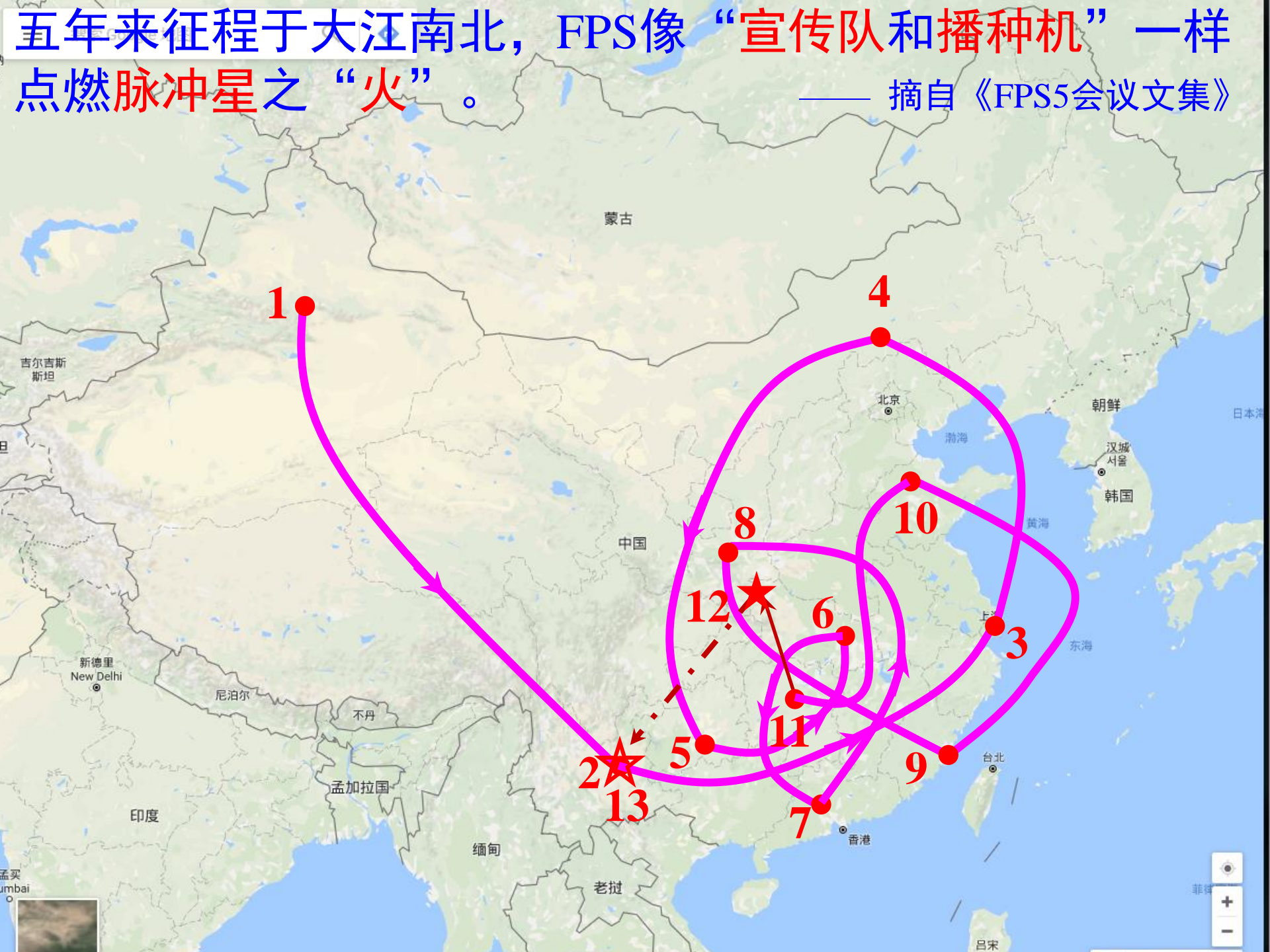


五年来征程于大江南北，FPS像“宣传队和播种机”一样  
点燃脉冲星之“火”。  
——摘自《FPS5会议文集》



# 脉冲星脸上会长“痘痘”？

“ZITS” ON PULSAR’S FACE?

Renxin Xu (徐仁新)<sup>1,2</sup>

<sup>1</sup>School of Physics, <sup>2</sup>KIAA; PKU

(北京大学物理学院)

“FPS12”

July 4-6, 2023; Nanyang Normal University

# 脉冲星~~脸上~~会长“痘痘”？ 表面

“ZITS” ON PULSAR’S SURFACE?

