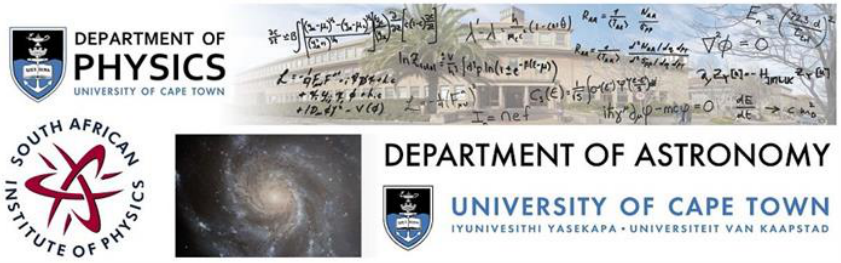

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Measurements of the hyperfine and weak field Zeeman spectra of Rb 85 and Rb 87

Wednesday, 6 July 2016 16:10 (1h 50m)

Abstract content
   (Max 300 words)
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In this presentation we report on the measurement of the hyperfine structure of rubidium 85 and rubidium 87 using a saturated absorption spectroscopy setup. This setup is part of a larger project involving laser cooling of rubidium atoms and will form part of the laser feedback system to lock the laser to a particular hyperfine transition of rubidium.

An external cavity diode laser was frequency modulated using a ramp signal. The output laser beam was split into three beams, one of which was a strong pump beam. The other two being weak probe beams that were sent through a rubidium vapour cell. The pump beam was configured to be counter-propagating and overlapping one of the probe beams. The probe beam intensities were monitored using photodiodes. A portion of the modulated laser beam was also separately analysed using a Michelson interferometer. The output of this interferometer was monitored using another photodiode. All signals were recorded using a digital oscilloscope.

The time axis, of each oscilloscope recording, was converted to frequency using a calibration factor determined by analysing the output signal of the Michelson interferometer. The converted spectra were fitted with Lorentzian curves to estimate resonant frequencies and lifetimes. Our estimates of the energy separation between hyperfine levels are consistent with published values in the literature.

As an additional experiment, a magnetic solenoid was placed around the rubidium vapour cell and the Zeeman separation as a function of weak magnetic fields was investigated. These results are also included.

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