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ENHANCED SENSITIVITY RUBIDIUM VELOCITY COMB MEASUREMENTS

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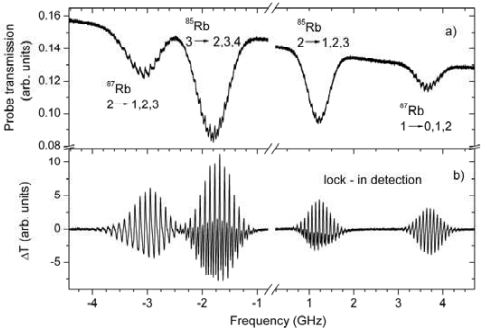
An experimental technique with enhanced sensitivity for the rubidium atom velocity comb observation will be presented. Rubidium atom velocity comb, observed as modulation of probe cw laser transmission, is a result of the velocity selective optical pumping induced by the resonant frequency comb excitation of Rb atoms. Resonant excitation of the rubidium atoms by discrete frequency comb optical spectrum results in the comb-like velocity distribution of the excited state hyperfine level populations and velocity-selective population transfer between the Rb ground state hyperfine levels. Decrease of the effective relaxation time of the Rb system is observed in the strong probe case, leading to the gradual change from the frequency comb excitation to the pulse by pulse excitation. We expand the theoretical model presented in our previous papers [1,2] to directly calculate the probe laser absorption and show preliminary results which support the experimental data.



Measured probe transmission for the Rb vapor at room temperature in the case when the fs laser is tuned to $5^2S_{1/2} \rightarrow 5\,^2P_{1/2}$ transition at 795 nm.

References

[1] D. Aumiler, T. Ban, H. Skenderović and G. Pichler, Phys. Rev. Lett. **95**, 233001 (2005).

[2] T. Ban, D. Aumiler, H. Skenderović and G. Pichler, Phys. Rev. A 73, 043407 (2006).