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# “一平如镜”的海螺沟



# “青春痘”长在固体的表面



# 固体地球表面“青春痘”——山峰



# 脉冲星表面会长“青春痘”吗？

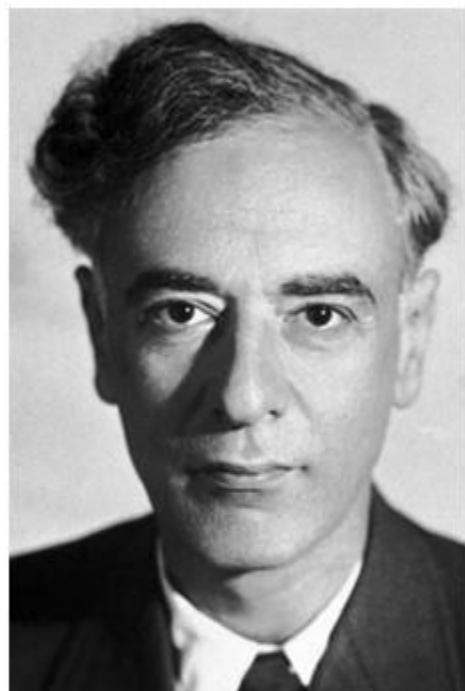
- 答：依赖于脉冲星**到底是啥**...

亚临界磁场中子星或奇异夸克星：没有

超临界磁场中子星或奇子星：可以有

啥是**奇子星**？

# Three Arguments to Strangeon Star



Lev Davidovich Landau  
(1908-1968)

*Neutrality*

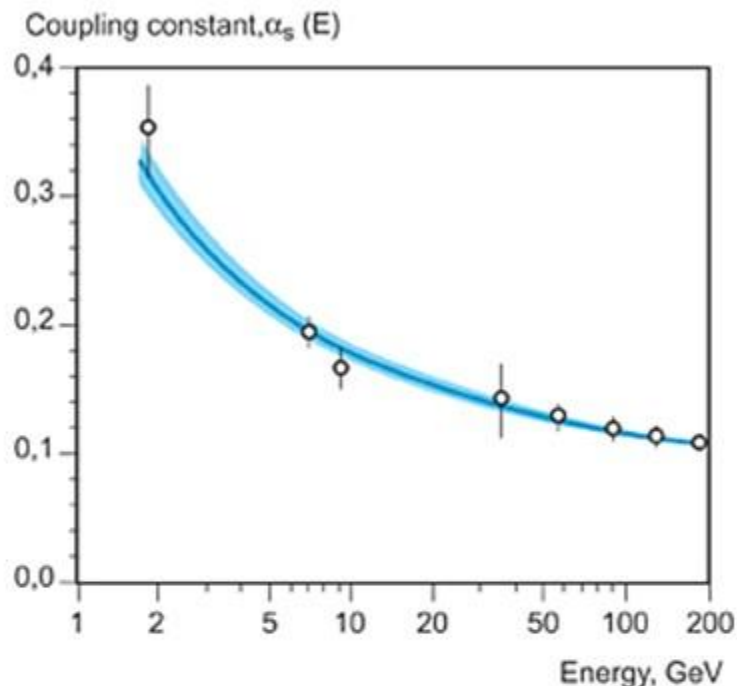
Proton Star?



Edward Witten  
(1951-)

*New-degree*

Symmetry Energy?



Strong-coupling QCD  
(1973-)

*No-perturbativity*

Nucleons in Nucleus?

