

Our research area is aiming the quantum technologies using neutral atoms such as Rb and Yb atoms. Our focus for the quantum technologies has two parts, one is quantum computation and simulation and another part is quantum sensors which is atomic clock.

Our research area is to do **quantum computation and simulation with laser cooled Yb and Rb atoms**. This involves various steps such as laser cooling and trapping of atoms up to few μK , loading the atoms in optical tweezer array, manipulating the qubits states of the atom, Rydberg excitation, study of Rydberg blockade etc. This interesting field involves various experimental techniques and skills such as, building high coherent laser, laser spectroscopy, ultra-high vacuum technologies, computer control, various steps of laser cooling and trapping, optical tweezing of atoms. In the process, we have laser cooled the Yb and Rb atoms and we are planning loading the atoms in optical tweezer array. The new PhD students joining the lab will be involved in the current project of quantum computation and simulation.

In another part of research of quantum sensor involves atomic clock which has two parts one is **atomic optical clock using cold Yb atoms in optical lattices and another one is portable atomic clock using CPT in Rb atom**. The new PhD students joining the lab will be also involved in this aspect of research.

Besides the above long-term goals, we also conduct experiment and theory on atomic coherence and its application in spectroscopy and quantum sensing, the PhD students will learn this basic aspect of the field.