五年来征程于大江南北，FPS像“宣传队和播种机”一样点燃脉冲星之“火”。

—— 摘自《FPS5会议文集》

我的物质观：三类物质形态

Renxin Xu (徐仁新)[1,2]

[1]School of Physics, [2]KIAA; PKU

(北京大学物理学院)

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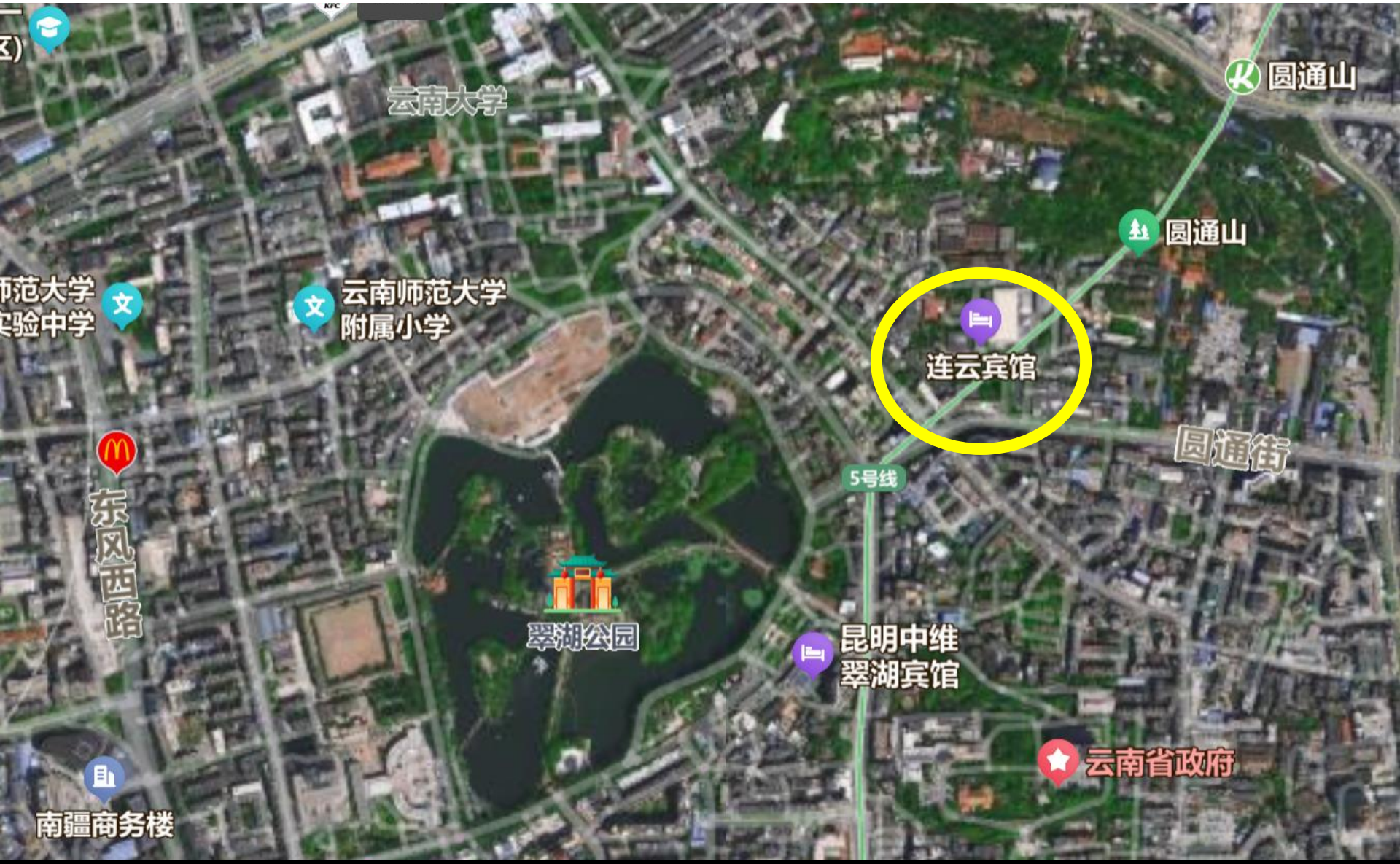
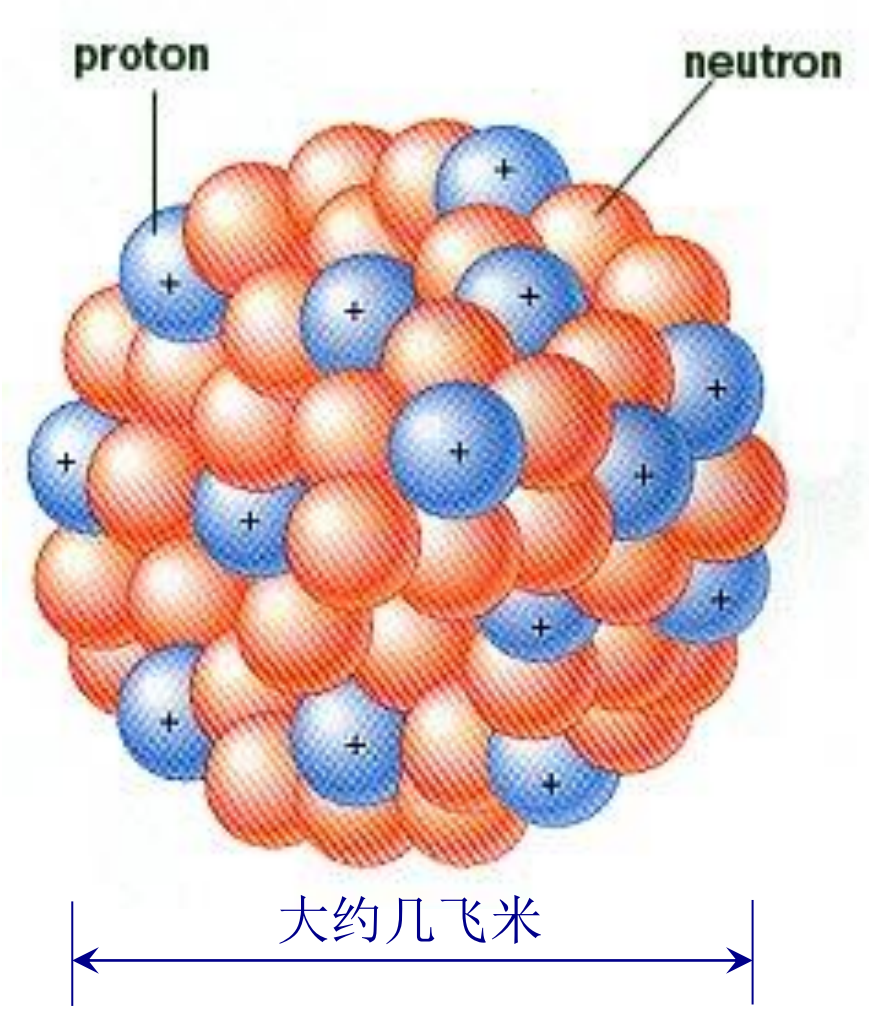
丰富多彩的物质世界


