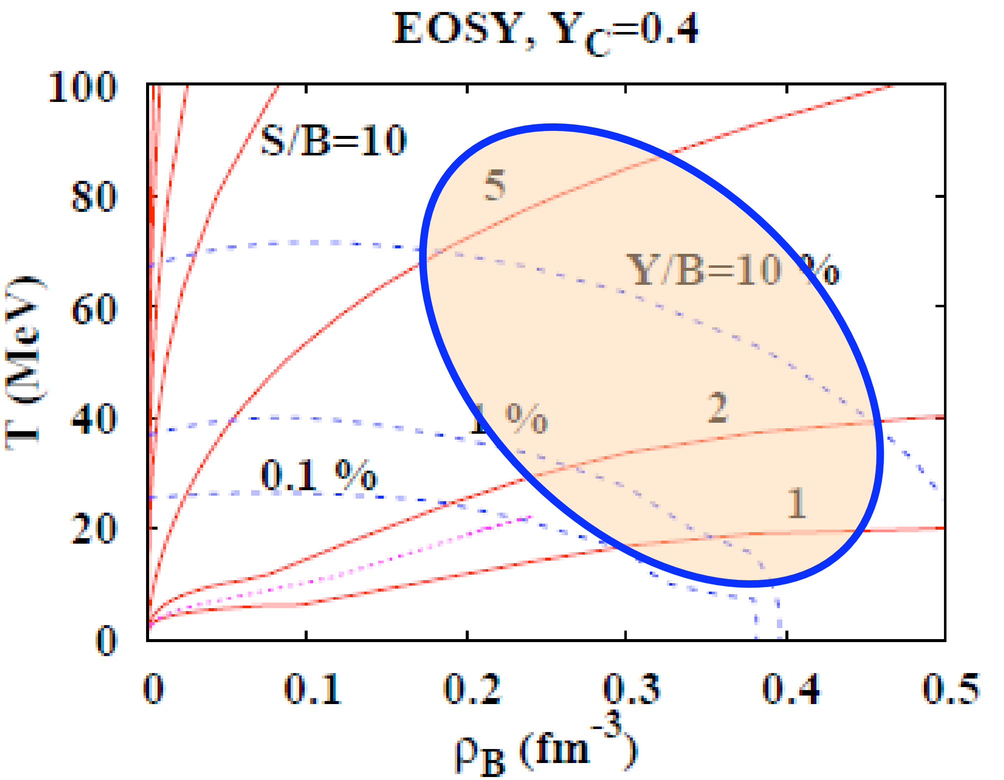
Constituents in Dense Matter

Supernova Matter EOS with Y + Application to BH formation

Ishizuka et al., JPG35('08)085201[arXiv:0802.2318]

Sumiyoshi et al., 2009





→ BH form. = HOT Process (T ~ 70 MeV), then π should be included

Relativistic Mean Field at High Densities

β Equil. cond. in neutron star: $\mu_e = \mu_n - \mu_p$

Exceeds m_π at around ρ_0 (Sym. energy)

Small ambiguities in μ_e
(Cancellation of σ, ω effects)

Big dif. in E/B at high density
(Large ambiguities in meson self-energies)

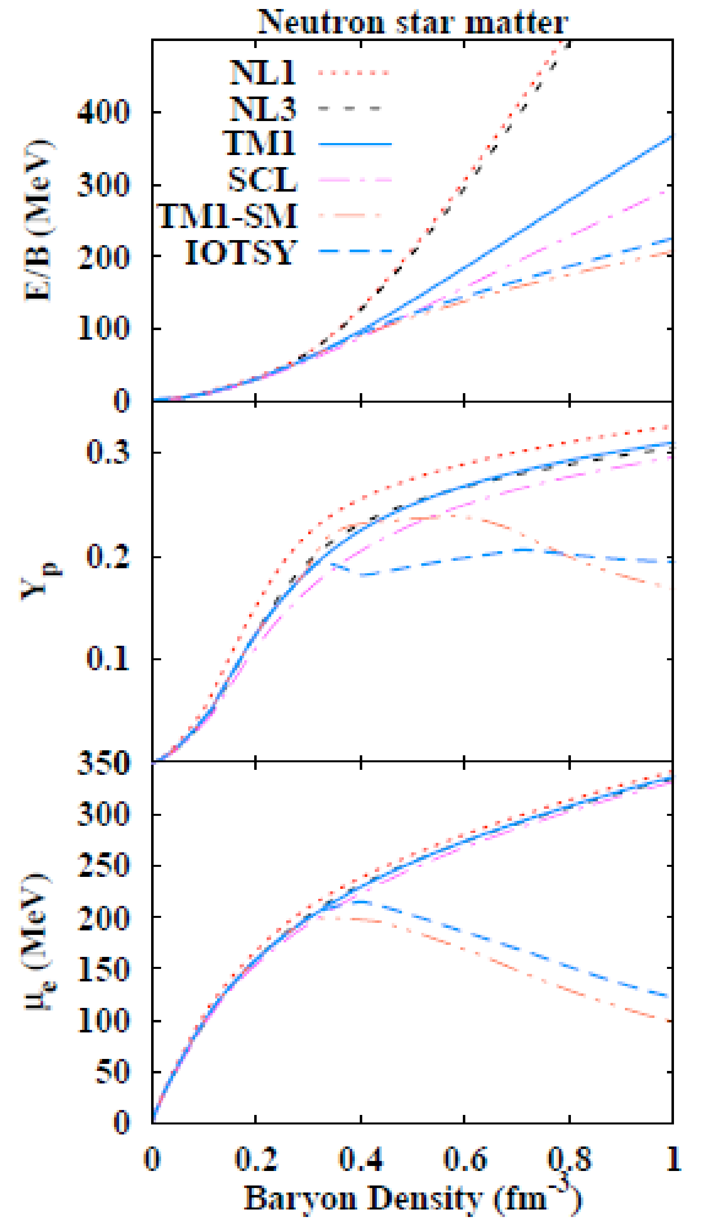
$$\mu_e = \mu_n - \mu_p \ , \quad \rho_e = \rho_p \ ,$$

