The Golden Ratios Which Imply Maximum Entropy in Nuclear Physics [#1]

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In 2016, Takashi Aureus reported that thermodynamic entropy is quantum mechanical and different from mathematical information entropy [1]. It clearly means two things.
One is there will be the definition of entropy by quantum mechanics. Another is there should be the appearance of Fibonacci numbers or other numbers and the golden ratios in quantum mechanics or in nuclear physics.

Unfortunately there is no room for the concept of entropy in quantum mechanics and nuclear physics, because energy transfers are easy to observe in experiments. So there is no definition over entropy by quantum mechanics.
There are, however, the appearance of number and golden ratios in nuclear physics. I would like to show three examples; the magic number, mathematical trend of stable nuclei and mass ratios of nuclear fission products, as the appearance of the number and the golden ratios in nuclear physics.

The phenomenon is well-known facts in nuclear physics.

(1) The magic numbers (2, 8, 20, 28, 50, 82, and 126) resembles Fibonacci sequence.
The pair of nucleon has the lower potential energy than single nucleon. So only as magic number " 2" has the clear reason of stability. Real magic numbers are;
8 : 20 :28: 50: 82: 126 ≒ 1 : 2 : 3 : 5 : 8 : 13
The magic numbers is almost ten times the Fibonacci numbers. There are some drifts or errors in the sequence. It is just reflect of the nature of quantum mechanics which has probability theory basis.

(2) The tangent of the angle of inclination of stable nuclei in the nuclear chart is about 0.618. It is shown in the nuclear chart below.

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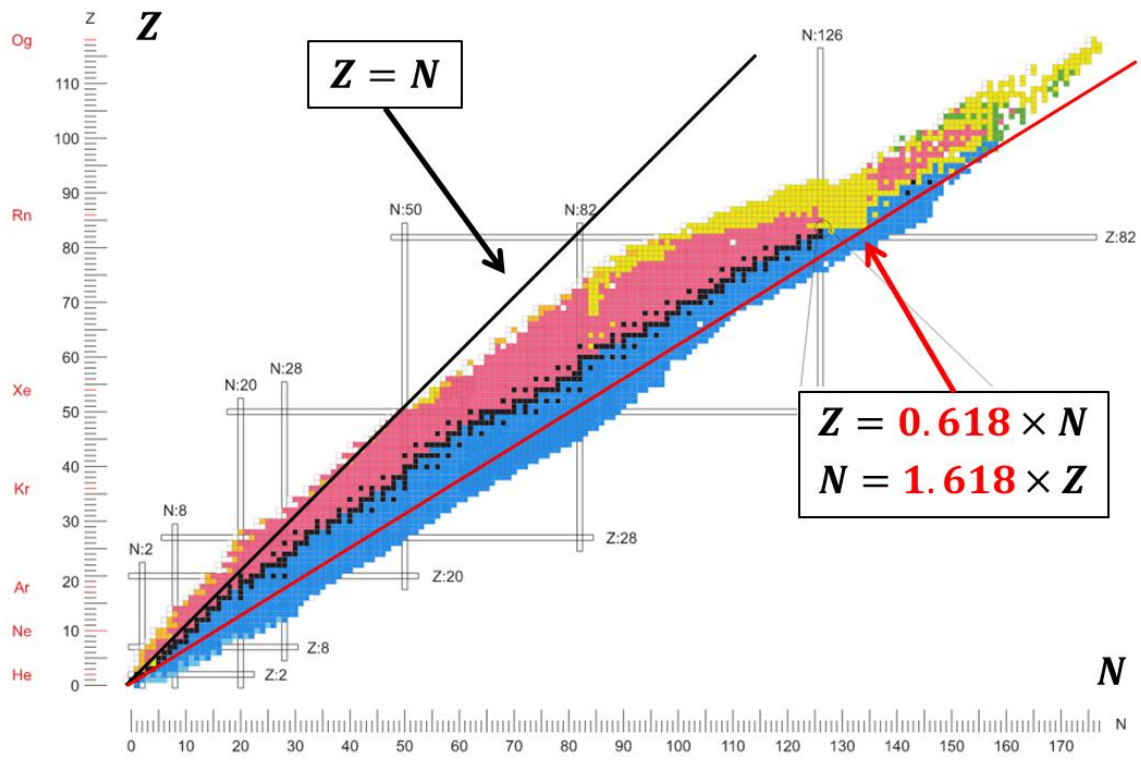

