

Speaker: Qichen Wang (Kyushu University)

Title: Quantum Software Testing: From Foundations to Frontier Challenges

Abstract: Quantum software testing is becoming increasingly important as quantum programs grow in scale and complexity. This talk provides an accessible overview of the foundations, current progress, and open challenges of quantum software testing. We first introduce the basic execution and observation model of quantum programs, highlighting how quantum states, measurement, and probabilistic outputs make testing fundamentally different from its classical counterpart. We then review representative testing techniques and discuss their current limitations. Building on this background, we present our recent work on QDoctor, a black-box testing framework that treats test design as a joint construction of input-state preparation and measurement, so that behavioral differences can be both triggered and made observable. Finally, we discuss several remaining challenges, including effective test generation, observability, scalability, and the evaluation of quantum testing techniques, and outline possible directions toward more reliable quantum software.