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Nontrivial analytic structure of fermion propagators: Truncation Artefact or Confinement Signal?

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Dyson-Schwinger studies of the fermion propagator are typically performed in Euclidean metric, providing information on the nonperturbative behavior of the fermion propagator at spacelike momenta. It has been known for more than 40 years that an analytic continuation to the entire complex momentum plane can, and often does, reveal 'mass-like' singularities at complex-conjugate momenta, even in QED. The existence of complex singularities instead of the a mass-pole at timelike momenta would certainly imply that the fermion field is confined; however, it would also have profound consequences for the (naive) Wick rotation. I discuss different numerical methods to investigate the analytic structure of fermion propagators and apply them to both QED and QCD. It turns out that the obtained analytic structure depends not only on the coupling strength, but also on details of e.g. the regularization scheme and the truncation of the DSEs.

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