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Exploring gauge-fixing conditions with gradient-based optimization

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Lattice gauge fixing is necessary to compute gauge-variant quantities, for example those used in RI-MOM renormalization. Recently, gauge-variant observables have also been found to be more amenable to signal-to-noise optimization using contour deformations. These applications motivate systematic parameterization and exploration of gauge-fixing schemes. This work introduces a differentiable parameterization which is broad enough to cover Landau gauge, Coulomb gauge, and maximal tree gauges. The adjoint state method allows gradient-based optimization to select gauge-fixing schemes that minimize an arbitrary target loss function.

Primary authors: DETMOLD, William (MIT); KANWAR, Gurtej (University of Bern); Dr LIN, Yin (MIT); SHANAHAN, Phiala (Massachusetts Institute of Technology); WAGMAN, Michael (Fermilab)

Presenter: KANWAR, Gurtej (University of Bern)

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