

PATH INTEGRALS ON REAL, p -ADIC, AND ADELIC SPACES

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ABSTRACT. We study path integrals in ordinary, p -adic and adelic quantum mechanics for systems determined by wide class of Lagrangians. The corresponding probability amplitudes $\mathcal{K}(x'', t''; x', t')$ for two-dimensional systems with quadratic Lagrangians are found. The obtained expressions are generalized to any finite-dimensional spaces. These exact general formulas are presented in the form which is invariant under interchange of the number fields $\mathbb{R} \longleftrightarrow \mathbb{Q}_p$ and $\mathbb{Q}_p \longleftrightarrow \mathbb{Q}_{p'}, p \neq p'$. This invariance shows the fundamental rôle of adelic path integral in mathematical physics of quantum phenomena.

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