

# Nonlocal Lagrangians for $p$ -Adic Strings

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## Abstract

$p$ -Adic strings are important objects of string theory, as well as of  $p$ -adic mathematical physics and nonlocal cosmology. By a concept of adelic string one can unify and simultaneously study various aspects of ordinary and  $p$ -adic strings. By this way, one can consider adelic strings as a very useful instrument in the further investigation of modern string theory. It is remarkable that for scalar  $p$ -adic strings exist effective Lagrangians, which are based on real instead of  $p$ -adic numbers and describe not only four-point scattering amplitudes but also all higher ones at the tree level. In this talk, we will first give a review of  $p$ -adic strings and their Lagrangians. Then, starting from  $p$ -adic Lagrangians, we consider some approaches to construction of effective field Lagrangians for  $p$ -adic sector of adelic strings. It yields nonlinear and nonlocal scalar field theory Lagrangians, where spacetime nonlocality is determined by an infinite number of derivatives contained in the operator-valued Riemann zeta function. Owing to the Riemann zeta function in the dynamics of these scalar field theories, obtained Lagrangians are also interesting in themselves.

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