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A Backend for scalable Ion-Trap Quantum Computing

To enable pulse-level control of scalable ion-trap quantum computer architectures, we discuss the development of a backend which tracks changes in ion configuration during experiments. We outline a software object structure to model components of an ion-trap quantum computer such that we can access different layers of the complexity in the setup. Consequently, we introduce functions to define the generation of parameters and laser pulses independently from the layout of the control laser beams and the trap geometry. We embed them in backend classes, which enable sharing the functions for pulse-generation of gates and functionality for changing ion configurations in the trap in between ion-trap setups. Then, we show a framework that can run pulse experiments and generate calibration sequences on any pulse circuit created with our backend.