云南大学
圆通山
圆通山
师范大学
实验中学
云南师范大学
附属小学
连云宾馆
圆通街
5号线
东风西路
翠湖公园
昆明中维
翠湖宾馆
云南省政府
南疆商务楼

丰富多彩的物质世界

丰富多彩的物质世界

- 原子核（即**小核**）也是一种物质形态…



构成单元主要被**强力**束缚 → **强物质**

v.s. **电物质**

有更大的强物质吗？

丰富多彩的物质世界

- 是的，朗道1932年就说了啊～即巨核

ON THE THEORY OF STARS.

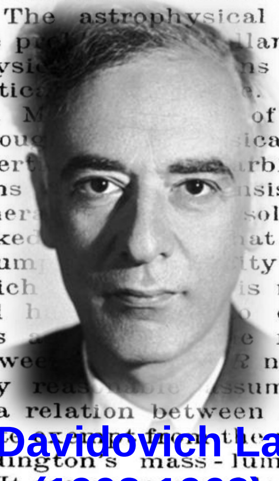
By L. Landau.

(Received 7 January 1932).

From the theoretical point of view the physical nature of Stellar equilibrium is considered.

The astrophysical methods usually applied in attacking the p... lar structure are characterised by making physi... ns chosen only for the sake of mathe-matic... By this is characterised, for instance, Mr. M... of the impossibility of a star consisting throu... ical ideal gas; this proof rests on the asser... rbitrary L and M, the fundamental equa-tions ... nsisting of classical ideal gas admit, in gener... solution. Mr. Milne seems to have over-looke... hat this assertion results only from the assum... ity being constant throughout the star, which ... is made only for mathematical purposes and h... do with reality. Only in the case of this ... e radius R disappears from the relation betwee... R necessary for regularity of the solution. Any rea... assumptions about the opacity would lead to a relation between L, M and R, which relation would be ... criticisms put forward against Eddington's mass-luminosity-relation.

