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Double resonance spectroscopyof ^4^F_5/2_ state in Er:YSO crystal for coherence generation

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Coherent amplification is useful to detect very weak signals, like signals from axions, dark photons, etc. Because its signal intensity is proportional to the square of the atoms inside the system. Ion-doped crystal is a very good material for coherent amplification due to its dense number of atoms inside the crystal. In order to detect such a weak signal, one must generate a coherence between two excited states. The efficient way to generate such coherence is double resonance. We used 640nm ring dye laser and 1538nm ECLD for the double resonance pumping. The lasers excites the ions on the ground state ^4^I_1 5/2 to the 1st excited state ^4^I_1 3/2, and again excites the ions up to ^4^F_5/2 . In order to observe the potentially weak signal, we used photomultiplier tube to measure the fluorescence. In this poster, we present the absorption spectrum and the fluorescence emission spectrum of the transition between ^4^I_1 3/2 state and ^4^F_5/2 state.

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