SACRAMENTO STATE

Department of Physics & Astronomy Fall 2009

Physics Colloquium Series

Senior Project Talks by Sac State Physics Majors

"Calculation of the Inclincation Angle for the Liquid Crystal Molecules in Liquid Crystal Cells with Planar Boundary Conditions"

In order to achieve optimal performance of liquid crystal (LC) devices one has to control the molecular alignment of LC molecules, which is achieved through the manipulation of the molecular inclination (pretilt) angle a generated by the alignment layers (measured with respect to the cell substrate). In our work the pretilt angle was estimated for two types of uniform cells fabricated by applying different alignment techniques. We measured the transmission versus incidence angle curves for the cells placed with the projection of the optic axis at 45^o with respect to the transmission axes of crossed polarizers which remained stationary during the measurement. The experimental curves were fitted using Mathematica modeling software in which the fitting parameter was the average inclination angle of the optic axis. We found that a rubbed polyimide alignment layer provides the formation of the uniform liquid crystal structures with a pretilt angle of $3^o \pm 0.1^o$. For the samples in which the pretilt angle was generated as a result of the formation of a polymer network while high voltage of 20 and 50 V was applied across the cell, the pretilt angle was significantly higher : about $20^o \pm 0.5^o$ and $49^o \pm 3^o$, respectively. The accuracy in the latter case is relatively low due to the limited applicability of the model.

Joseph Apicella

"Comparison of deflection of protons in the ideal and the fringe-field capacitor"

A parallel-plate capacitor has a uniform electric field between the plates, but a non-uniform fringe field, extending beyond the plate edges. Propagation of protons in the fringe fields was simulated using the SIMION software and the results were compared to the ones obtained for the ideal capacitor. The result was the correction for the magnitude of deflection and the time of flight of a proton, which significantly improved the detection of singly ionized ions that are the product of dissociation of diatomic molecules.

Bret Polopolus

Thursday, December 10, 2009
4:00-5:20 PM - MND 1015

Open & Free to all Students, Faculty & Public