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[559] Multi parameter Bayesian optimisation of the Mølmer-Sørensen gate

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One of the challenges of scaling up quantum processors is the optimization of the quantum gates, as each gate may require different control parameters. We developed and tested a fast protocol to automatically calibrate the entangling 2-qubit Mølmer Sørensen gate using Bayesian parameter estimation. Such a protocol promises to increase experimental uptime by decreasing the time needed for calibration, as well as allowing automated operation. Our protocol achieves a median infidelity of 0.13(1)% caused by miscalibration in $1200 + / - 500$ experimental shots. This paves the way to decouple quantum circuits from their implementation on ion trap hardware, allowing operation by an end user without detailed knowledge of the physical realization.

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