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Rethinking Fundamental Interactions: From Asymptotic Freedom to Asymptotic Safety

Content :

I will discuss new exact results in four-dimensional quantum field theory that led us to the discovery of asymptotically safe theories in four dimensions without supersymmetry. I will then move to supersymmetric cousins of the theories above, and present exact results that make use of a number of non-perturbative tools ranging from the unitarity of the conformal operators to the a -theorem and a -maximisation. In addition, the supersymmetric results also complete Seiberg' phase diagram once asymptotic freedom is lost. The results allow to rethink about fundamental interactions and pave the way for the construction of novel extensions of the standard model of particle interactions.

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