Special Issue

Quantum Computing with Trapped Ions

Message from the Guest Editors

Trapped ions are a unique platform for quantum computing and simulation. They boast all-to-all connectivity, reconfigurability via shuttling, full- and partial-entangling operations mediated via phonons and straightforward individual control and readout. However, efforts to standardize quantum computing across different hardware platforms have left many of these unique features either unexplored or unleveraged to their full potential. This Special Issue aims to highlight how harnessing characteristics unique to ions can result in quantum system performance improvements, new quantum technologies, or new approaches to quantum simulation. Contributions relating to unique gate implementations, shuttling, noise mitigation, modeling of noise sources other than depolarizing noise, and efficient device calibration are especially encouraged. In addition, contributions which discuss couplings to degrees of freedom beyond the standard two-level qubit. Finally, we also invite submissions utilizing bosonic degrees of freedom within trapped ion systems, with applications to studying both coherent and open-system quantum dynamics.

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Deadline for manuscript submissions

15 September 2025

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