Optical double resonance (ODR) is one of the powerful tools for change in wavelengths and control of quantum states in the range from radio frequency to optical frequency. It can be investigated for the researches of the four-wave mixing and dressed state. In vapour experiments, blue light emission (420 nm) of rubidium (Rb) atoms has been investigated for change in colour by using four-wave mixing with 780 and 776 nm lasers for emitting 5.5 µm and 420 nm photons [1].

In the case of ultracold atoms, it is possible to realise precise measurement lengthening of coherence time and narrowing of spectra. Researchers irradiate 780 and 776 nm lasers into MOT and detect blue light emission [2–4]. We have investigated ODR experiment to observe blue light emission using optical molasses of cold Rb atoms [5]. In this work, we observe the effect of ODR on ultracold atoms in an optical trap. We prepare ultracold Rb atoms by loading the MOT cloud into the optical trap. We irradiated ultracold Rb atoms with 780 and 776 nm beams and observed the number of remained atoms in an optical trap by the absorption imaging. We will report on spectra of optical double resonance by the dependence on the laser detunings and intensities of both 776 and 780 nm lasers.

References