QUANTUM INTERFERENCE PHENOMENON IN THE COLD ATOMIC CASCADE SYSTEM

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By using the technique of electromagnetically induced transparency(EIT), we have observed the quantum interference phenomenon in the lower-lying atomic Rydberg states of cold Cs atom in a magneto-optical trap (MOT) with typical atom numbers up to 1×10^7, and cloud temperature about 100μK. In our experiments, a grating feedback diode laser is frequency stabilized on the Cs atom via Doppler-free saturation absorption transition $|6s\ ^2S_{1/2},\ F = 4 >\rightarrow |6p\ ^2P_{3/2},\ F' = 5 >$, and a tunable Ti:Sapphire laser scans across the $|6p\ ^2P_{3/2},\ F' = 5 >\rightarrow |8s\ ^2S_{1/2},\ F'' = 4 >$ transition frequency. Both spontaneous emission fluorescence from MOT and transmission intensity of the diode laser are monitored. A subnatural linewidth signal is obtained for probing the transition of Cs $|6p\ ^2P_{3/2},\ F' = 5 >\rightarrow |8s\ ^2S_{1/2},\ F'' = 4 >$. These signals correspond to the cascade EIT among the $|6s\ ^2S_{1/2},\ F = 4 >\leftrightarrow |6p\ ^2P_{3/2},\ F' = 5 >\leftrightarrow |8s\ ^2S_{1/2},\ F'' = 4 >$.

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