uids due to chances in environmental conditions. The method is based on the excitation of guided modes in a planar waveguide. The system consists of a semi-cylindrical optical coupler coated with a double-layer thin film stack, one of SiO2 and the other of low-loss ZrO2, with thicknesses of 800 and 65 nm, respectively. The light source is a linearly polarized He-Ne laser operating at 543.5 nm. The sample is considered to be a semi-infinite medium in contact with the ZrO2 film. The radiation reflected from the ZrO2 film interferes with that coming from the optical coupler base, resulting in an interference pattern that shifts when changes of sample IR occurs. This shift is detected by a CCD camera and processed by acquisition software that calculates the positions of the fringes as a function of the sample IR. For instance, IR variations of air were measured due to changes in temperature, relative humidity and pressure, and then compared with values given in the literature. The system is able to measure variations due to relative humidity between 20 and 95

[13/05/10 - 16h45 - Room 5]
Development of a Mueller Matrix Optical Coherence Tomography System, Marcus Paulo Raele, Marcello Magri Amaral, Nilson Dias Vieira Jr., Anderson Zanardi de Freitas, *Instituto de Pesquisas Energéticas e Nucleares, IPEN - CNEN/SP* ■ Optical Coherence Tomography (OCT), is a technique based on low length coherence interferometry which can perform tomographic images of live structures. Mueller Matrices are mathematical elements which describes how a media alter the polarization state of the incident light. Differently of the Jones formalism for polarized light, Mueller Matrices can cope with unpolarized light and with absorption as well. The present work developed an Optical Coherence Tomography system capable of determine completely and uniquely the Mueller Matrix of a sample, in depth. In this way many measurements are needed to be done with different combinations of polarization states of the incident beam on the sample and the reference arm of the interferometer. After calibrating the system, a roll of adhesive tape was used as sample for two main reasons: presents birrefringent and has a periodic structure. Software also was developed to solve a matrix linear equations system. As a result a 4x4 matrix of images were calculated. Some of the features, as birefringence were easily indentified in some elements of this matrix, others, more subtle, can be founded in the literature. We also decomposed the matrix in three components (depolarizer, retarder and diattenuation) which allowed understand the sample as a linear combinations of three optical phenomena.

[13/05/10 - 17h00 - Room 5]
Defocusing Microscopy: Information from out of focus, Ulisses Moreira Silveira Andrade, , Oscar Nassif de Mesquita, Ubirajara Agero, *Departamento de Física - Universidade Federal de Minas Gerais*, Lucila Helena Deliesposte Cescato, *Instituto de Física Gleb Wataghin - UNICAMP* ■ Phase objects can be made visible by a slight defocus in a light microscope. This property is very useful to quantify fluctuations in cells and other biological samples that behave as phase objects in a microscope. The microscopy technique that quantifies these results, developed in the Physics of Biological Systems Laboratory, is called Defocusing Microscopy. The defocus creates a phase difference between the diffracted and non-diffracted light that generates a contrast in the image plane. In this work we show the validity of Defocusing Microscopy for larger defocus distances, in the order of $300\mu m$, and verify the theory limit defined by the paraxial approximation used in calculations. Diffraction gratings constructed in the Diffractive Optics Laboratory at UNICAMP were used as phase objects. The diffraction gratings have sinusoid profile with known period and amplitude. We show that, as predicted from the theory, diffraction gratings images present an oscillatory behavior with the correct frequency. We measure the diffraction grating profile using atomic force microscopy. We compare these results with amplitude measurements from the images in the focus position that maximizes the contrast. We obtain a very good agreement for the amplitude measurements. With these results we show Defocusing Microscopy limits of validity.

[13/05/10 - 17h15 - Room 5]
Determination of spectral responsivity of silicon trap photodetectors, Thiago Menegotto, Mauricio S. Lima, Hans Peter Grieneisen, Iakyra B. Couceiro, *INMETRO* ■ Measurement of optical power is of primary importance for both research and industrial laboratories. Up to now, the most accurate measurement of optical power is accomplished with cryogenic radiometer operating near 4 K. The principle of operation of the radiometer relies on the substitution of optical power by electrical power measurements. The light absorbing cavity of the cryogenic radiometer has a nearly flat spectral response from the ultraviolet up to the infrared region, but this equipment is not of practical use for everyday measurement. Therefore, good transfer standards for the visible range of spectrum are achieved with silicon photodiodes. Three of these photodiodes, when mounted in a trap configuration, exhibit a nearly a 100 % internal quantum efficiency and highly reduced dependence the state of polarization of the incident radiation.

We report on the work done at Inmetro to implement of a national standard for optical power measurements. A cryogenic radiometer is used to measure the optical power of a power-stabilized laser beam. This beam is made to impinge on a silicon trap detector and the photocurrent generated is measured by means of a calibrated current to voltage converter. Using this procedure, the spectral responsivity of the detector is measured for several wavelengths of HeNe laser and Ar ion laser. A simple model is applied to interpolate and extrapolate the spectral response over the whole visible spectral range. The obtained results show excellent agreement with detector previously calibrated at other national institutes of metrology.

[13/05/10 - 17h30 - Room 5]
Remote Characterization of Uranium 238, Niklaus Ursus Wetter, , Matheus Araujo Tunes, Marcello Magri