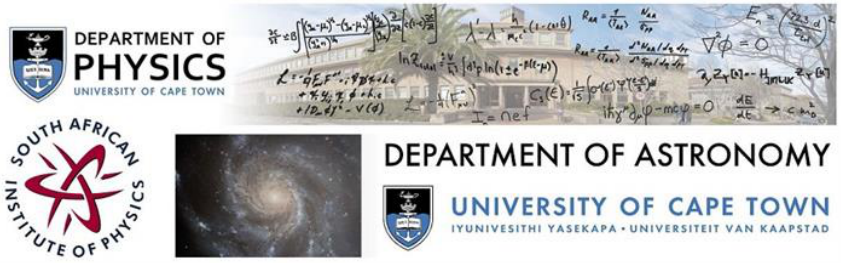

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Integrated optical tweezer and fluorescence microscope.

Wednesday, 6 July 2016 10:20 (20 minutes)

Abstract content
   (Max 300 words)
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An integrated optical tweezer and fluorescence microscopy setup has been developed. The system allows a sample to be optically trapped using the tweezer setup and investigated further by looking at a fluorescence signal detected subsequent to an excitation laser. Optical tweezing is made possible by tightly focusing laser light onto a dielectric bead. In the focus, the difference in refractive index of the bead with respect to its surrounding environment causes a change in momentum of the focused light, which in turns imparts a force on the particle towards the centre of the focus. By attaching a fluorophore to an individual bead, the position of the fluorophore can be manipulated. The excitation laser that stimulates fluorescence in the sample (fluorophore) is coupled parallel to the optical tweezer system. Detection of this fluorescence signal at various positions on the sample permits the sample to be imaged. In this presentation the layout of the optical tweezer system and its characterization will be discussed. Piezo controllers allow x- and y- positioning of the sample. Detection using a spectrometer to record a spectrum at each x- and y- position hence allows spectral imaging of the sample. First fluorescence microscopy results will be presented. The proposed modification and adaptation of this setup to enable nonlinear microscopy techniques will be discussed. This includes combining the microscope setup with a compressed super continuum excitation source for near diffraction limited nonlinear microscopy. The nonlinear microscopy techniques to be considered is multiphoton absorption, second harmonic generation, third harmonic generation and coherent anti-Stokes Raman spectroscopy.

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