

Venerdì 10 maggio alle ore 14:30 in aula 155/1

il Dottor Andrey ILJIN (*Institute of Applied Physics, University of Münster, Germany e Institute of Physics, Kyiv, Ukraine*) terrà un seminario dal titolo:

### **Nonlinear optics of liquid crystals**

Throughout their long history, liquid crystals (LC) gained outstanding popularity and appeared in modern optoelectronic and photonic technologies due to their large birefringence and strong responsiveness to external fields. Simple at a first glance, LC's reveal spectacular behaviour with exciting and deep physics underneath. Almost all known nonlinear optical phenomena have been observed in LC media spanning over multiple time scales and a vast spectral range.

As far as holography needs are concerned, a strict one-to-one correspondence between the light intensity and refractive index modulation is required. It is not the case with the renowned and widely exploited orientational nonlinearity of LC because of the presence of elastic forces, which squeeze the light-induced effective refractive index modulation concealing thus the recorded optical information. A phenomenological model of Light-Induced Order Modification (LIOM) is presented that accounts for the variations of the refractive indices of an LC layer resulted from the light-induced changes of the LC molecular ordering. The LIOM-type mechanism does not depend on the cell thickness, works for the whole range of light wavelengths and runs by far faster than the LC director reorientation. Moreover, since the optical read-out is spectrally independent from the pumping, such a mechanism could be useful for fast control of optical signals of very high intensity, for instance, in the IR range and beyond.

Despite being strictly local in material response LIOM-mechanisms imply nevertheless fine tuning of the phase shift between an interference pattern and recorded refractive index grating. Such a photorefractive-like nonlocality could be used in phase conjugation, beam steering, creation of phase delay lines or pulse shaping, *etc.* There are expectations, at least.

#### **Short Bio**

Dr. Andrey Iljin got his PhD in Material Science in the Institute of Advanced Technologies and Chemistry of Military University of Technology (Warsaw, Poland). He has been for long working in the Institute of Physics (Kyiv, Ukraine) in the field of Liquid Crystals. His main research interests include nonlinear optics and photonics of liquid crystals, optical and electro-optical properties of heterogeneous Soft Matter systems, all-optical beam control and dielectric metamaterials. He has established and maintained efficient collaboration with research groups in France, Japan, China, Poland and USA. Currently he is a fellow of the Philipp Schwartz Initiative of Alexander von Humboldt Foundation at the Institute of Applied Physics, University of Münster (Germany).

Per informazioni rivolgersi alla Professoressa Liana Lucchetti o al Dottor Raouf Barboza