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Effective particles in quantum field theory

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The concept of effective particles is introduced in the Minkowski space-time Hamiltonians in quantum field theory using a new kind of the relativistic renormalization group procedure that does not integrate out high-energy *modes* but instead integrates out the large *changes* of invariant mass. The new procedure treats the size of effective quanta as a variable renormalization group scale. This is explained using examples of known interactions. Some applications in phenomenology, including processes measurable in colliders, are briefly reviewed. The examples include asymptotic freedom in QCD [1] and jet production in TeV pion-nucleus scattering [2], with brief remarks concerning also the earlier studies concerning proton radius in atomic physics [3], effective potential in light-front holography [4,5] and ridge effect in proton-proton collisions [6]. Such a large scope of phenomena to be mentioned is achieved thanks to the universality of the new renormaliztion group procedure as a method for developing quantum field theory.

[1] M. Gomez-Rocha, S. D. Głazek, Phys. Rev. D **92**, 065005 (2015)

[2] A. P. Trawiński, PhD Thesis, University of Warsaw, 2016

[3] S. D. Głazek, Phys. Rev. D **90**, 045020 (2014)

[4] A. Trawiński, S. D. Głazek, Phys. Rev. D **88**, 105025 (2013)

[5] A. Trawiński, S. Głazek, S. Brodsky, G. de Teramond, H. Dosch, Phys. Rev. D **90**, 074017 (2014)

[6] P. Kubiczek, S. D. Głazek, Lith. J. Phys. **55**, 155 (2015)

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