東京大学大学院理学系研究科・理学部
物理学教室　談話会

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「Universal Biology, the Genetic Code and the First Billion Years of Life on Earth」

２０１６年１２月２日(金)　１６：３０～１８：００
東京大学理学部４号館１３２０号室

This colloquium concerns two ideas. First, that there are universal laws of life, which can be deduced by abstracting what we know about life on Earth. I'll discuss what universal biology is, and what questions it can potentially address. Second, an example of the sorts of insights available from universal biology is the following. Universal dynamical signatures of early life, preceding even the last universal common ancestor of all life on Earth, are present in the structure of the modern day canonical genetic code --- the map between DNA sequence and amino acids that form proteins. The code is not random, as often assumed, but instead is now known to have certain error minimisation properties. How could such a code evolve, when it would seem that mutations to the code itself would cause the wrong proteins to be translated, thus killing the organism? Using digital life simulations, I show how a unique and optimal genetic code can emerge over evolutionary time, but only if early life was dominated by collective effects, very different from the present era where individuals and species are well-defined concepts. If time permits, I will also discuss a second universal signature of life: the breaking of chiral symmetry in biological amino acids and sugars.

Goldenfeld氏は、統計物理の研究者で相転移と繰り込み群理論の教科書や非平衡系、乱流の研究、普遍性生物学の研究などで知られています。また、NASAと共同で地球外生命や生命の起源を探求するための研究所を立ち上げています。この機会に学部生を含む一般向けに 生命現象の普遍的な法則や生命の起源に関する彼の考察を分かりやすく講演していただく予定ですので奮ってご参加ください。

※　専門外、学生の方にもわかりやすくお話し頂く予定です。

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