It seems ... to try to attack the problem of stellar structure by methods of theoretical physics, i. e. to investigate the physical nature of stellar equilibrium. For that purpose we must at first investigate the statistical equilibrium of a given mass without generation of energy, the condition for which equilibrium being the minimum of free energy F (for given temperature). The part of free energy due to gravitation is negative and inversely proportional to some



Lev Davidovich Landau (1908-1968)

we have no need to suppose that the radiation of stars is due to some mysterious process of mutual annihilation of protons and electrons, which was never observed and has no special reason to occur in stars. Indeed we have always protons and electrons in atomic nuclei very close together, and they do not annihilate themselves; and it would be very strange if the high temperature did help, only because it does something in chemistry (chain reactions!). Following a beautiful idea of Prof. Niels Bohr's we are able to believe that the stellar radiation is due simply to a violation of the law of energy, which law, as Bohr has first pointed out, is no longer valid in the relativistic quantum theory, when the laws of ordinary quantum mechanics break down (as it is experimentally proved by continuous-rays-spectra and also made probable by theoretical considerations).[1] We expect that this must occur when the density of matter becomes so great that atomic nuclei come in close contact, forming one gigantic nucleus.

On these general lines we can try to develop a theory of stellar structure. The central region of the star must consist of a core of highly condensed matter, surrounded by matter in ordinary state. If the transition between these two states were a continuous one, a mass $M < M_0$ would never form a star because the normal equilibrium state (i. e. without ... regions would be ...e. Because, as far as we know, it is not the fact, we must conclude that the condensed and non-condensed states are separated by some unstable states in the same manner as a liquid and its vapour are, a ... be easily explained by some kind of nuclear attraction, would lead to the existence of a nearly discontinuous boundary between the two states.

gigantic nucleus

中子星

The theory of stellar structure founded on the above considerations is yet to be constructed, and only such a theory can show how far they are true.

February 1931, Zurich.

[1] L. Landau und R. Peierls, ZS. f. Phys. 69, 56, 1931.