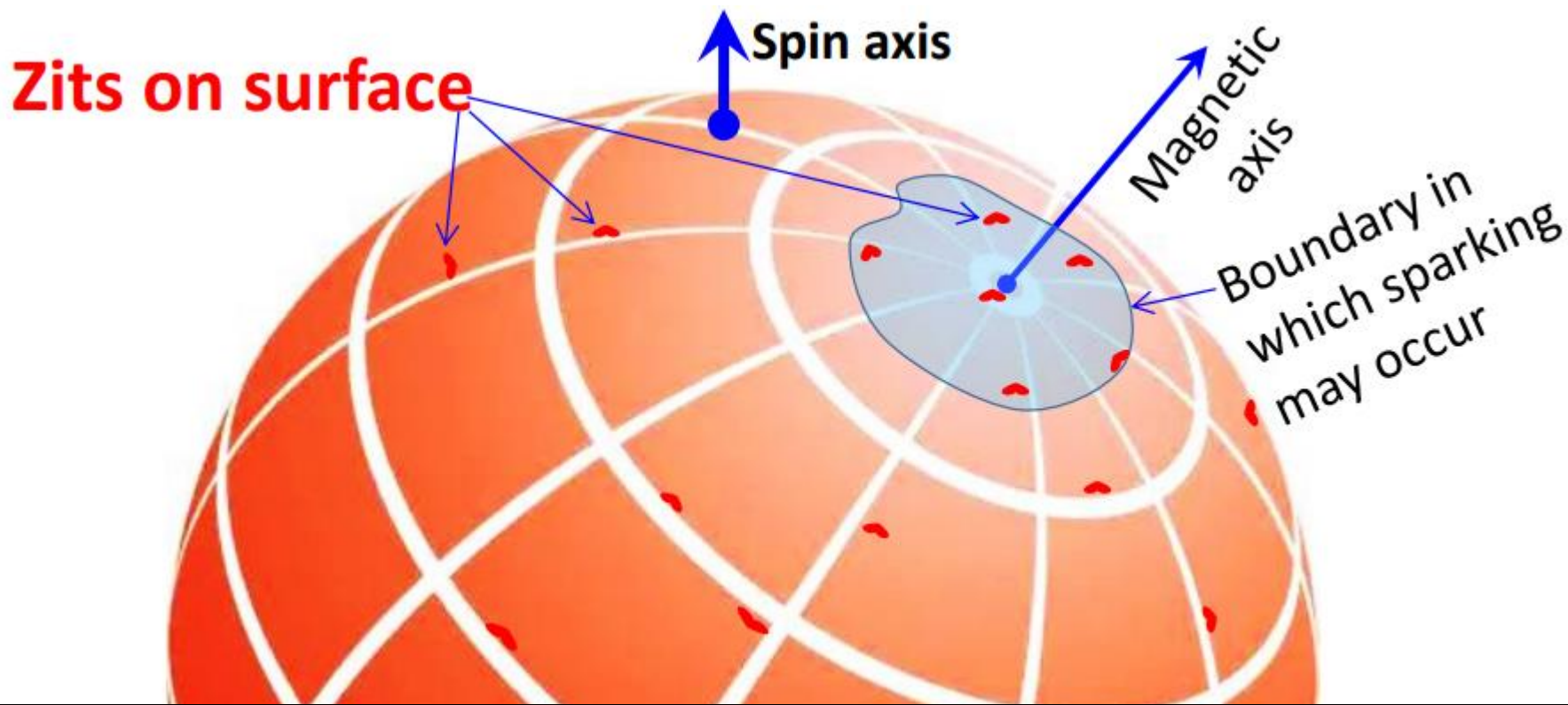
↓  
strangeon star



# 奇子星表面的“山峰”

● 多高?  $h_{\max} \sim (7 \times 10^2 \text{ cm}) \mu_{32} \rho_{15}^{-1} M_1^{-1} R_6^2$

