Quantum thoery predicts an existence of strong and collective strong coupling regime of atoms and electromagnetic field inside and within optical resonator. As an optical resonator is being used in optical cavity. In this regime it is possible to study atoms in excited states and their interaction with optical resonator. This thesis focuses on design of optical resonator and experimental procedures of making curved surfaces on fibers which are needed for its assembly. In order to stabilise the frequency of electromagnetic field, it is necessary to design the stabilizing algorithm. This algorithm for analyzing data examines cavity spectra for specific parametres of the research.