

Quantum Advantage for High Performance Computing

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After years of anticipation, quantum computing is finally here as evidenced by many ongoing projects around the world. In June 2024, the Leibniz Supercomputing Centre (LRZ) publicly demonstrated how a job run on a supercomputer is assisted by a superconducting quantum accelerator. Although this was only the first public demonstration, it gives a clear indication of the potential of hybrid quantum computing. Supercomputers, which are the most powerful machines on the planet, will use integrated quantum computers whenever quantum computation is advantageous. This talk will provide an update on quantum activities at the LRZ, where 3 quantum computers are already working in conjunction with HPC systems, while 2 more are approaching. Obviously, the current first version prototypes need to be transformed into production systems, while quantum computing itself is on its way to maturity. This will require not only improved quantum hardware, but also advances in quantum software and quantum-HPC integration.

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