## The complex structure of strong interactions in Euclidean and Minkowski space

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## Radiative corrections in the Refined Gribov-Zwanziger framework and its coupling to matter

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The Refined Gribov-Zwanziger (RGZ) scenario is one of the most well-developed frameworks to account for the existence of (infinitesimal) Gribov copies and further non-perturbative effects such as the formation of condensates. Most progress has been achieved in the Landau gauge. The theory features a tree-level gluon propagator that reaches a non-vanishing value at zero momentum and a non-enhanced ghost propagator in the deep infrared. One of the key questions is if such a structure is stable against quantum corrections. Another issue to be faced is how to couple matter in this context and if the underlying RGZ-matter system provides a good description of matter correlation functions (in the presence of radiative corrections). Finally, a long-standing issue is the fate of BRST symmetry in such a theory and how to extend it to different gauges. In this talk, I will report on recent developments on the aforementioned issues and discuss future research directions to be taken in order to strengthen or invalidate the RGZ(-matter) scenario as an efficient description of the infrared regime of Yang-Mills theories/QCD. Main challenges and difficulties will also be discussed.

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