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'.\textsuperscript{[1]} Of course, in the history the 'meson' associated to Yukawa was not observed with high-precision. \textsuperscript{[2][12]}

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

Alternatively, one can extend Klein-Gordon using biquaternion number, and it will lead to a new type of potential having sinusoidal form \textsuperscript{[4][5]}. It is coined as 'SC-potential'. \textsuperscript{[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. \textsuperscript{[7]}

c. Implications:
For experimental verification of this new potential, we find possible application in the context of Condensed Matter Nuclear reaction \textsuperscript{[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 \textsuperscript{[8]}:

\[ 4D \rightarrow 8\text{Be} \]

Then because be is unstable, it will yield:

\[ 8\text{Be} \rightarrow 4\text{He} + 4\text{He} + 47.6 \text{ MeV} \]
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:

$$\text{DDDH} \rightarrow 7\text{Be} \rightarrow 3\text{He} + 4\text{He} + 29.3 \text{MeV}$$

or

$$\text{DHDH} \rightarrow 6\text{Be} \rightarrow 3\text{He} + 3\text{He}$$

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.

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Further reading:


http://www.nature.com/nature/journal/v166/n4230/abs/166907a0.html