(3) Mass ratios of nuclear fission products (major two fragments) are about 1.6.

$^{235}_{92}U + {}^{1}_{0}n \rightarrow {}^{144}_{55}Cs + {}^{90}_{37}Rb + 2{}^{1}_{0}n \quad {}^{144}/_{90} = 1.6$

$^{235}_{92}U + {}^{1}_{0}n \rightarrow {}^{141}_{56}Ba + {}^{92}_{36}Kr + 3{}^{1}_{0}n \quad {}^{141}/_{92} = 1.53$

$^{235}_{92}U + {}^{1}_{0}n \rightarrow {}^{139}_{56}Ba + {}^{94}_{36}Kr + 3{}^{1}_{0}n \quad {}^{139}/_{94} = 1.48$

$^{235}_{92}U + {}^{1}_{0}n \rightarrow {}^{142}_{54}Xe + {}^{90}_{38}Sr + 4{}^{1}_{0}n \quad {}^{142}/_{90} = 1.58$

$^{10}_{5}B + {}^{1}_{0}n \rightarrow {}^{7}_{3}Li + {}^{4}_{2}He \quad {}^{7}/_{4} = 1.75$

Many of colleagues may be skeptical about my observations due to the drift or difference. My answer is that quantum mechanics have the characteristic in understanding the statistics deviation. It somehow implies that we should make reconsideration over the nature of probability, statistics and entropy.

I had known since around 40 years ago about the magic numbers and the nuclear chart.
I just understand that nuclear force and electromagnetic force make some kind of equilibrium in stable nuclei on some conditions. The quantum mechanical entropy is the way to formulate the equilibrium condition in stable nuclei. It may bring a new aspect to the theory between the strong interaction and electromagnetic interaction.

Abstract in Japanese:

エントロピーが、量子力学的なものであるとするならば、原子核について観測されている現象の中に、フィボナッチ数列などの特徴的な数列の出現あるいは黄金比というマキシマム・エントロピーの出現を示す現象が観測されるはずである。筆者は、このような現象の例として、魔法数の解釈、ハイゼンベルクの谷の傾きおよび核分裂反応の娘核の質量比の観測結果を提示したい。

数学的な美しさを基準とした場合、余りにラフな即ち偏差とふらつきのある観測結果に無理やり、黄金比を押し付けたという評価がありうるものと考えられる。工学的な教育を受けた筆者には、一定のまとまりの存在を無視することはできないことであり、偏差は主たる作用とは異なる副となる作用が優越する機序または領域の存在を示すものであり、極めて日常的でありその意味で宇宙的な真実であると思われる。

一つの理論で、すべてが説明できるほど宇宙は単純なものではないはずである。核力と電磁気力が作用する原子核内の現象に、電磁気力が優越する領域と核力が優越する領域が存在しても良いはずである。

今後は、エントロピーの量子力学的定義と確率、統計の本質を中心に研究を進めたい。

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[1] Takashi Aurues "*Breaking Free From the Spell of Entropy (We must take a fundamental change in the basic concept of entropy.)*" (in Japanese) The Annual Reports on the 14th Fibonacci Meeting of Japan (2016) 137-147「エントロピー：その形式的呪縛からの解放（人間の非論理的な判断の物質的根拠に関する論理的かつ非論理的な説明の試み）」日本フィボナッチ協会第 14 回研究集会報告書 Link1 Link2