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Polarization dependence of ^{133}Cs $6S_{1/2}$-$6P_{3/2}$-$11S_{1/2}$ electromagnetically induced transparency at room temperature[1] THI-THUY NGUYEN, CHIN-CHUN TSAI, LY LY NGUYEN THI, Natl Cheng Kung Univ, TE-HSIN CHEN, Academia Sinica — We constructed an experimental setup for investigating the effect of polarization on the ladder-type Electromagnetically Induced Transparency (EIT) spectra of ^{133}Cs atoms at room temperature for the transitions $6^2P_{1/2}$-$6^2P_{3/2}$-$11^2S_{1/2}$. The whole spectra with additional peaks arisen from Doppler effect are observed. As the relative angle rotates from 0^o to 90^o, the peak height ratio of $44^{'}$ $3^{"}$ to $44^{'}$ $4^{"}$ drastically increases from 1:5.3 to 1.4:1 while that of $45^{'}$ $4^{"}$ to $44^{'}$ $4^{"}$ slightly increases from 1:1.6 to 1.2:1. A theoretical model built to explain the experimental results with the considerations of optical pumping effect and two-photon transition probability for each Zeeman sublevel, where the optical pumping effect realigns the population of the involving Zeeman sublevels so that the corresponding optical pumping ratio of $44^{'}$ $3^{"}/44^{'}$ $4^{"}$ changes from 0.4 to 0.8 and the corresponding two-photon transition probability goes from 0.23 to 1.9. These two factors contribute to an increase in the ratio of the effective factor which is the product of optical pumping and two-photon transition probability of $44^{'}$ $3^{"}/44^{'}$ $4^{"}$ changes from 0.09 to 1.52. This trend is in correspondence with the peak height ratio change. A similar argument for the $45^{'}$ $4^{"}/44^{'}$ $4^{"}$ peak height ratio is found. The simulated and experimental results show an excellent agreement when taking into account the dephasing rate.

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