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First-principles lattice QCD calculation of the neutron lifetime

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There is an intriguing discrepancy in the measurements of the neutron lifetime. The almost 4σ difference has recently been highlighted due to new high-precision experiments using ultra cold trapped neutrons and it could indicate the existence of new physics.
Thanks to the Standard Model relation between the lifetime and the axial coupling g_A of the neutron, which governs it's transition to a proton, a first-principle QCD calculation of g_A could shed light on the experimental discrepancy and new physics.
Lattice QCD provides a robust framework to numerically compute inherently non-perturbative quantities from first principles. Starting only from the Lagrangian of QCD and owing to new improved numerical algorithms, we calculate the axial coupling of the neutron with unprecedented precision and thus obtain the neutron lifetime: $\tau_n = 885(15)$ seconds.
This calculation is challenging and the outcome is very promising: it paves the way to understanding nuclear observables directly from QCD degrees of freedom with high accuracy.

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