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Dispersive approach to QCD and its applications

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The dispersive approach to QCD, which extends the applicability range of perturbation theory towards the infrared domain, is applied to the study of hadronic vacuum polarization function and related quantities. This approach merges, in a self-consistent way, the intrinsically nonperturbative constraints, which originate in the kinematic restrictions on the relevant physical processes, with corresponding perturbative input. The obtained hadronic vacuum polarization function agrees with pertinent lattice simulation data. The evaluated hadronic contributions to the muon anomalous magnetic moment and to the shift of the electromagnetic fine structure constant conform with recent estimations of these quantities. The effects due to continuation of the spacelike perturbative results into the timelike domain are elucidated.

[1] A.V.Nesterenko, "Strong interactions in spacelike and timelike domains: Dispersive approach". Elsevier, Amsterdam, 222p., 2016

[2] A.V.Nesterenko, Eur. Phys. J. C 77, 844 (2017)

[3] A.V.Nesterenko, J. Phys. G 42, 085004 (2015)

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