$h \sim (10^{-3} - 10^{-1}) h_{\max} \sim (\text{mm-dm}) \gg r_{\text{cap}}!$



# 奇子星表面的“山峰”

有啥后果？

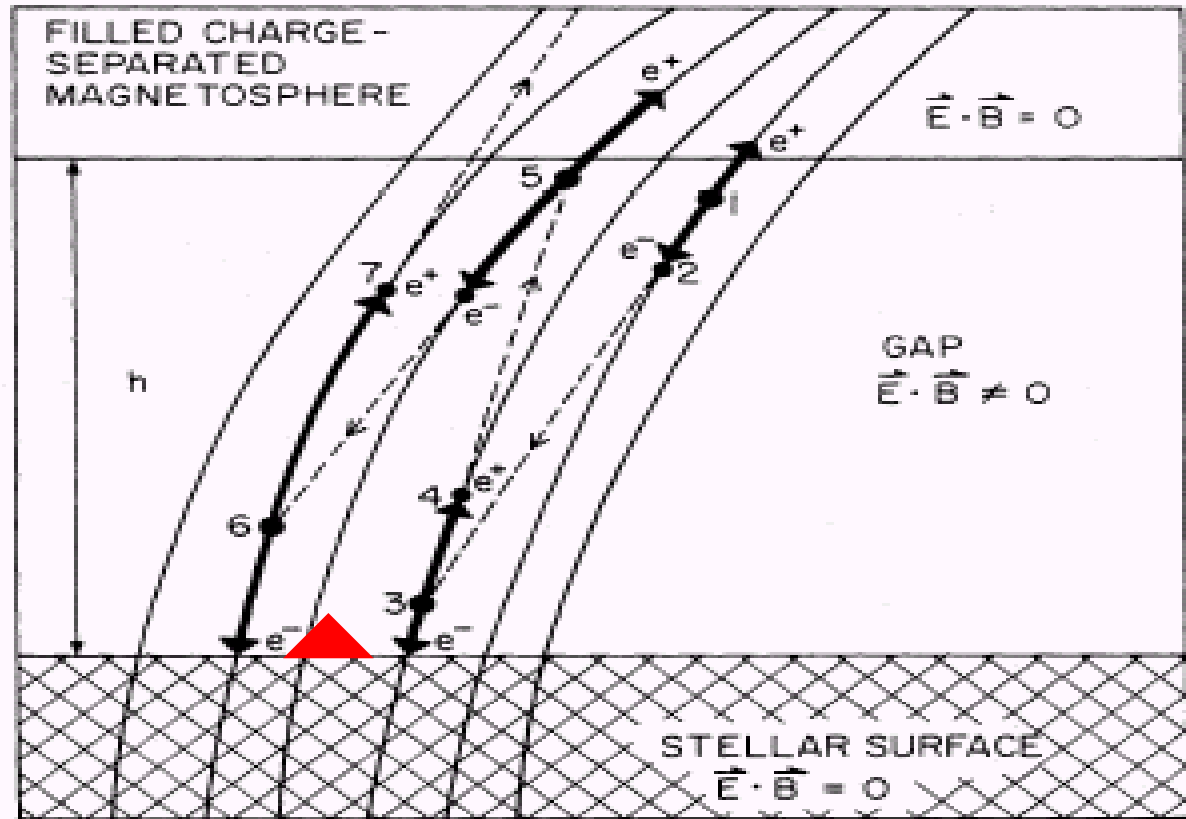
$$E_{\parallel, \text{peak}} \gg E_{\parallel, \text{plain}}$$

山峰处优先放电

Mode-change?

Swooshes?

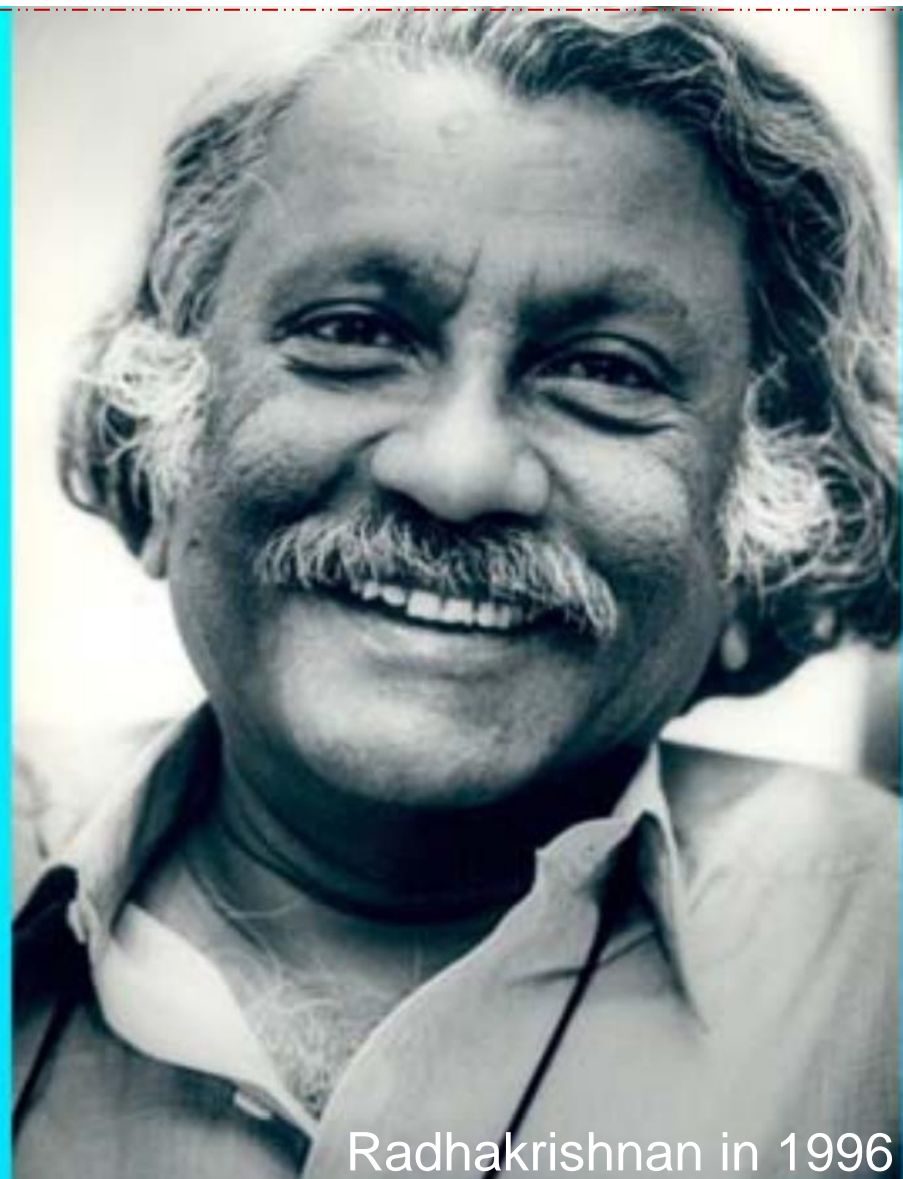
Jitters?



