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Theorie-Palaver

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Lorentz room (Staudingerweg 7, 5th floor)

Álvaro Pastor Gutiérrez
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Unveiling hidden phases and charting strong sectors

While the Standard Model of particle physics has been extremely successful in predicting experimental results, it still leaves us with unanswered questions about dark matter, the imbalance between matter and antimatter, and the emergence of fundamental scales. In this talk, I will outline our initial efforts to explore strong new physics scenarios using the non-perturbative functional renormalisation group. I will begin by introducing the flow equation and applying it to the Standard Model, thereby uncovering previously uncharted high-energy phases in the Higgs potential. The second part of the talk will focus on a comprehensive study of (quasi-)conformal “Technicolour” theories, aiming to identify Higgs-like bound states and detectable dark sectors. To achieve this, we will employ bosonisation techniques, which provide valuable insights into the properties of dynamically emergent bound states. I will conclude with a specific case study addressing the flavour puzzle within the framework of fundamental partial compositeness.

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