$$\mu_{n,p} = \sqrt{M_N^{*\,2} + k_F^2} + g_\omega \omega \mp g_\rho \rho \ ,$$

TABLE II: RMF parameters

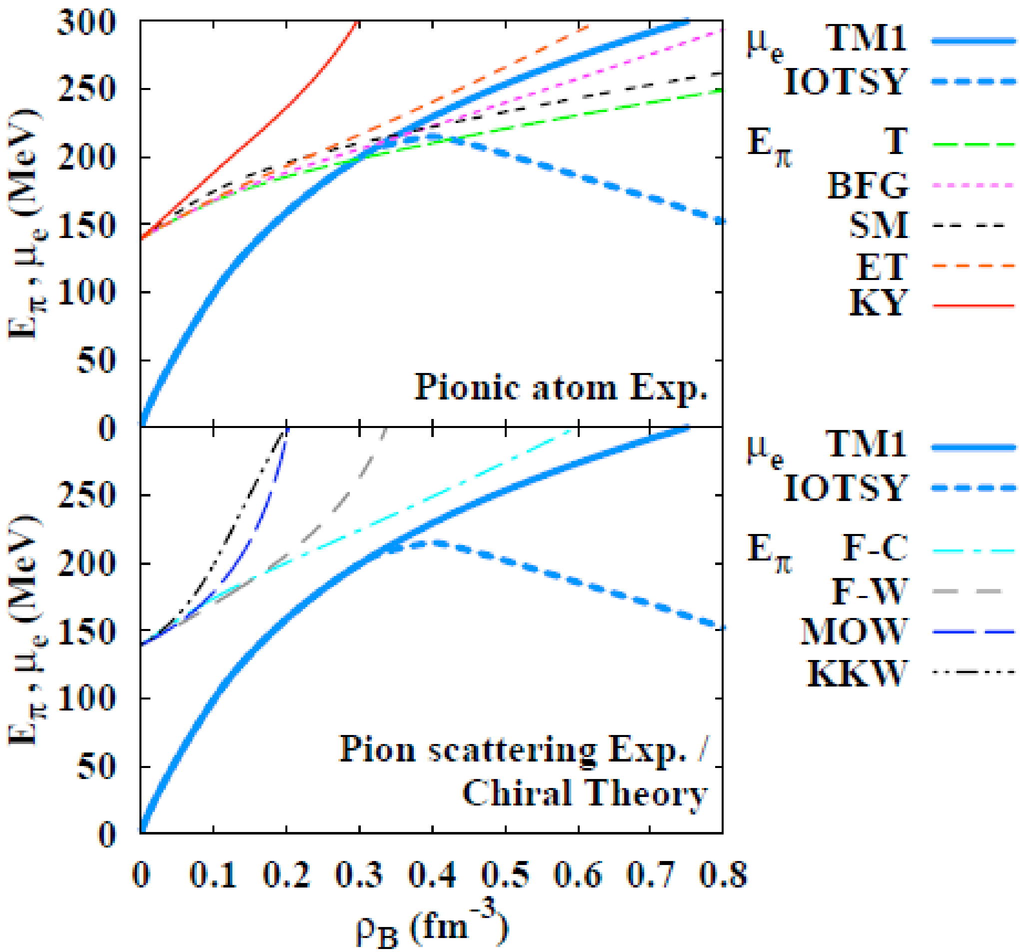
	$g_{\sigma N}$	$g_{\omega N}$	$g_{\rho N}$	g_3(MeV)	g_4	c_ω
NL1[20]	10.138	13.285	4.976	2401.9	-36.265	0
NL3[21]	10.217	12.868	4.474	2058.35	-28.885	0
TM1[22]	10.0289	12.6139	4.6322	1426.466	0.6183	71.3075
SCL[23](*1)	10.08	13.02	4.40	1255.88	13.504	200

(*1): g_3 and g_4 are from the expansion of f_{SCL}.



Do s-wave pions condensate in neutron stars ?

Comparison of μ_e in RMF and E_π calculated with Opt. Pot.



Model		No Y	Y
T	Pb	O	O
BFG, SM	Pb	O	X
ET, F-C	Pb,Scatt	X	X
KY, F-W	Sn,Scatt.b(ρ)	X	X
MOW, KKW	Chiral,b(ρ)	X	X

Either
$Y / b_1(\rho) / \pi A$ scatt.
→ s-wave pions
do not condensate
except for T(Taucher 71)

New Frontiers in QCD 2010
--- Exotic Hadron Systems and Dense Matter ---
(NFQCD10)
Jan. 18-Mar.19, 2010, YITP, Kyoto, Japan

Exotic hadron systems

- **Exotic Hadrons (Ia)**
- **Hadrons in Nuclei (Ib)**

Compact astrophysical phenomena in relation to quark, hadron and nuclear physics

Condensed matter physics of dense hadronic and quark matter

Theoretical Developments in quark and hadron physics