

## Introduction to Smarandache-Christianto (SC) potential

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### a. Definition:

A new type of potential for nucleus, which is different from Coulomb potential or Yukawa potential. This new potential may have effect for radius range within  $r=5 - 10$  fm.

### b. Reasoning:

It is known that Yukawa potential has been derived from radial Klein-Gordon equation. Yukawa was able to predict new type of particle, which then it was coined as 'meson'. [1] Of course, in the history the 'meson' associated to Yukawa was not observed with high-precision. [2][12]

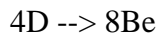
But recently there is critics that Yukawa potential has problems because it uses Klein-Gordon with Lagrangian over real. [3]

Alternatively, one can extend Klein-Gordon using biquaternion number, and it will lead to a new type of potential having sinusoidal form [4][5]. It is coined as 'SC-potential'. [6]

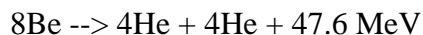
Interestingly, a quite similar form of potential has been derived by M. Geilhaupt. Using modified Klein-Gordon equation he comes up with sinusoidal wave representation of electron, which can be used to predict electron mass and charge. He called this equation: unified force equation. [7]

### c. Implications:

For experimental verification of this new potential, we find possible application in the context of Condensed Matter Nuclear reaction [5][6]. According to Takahashi's research, it is more likely to get condensed matter nuclear reaction using cluster of deuterium (4D) rather than using D+D reaction (as in hot-fusion, in this process Coulomb barrier is very high). The probable reaction according to Takahashi is [8]:



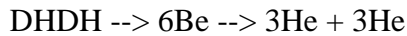
Then because be is unstable, it will yield:



In recent work, Takahashi shows that in the TSC framework it is also possible to do CMNS reaction not only with DDDD, but also with DDDH, DDHH, DHHH, or HHHH [8], where the reaction can be different from above:



or



In other words, TSC can be A mixture of heavy and light water. [8]

More interestingly, his EQPET/TSC (*tetrahedra symmetric condensate*) model, Takahashi can predict a new potential called STTBA (*sudden-tall thin barrier approximate*) which includes negative potential (reverse potential) and differs from Coulomb potential [8].

Therefore the SC-potential which has sinusoidal form can be viewed as a generalization of Takahashi's TSC/STTBA potential.[9]

Prof Akito Takahashi is chairman of ISCMNS (International Society of Condensed Matter Nuclear Science) [10].

Further experiments are recommended in order to verify this proposition.

FS & VC  
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### **Further reading:**

[1] [http://en.wikipedia.org/wiki/Yukawa\\_potential](http://en.wikipedia.org/wiki/Yukawa_potential)

[2] Grosjean, P.V., Static meson potential and Deuteron problem, **Nature** 166 (1950),  
<http://www.nature.com/nature/journal/v166/n4230/abs/166907a0.html>

[3] Comay E. Apeiron, 2007, v. 14, no. 1; arXiv: quant-ph/0603325.

[4] V. Christianto & F Smarandache, "Numerical solution of radial biquaternion of Klein-Gordon equation," **Progress in Physics** vol.1 (2008)

URL: [http://ptep-online.com/index\\_files/2008/PP-12-08.PDF](http://ptep-online.com/index_files/2008/PP-12-08.PDF)

[5] V. Christianto & F Smarandache, "Interpretation of solution of radial biquaternion of Klein-Gordon equation and comparison with EQPET/TSC model," Infinite Energy (to appear in July 2008).

[6] F. Smarandache & V. Christianto (eds.), Hadron models and related new Energy issues, InfoLearnQuest, January 2008.

[7] M. Geilhaupt, <http://hestia.hs-niederrhein.de/~physik07/index.html>

[8] Kowalski, L., "An interesting theory of Akito Takahashi," <http://pages.csam.montclair.edu/~kowalski/cf/249takahashi.html>

[9] Takahashi, A., <http://newenergytimes.com/Library/2005TakahashiA-CondensedMatterNuclearEffects.pdf>

[10] [www.iscmns.org](http://www.iscmns.org)

[11] Hideki Yukawa, [http://en.wikipedia.org/wiki/Hideki\\_Yukawa](http://en.wikipedia.org/wiki/Hideki_Yukawa)

[12] History of meson, <http://en.wikipedia.org/wiki/Meson>

[13] K-capture, <http://en.wikipedia.org/wiki/K-capture>