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Towards to the Yang-Mills ensemble

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We review our recent work on the new procedure to quantize the Yang-Mills theories in the continuum, which points towards the existence of a Yang-Mills ensemble. In the new approach, the idea is to divide the configuration space into sectors labeled by different topological degrees of freedom and fix the gauge separately on each one of them. To implement this mechanism, the gauge fields are mapped into an auxiliary field space used to initially determine sectors labeled by center vortices, and then separately fix the gauge on them. The whole procedure results into a BRST-invariant local action which turns out to be renormalizable to all orders. We provide examples of configurations belonging to sectors labeled by center vortices and we discuss the importance of the mapping injectivity, and show that this property holds infinitesimally for typical configurations of the vortex-free sector and for the simplest example in the one-vortex sector. Finally, we show that these configurations are free from Gribov copies.

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