Contribution ID: **13**   Type: **not specified**

Stabilizing dark matter with quantum scale symmetry

Wednesday, September 24, 2025 4:30 PM (15 minutes)

In the context of gauge-Yukawa theories with trans-Planckian asymptotic safety, quantum scale symmetry can prevent the appearance in the Lagrangian of couplings that would otherwise be allowed by the gauge symmetry. Such couplings correspond to irrelevant Gaussian fixed points of the renormalization group flow. Their absence in the theory implies that different sectors of the gauge-Yukawa theory are secluded from one another, in similar fashion to the effects of a global or a discrete symmetry. As an example, we impose the trans-Planckian scale symmetry on a model of Grand Unification based on the gauge group SU(6), showing that it leads to the emergence of several fermionic WIMP dark matter candidates whose coupling strengths are entirely predicted by the UV completion, while the scalar potential at low energy is similar to a 2HDM+2S model.

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Session Classification: Parallel 6

Track Classification: Parallel