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## Update on a MicroTCA-based control system for quantum computers

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Atom Computing has chosen to develop a control system for its quantum computers based on the MicroTCA platform. We previously reported on the challenges and successes of developing and integrating such a system. After almost a year of operating our last-generation quantum computers, we can now share our experience with operating these systems.

The presentation begins with an introduction to the company and its quantum computers, followed by highlights from our recently published results. We continue with an explanation of the role of the control system in a quantum computer, diving deeper into the hardware itself. Here, the role and advantages of the MicroTCA platform are clearly visible - a modular platform that allows us to reuse building blocks to construct a system that is easily extendable to accommodate the ever-changing needs of the system. We then discuss our experience operating a control system for large quantum computers, touching on some of the challenges we faced and the solutions we implemented.

With the quantum computers in operation, most of the effort was spent developing more features in gateware and software. Nonetheless, we also completed two hardware projects that we are excited to present: the first is a DMD controller, where the MicroTCA part is fully built from COTS components, highlighting the ease of development on the MicroTCA platform. The second is a trigger extender board for DAMC-FMC2ZUP, released as an open hardware project, as it might be of interest to the broader community.

Finally, as we look toward the future and begin planning our next-generation machines, we discuss considerations for multi-chassis synchronization and a new Zone 3 class that might be required as we progress toward utility-scale quantum computers.

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