Action of optical frequency comb on K 770 nm resonance line

Mario Rakic[1], and G. Pichler[1,2]

[1]*Institute of Physics, Bijenicka cesta 46, Zagreb, Croatia*
[2]*Physics Department, Kuwait University, P.O.Box 5969, 13060 – Safat, Kuwait*
pichler@ifs.hr

We performed the observation of coherent accumulation effects in potassium vapor. For this purpose we used a femtosecond laser frequency comb centered at 766 or 770 nm (D1 and D2 resonance spectral lines of potassium). With new semiconductor laser for potassium resonance line we scanned hyperfine transitions at D1 and D2 spectral lines of potassium isotope 39, while the irradiation by femtosecond laser was centered at 770 nm [1,2,3,4]. It was necessary to make the calculation of the relative intensity of hyperfine components and compare it with the experimental absorption profiles. Through saturation and polarization spectroscopy on D1 and D2 lines of potassium we established the frequency scale. A homogeneous magnetic field was introduced in all experiments with glass cells filled with pure potassium. We observed how the optical frequency comb was „inprinted“ on the Doppler profile of the resonance line. With increasing magnetic field the contrast of the velocity comb was decreasing. This effect open up a possibility for the application in measurements of the gradient of the inhomogeneous magnetic field.

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).
[3] N. Vujičić, S. Vdović, D. Aumiler, T. Ban, H. Skenderović, and G. Pichler, Eur. Phys. J. D **41**, 447 (2007).
[4] D. Aumiler, T. Ban, N. Vujičić, S. Vdović, H. Skenderović and G. Pichler, Appl.Phys. B **97**, 553 (2009).