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Title: Automating Quantum Software Development Across Abstraction Levels: From Program Translation to Ansatz-Based Circuit Synthesis

Abstract: Quantum software development involves multiple abstraction levels, ranging from high-level programming frameworks to low-level quantum circuit representations. As quantum programming ecosystems continue to evolve rapidly, developers face challenges such as framework fragmentation, frequent API changes, and the difficulty of constructing efficient quantum circuits.

This talk presents recent efforts toward automating quantum software development at two complementary abstraction levels. At the program level, automated translation of quantum programs across different programming frameworks is investigated, with a particular focus on identifying semantically corresponding APIs and evaluating the correctness of translated programs. At the circuit level, an ansatz-based quantum circuit synthesis approach is explored, which reuses parameterized circuit structures to reduce the search space and improve synthesis scalability.

Through these studies, the goal is to explore how reusable knowledge and automated synthesis techniques can reduce the effort required to develop, migrate, and construct quantum software.