From p-Adic Strings to p-Adic Matter

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p-Adic string, as a part of string theory, was introduced in 1987 by construction of an analogue of the Veneziano scattering amplitude replacing real world-sheet by the p-adic one. It was also shown that product of ordinary crossing symmetric Veneziano amplitude and its p-adic counterparts over all primes p is a constant. This convergent product of amplitudes is an example of connection between ordinary and p-adic strings.

Investigation of p-adic strings was pushed forward by invention of effective Lagrangians for open and closed p-adic strings. These Lagrangians with scalar fields describe not only four-point scattering amplitudes but also all higher ones at the tree level. This line of research has led to new insights on the role of p-adic strings in string theory. However, p-adic strings have been mainly treated as an auxiliary tool to better understand ordinary strings. But, is it possible that p-adic strings could make a new kind of matter?

In this talk, I will start with p-adic strings giving a short review of some their basic properties and connections with ordinary strings. Then I will consider a slight modification of the Lagrangian of p-adic open string to get a non-tachyonic p-adic matter. It will be shown that there exists a new scalar p-adic field. Taking this field as a cosmic matter, it causes an exponential expansion (and contraction) of a closed universe.