Landau L. 1932, *Sov. Phys.*, 1, 285

丰富多彩的物质世界

- 似乎强物质的质量谱跟电物质不一样，而是…

真得吗？如果自然喜欢“味”对称就不一样咯～

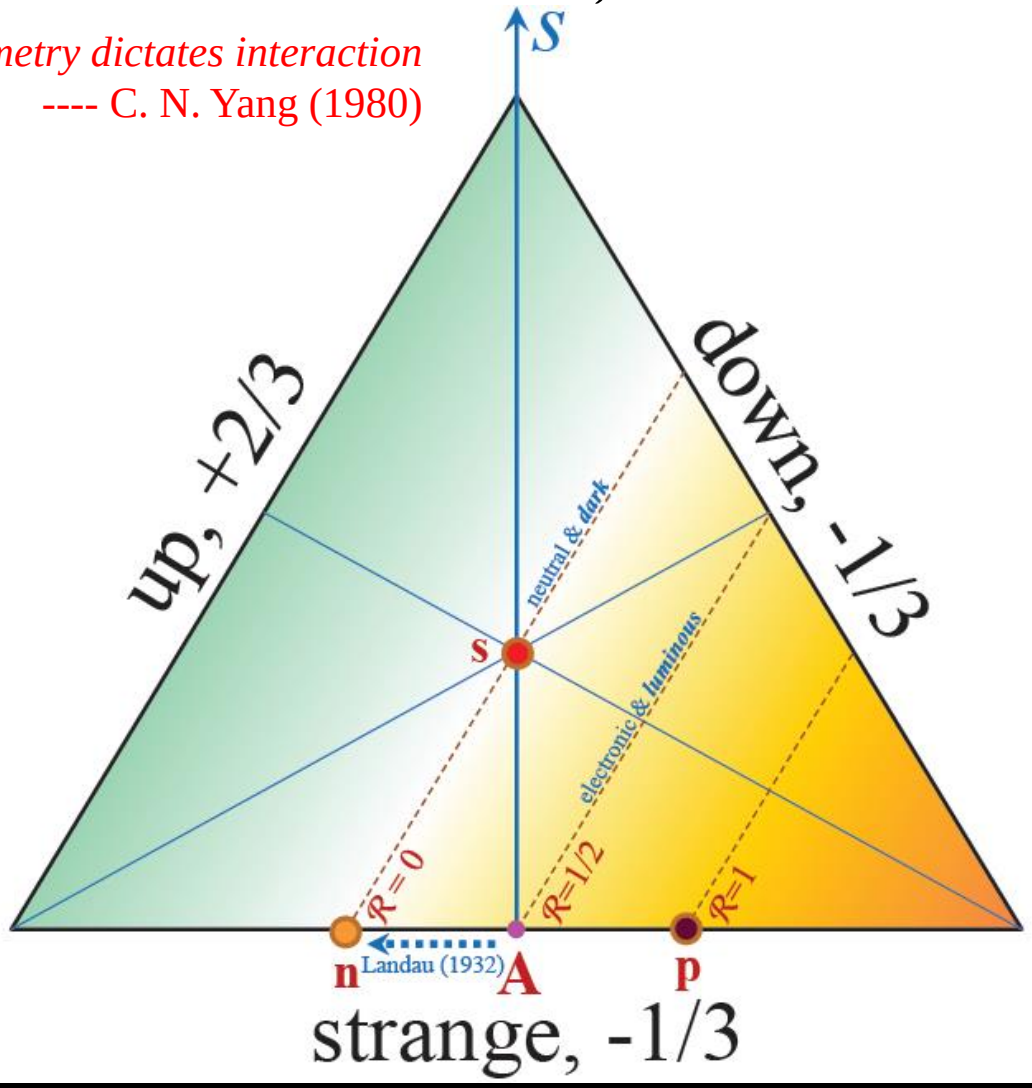
我的物质观：三类物质形态

构成“巨核”单元
真得是中子？

构成“巨核”单元真得是中子？

- 若自然偏好味对称，巨核该由**奇子**组成...

Symmetry dictates interaction
---- C. N. Yang (1980)



