



**University of Pavia**

**Ph.D. School of Electrical and Electronics Engineering and Computer Science**

## **SEMINAR**

### **Light-induced effects in liquid crystals: latest achievements**

***Prof. Liana Lucchetti***

**Università Politecnica delle Marche, Dipartimento SIMAU**

10/03/2017 – h. 11:00

Aula Seminari - Piano D

Two recent results concerning light-induced effects in liquid crystals will be reported. In particular, the talk will deal with:

- The all-optical phase control in liquid crystal cells based on Lithium Niobate substrates. When two LiNbO<sub>3</sub>:Fe crystals are used as substrates in a liquid crystal (LC) cell in the proper configuration, the photovoltaic field in each substrate gives rise to a field between the two substrates. Such optically-generated electric field induces reorientation of the LC director with a consequent phase shift of the incoming light. The peculiarity of the described hybrid lithium niobate/liquid crystal cells lies in the absence of external contacts and on the possibility to have a full control of the electric field in the cell by light. The absence of electric contacts, makes the described effect very interesting for applications in optofluidic platforms based on lithium niobate.
- The nonlinear optical response of lyotropic DNA chiral nematic liquid crystals. Here we propose an all-optical method for the measurement of the twist elastic constant  $K_{22}$  in lyotropic chiral nematics ( $N^*$ ). The method is based on a conventional pump-probe set-up to measure light-induced optical birefringence in cells in which the  $N^*$  helical axis is perpendicular to the cell plates. This approach enables bypassing two main limitations that so far prevented the measurement of elasticity of DNA LC: the counterion screening that precludes the use of low-frequency electric fields, and the impossibility of controlling the surface alignment of DNA. The experiment also highlights the remarkable existence of a easily detectable nonlinear optical response of DNA solutions, a feature that could further promote considering DNA in photonics and biophotonics applications.

Bio: Liana Lucchetti has completed her PhD in physics in 1998, from the University of Bologna in Italy. She is currently Associate Professor of physics at Università Politecnica delle Marche. Her research activity is mainly devoted to the study nonlinear optical properties of liquid crystalline materials, both for fundamental science and applications. She has published more than 60 papers in reputed international journals and served as an editorial board member of the international journal Liquid Crystals.

**Organizer**

Prof. Ilaria Cristiani

**Ph.D. Coordinator**

Prof. Paolo Di Barba

Seminar in Italian

For more information: [ilaria.cristiani@unipv.it](mailto:ilaria.cristiani@unipv.it)