超临界磁场中子星不能有稳定的“痘痘”：

$$\gamma^{1/2} m_e c^2 \sim \gamma_6^{1/2} \text{ GeV} \gg \hbar e B / (m_e c) \sim B_{14} \text{ MeV}$$

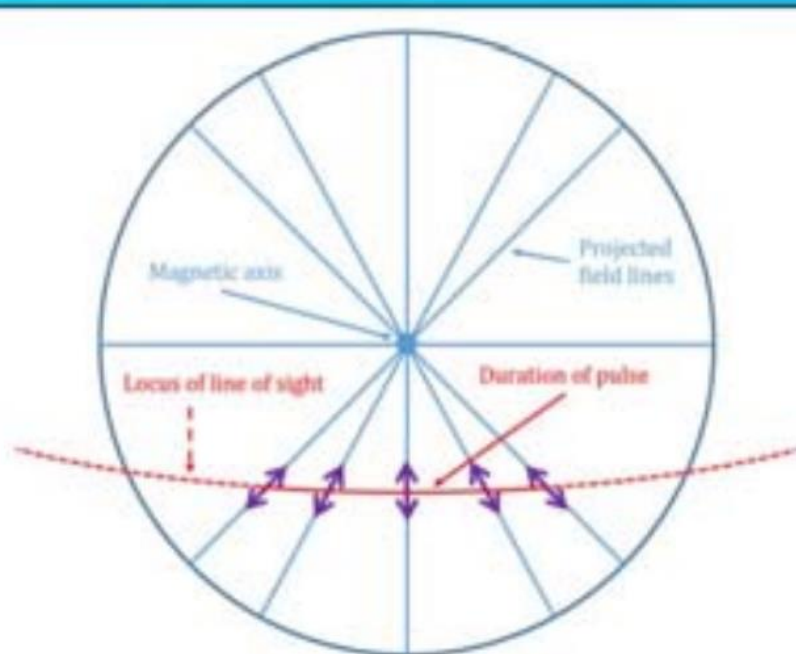
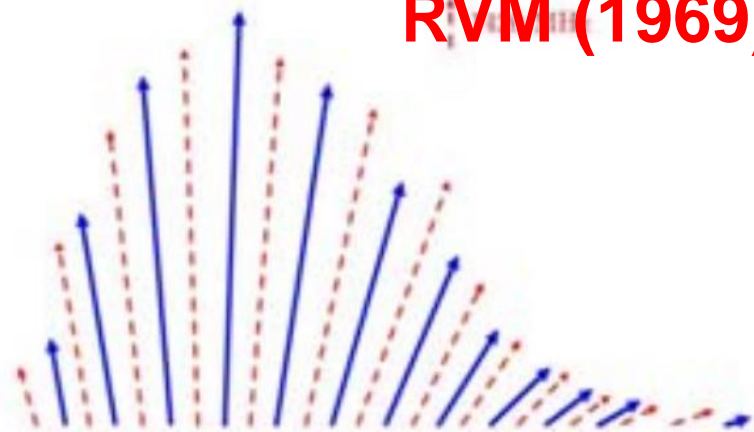
# 脉冲星表面的“山峰”



Radhakrishnan in 1996

from Manchester (2017)

RVM (1969)



# 总结

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- 如果脉冲星本质上是奇子星的话，它的表面会长出可爱而稳定的“小逗逗”。
- 这些“痘痘”处会持续诱导sparking，可能表现于脉冲星和快速射电暴的观测之中。

谢谢!