我的物质观：三类物质形态

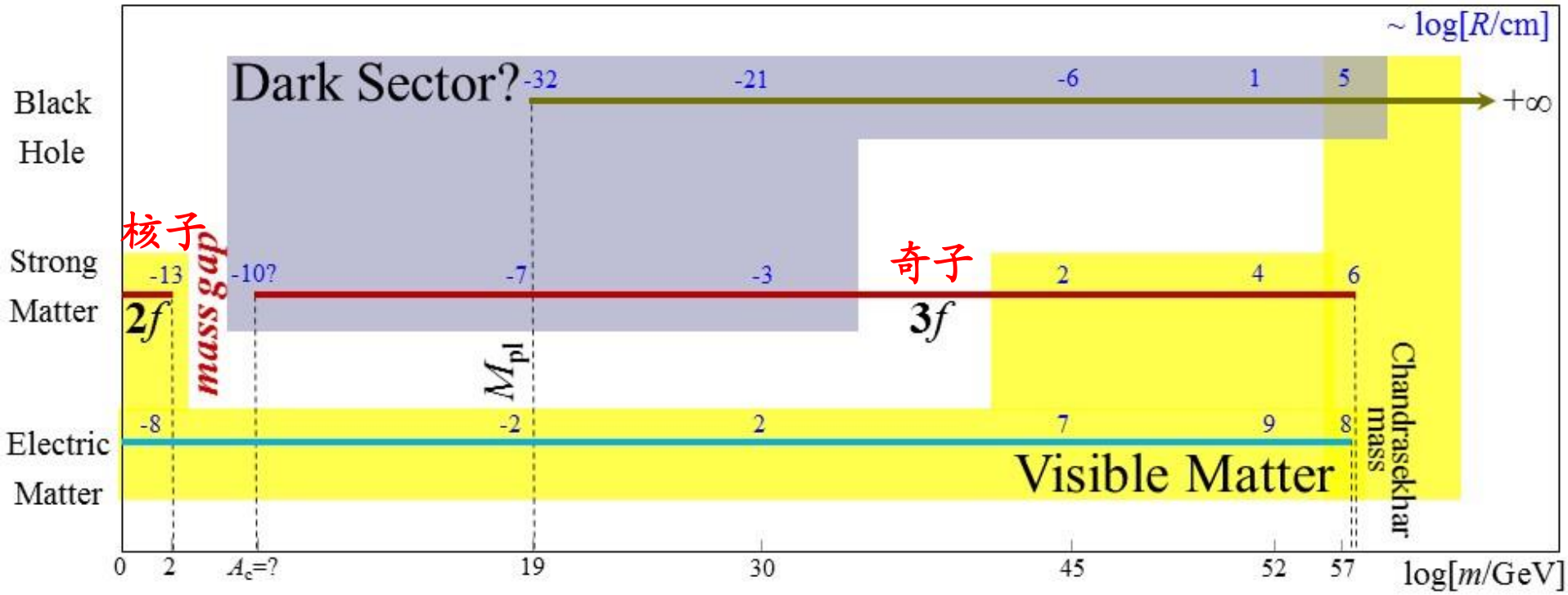
脉冲星是“奇子”星的话，天会塌下来吗？

脉冲星是“奇子”星的话，天会塌下来吗？

在“旧”物理框架内推测的物质世界：

电物质，**强**物质，**奇性**物质…

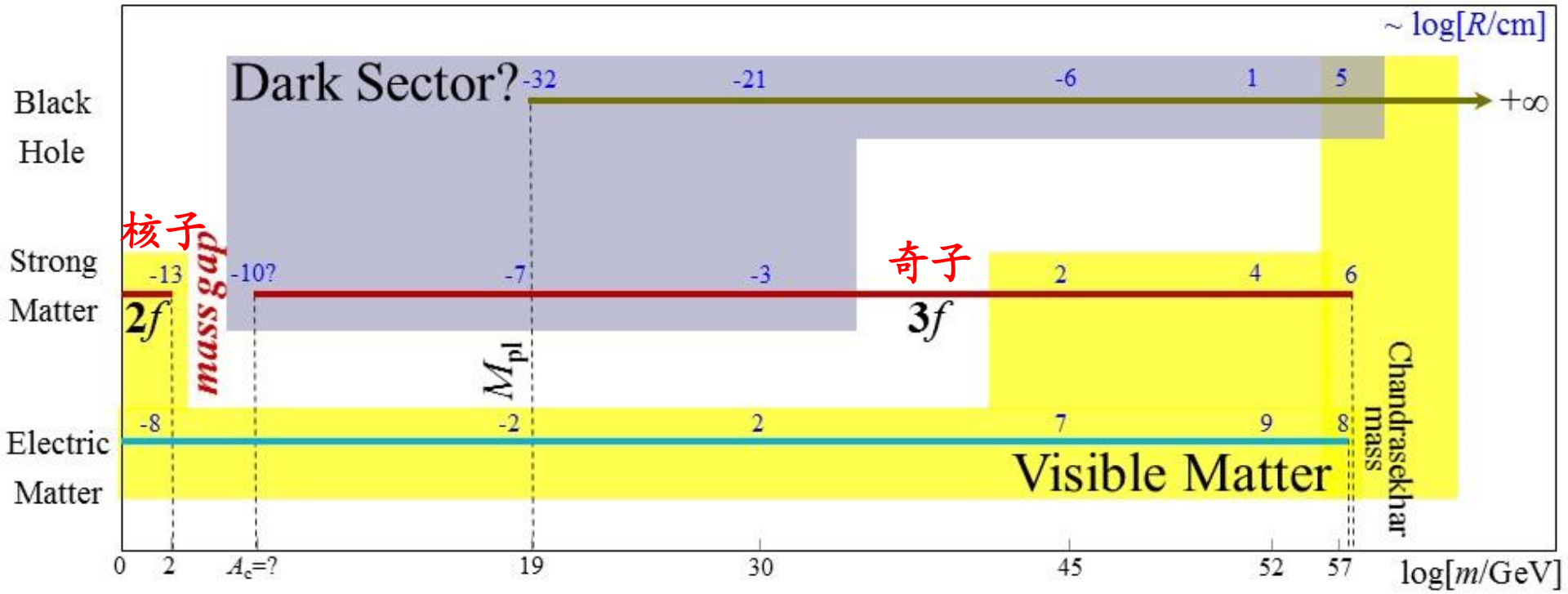
(物质内部没有能量供给)



脉冲星是“奇子”星的话，天会塌下来吗？

在“旧”物理框架内推测的物质世界：

这一物质世界中有亮的、也有暗的！



小　结

- 构成脉冲星这类“巨核”的基本单元是啥？当今众多极端天体物理现象的本质都与这个答案紧密相关。

- 我们认为巨核由**奇子**构成，正如日常物质由**原子**为单元；区别在于：前者的**强**相互作用主导代替后者的**电**磁力。

- 请大家独立甄别这一“物质观”

谢谢!