

Title: Atoms and ions based platforms for scalable and high fidelity quantum computing

Abstract: Atomic systems - neutral atoms as well as atomic ions are the leading candidates in the development of platforms for building quantum computers. There has been enormous progress in the recent past on scaling and increasing the number of physical qubits. These platforms have evolved over several decades of development in the field of laser cooling, trapping and control of individual atomic systems. The pristine environment and the purity of these qubits, offer very high fidelities and low error rates in preparing the quantum states and reading out the quantum states. The low decoherence rates relative to the atomic excited-state lifetimes offer high fidelity multi-qubit quantum gates. In addition, these systems offer promising scaling opportunities. In this talk, I will give an overview of both the platforms including the introduction to the physics of these platforms. I will present the state of the art of these platforms and conclude with our ongoing efforts in building an ion trap quantum computer at IISER Pune.