The Truth about the Strange Non-Chaotic Stars

Sylwester Kornowski

Abstract: Within the Scale-Symmetric Physics we showed that the structure of proton leads to the Theory of Chaos. We proved that the structure of the nonchaotic star KIC 5520878 mimics the internal structure of the core of baryons. The more precise observations should show that the ratio of the two principal frequencies for KIC 5520878 is 1.5711 (the today observations lead to 1.57) and has nothing with the golden ratio 1.618…. Moreover, notice that the ratio of the radius of the equator of the torus in the core of proton to the radius of the gluon loops the neutral pions consist of is 1.5 so there should be stars with such ratio of principal frequencies also. The same concerns the quasars.

John F. Lindner, *et al.* (February 2015), shows that some of Cepheid and 41 RR Lyrae variable stars pulsate with multiple frequencies. Several of these stars, including the RRc Lyrae star KIC 5520878, pulsate with two principal frequencies, which are nearly in the golden ratio $\varphi = (1 + \text{sqrt}(5))/2 \approx 1.618$ [1]. But it is not the whole story. The KIC 5520878 has primary and secondary frequencies at $f_1 \approx 1/(0.266 \text{ d})$ and $f_2 \approx 1/(0.169 \text{ d})$ i.e. $f_2/f_1 \approx 1.57$, not the golden ratio. The distance between the golden ratio and the ratio of frequencies is about 3%.

Here I will show that the ratio $f_2/f_1 \approx 1.57$ is directly associated with the atom-like structure of baryons which leads to the foundations of the Theory of Chaos ([2]: see Chapter "Proton and Loops as Foundations of Theory of Chaos"). The succeeding phase transitions of the modified Higgs field lead also to the atom-like structure of baryons [2]. For example, in a proton there is torus and condensate in its centre composed respectively of entangled and confined Einstein-spacetime components, whereas outside such core (i.e. torus plus condensate) is the relativistic pion [2]. In the cited Chapter we proved that the Feigenbaum constant $\delta = 4.66920\ldots$ is directly associated with internal structure of proton (we obtained 4.66913). The gluons outside the strong fields, i.e. the fields having internal helicity, behave as photons i.e. the internal structure of proton leaks outside it. The leaking structure of protons cause that, for example, the structure of quasars is dual to the structure of the core of protons/baryons. We can assume that similar structure is in the star KIC 5520878.

Mass of the condensate in cores of baryons is $Y = 424.1245 \text{ MeV}$ whereas the torus in the core produces the neutral pions [2]. The mass of the neutral pion is $M_{\text{Pion(o)}} = 134.9766 \pm 0.0006 \text{ MeV}$ [3]. According to the Scale-Symmetric Physics [2], there is the four-particle

symmetry. A neutral pion consists of two loops composed of gluons so there are preferred the binary systems of the neutral pions.

Calculate the ratio of the condensate and two neutral pions

$$R = Y / (2\ M_{Pion(o)}) = 1.5711. \tag{1}$$

We can see that R is very close to the ratio of frequencies $f_2/f_1 \approx 1.57$ for the nonchaotic star KIC 5520878.

Summary

Within the Scale-Symmetric Physics we showed that the structure of proton leads to the Theory of Chaos.

We proved that the structure of the nonchaotic star KIC 5520878 mimics the internal structure of the core of baryons. The more precise observations should show that the ratio of the two principal frequencies for KIC 5520878 is 1.5711 (the today observations lead to 1.57) and has nothing with the golden ratio $1.618...$.

Moreover, notice that the ratio of the radius of the equator of the torus in the core of proton to the radius of the gluon loops the neutral pions consist of is 1.5, [2], so there should be stars with such ratio of principal frequencies also. The same concerns the quasars.

References
[1] John F. Lindner, *et al.* (4 February 2015). "Strange nonchaotic stars" arXiv:1501.01747v2 [nlin.CD].
[2] Sylwester Kornowski (14 March 2014). "The Everlasting Theory and Special Number Theory". http://vixra.org/abs/1203.0021 [v3].
[3] K. A. Olive *et al.* (Particle Data Group), Chin. Phys. **C38**, 090001 (2014). http://pdg.lbl.gov .