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Quantum error correction with trapped ions

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Quantum computers promise exponential speed-up compared to their classical counterparts for certain problems. Unfortunately, the states required for quantum computation are fragile and lose their quantum properties with growing system size. In a milestone work, it has been shown that quantum error correction can overcome this problem and enable arbitrary long and arbitrary high quality quantum algorithms. However, current experiments are not able to fulfill the requirements to employ useful quantum error correction procedures. In this talk, I will first review past proof-of-principle experiments in trapped ion quantum information processors. Building on that, I will sketch a way towards a medium-sized trapped ion system that will be capable of running an error correction procedure that outperforms it constituents.