

Quantum AI: Quantum for AI and AI for Quantum

Quantum computing and artificial intelligence are two rapidly advancing fields with the potential to reshape how we approach complex computational problems. Their intersection, often referred to as Quantum AI, offers a particularly interesting two-way synergy: Quantum for AI, where quantum computing may provide new approaches to machine learning and AI workloads, and AI for Quantum, where modern AI techniques can help design, control, and improve quantum systems. In this colloquium, we will explore this bidirectional relationship, introducing key ideas, recent developments, and representative applications on both sides. We will also discuss the opportunities and challenges toward building practical Quantum AI systems, and consider how advances in quantum computing and AI may accelerate each other in the years ahead.