

5S-5D-two-photon transition in rubidium vapor at high densities

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The rubidium 5S-5D Doppler-free two-photon transition has been observed in a thermal vapor cell by detecting the infrared radiation emitted during the decay from the 5D excited level to the 5P intermediate level. Different to the usual detection scheme based on blue light emission this approach does not suffer from reabsorption and still works at high densities. This not only allows for an enhanced detectable emission rate but also for investigating collisional effects such as collisional broadening and collisional energy transfer. Consequences for the design of an optical Rb-frequency standard are discussed.

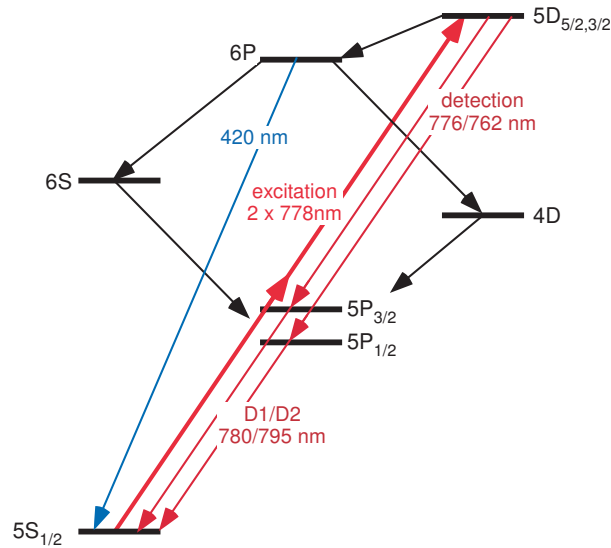


Figure 1. Two-photon spectroscopy of the 5D-states of rubidium. The two photon excitation is detected by recording the infrared emission from the 5D- to the 5P-level which also works at high densities.

[1] Karim Hassanin, Peter Federsel, Florian Karlewski and Claus Zimmermann, Phys. Rev. A 107, 043104 (2023).