DIPARTIMENTO DI FISICA "E.Fermi"
UNIVERSITÀ DI PISA
CORSO DI DOTTORATO IN FISICA
VIA BUONARROTI,2 - Edificio B-C
56127 PISA - ITALY

CORSO DI DOTTORATO IN FISICA

Venerdi 20 febbraio 2004
ore 10:00

Dipartimento di Fisica
Via Buonarroti, 2
Sala Seminari (248) - Ed. C - I piano

Prof. Irina T. Sorokina

Photonics Institute, Vienna University of Technology.

terrà un seminario su:

"Physics of active ion-doped II-VI materials for lasers and nonlinear optics"

Abstract: The active ion doped chalcogenide compounds suggested a few years ago for laser applications combine the properties of semiconductors with that of the traditionally used dielectric laser materials. The Cr^{2+} ions in these crystals have the simplest (similarly to Ti^{3+} ion in sapphire) energy level scheme facilitating efficient laser operation. These materials possess the excellent laser properties along with the interesting physics, distinguishing them from the traditionally used dielectric laser media. This opens up new opportunities for laser- and nonlinear-optical applications.
An attractive feature of these materials is the ultrabroad gain bandwidth, allowing widest tuning and few optical cycle pulse generation. The extremely high nonlinearity of these materials causes strong tendency to multipulsing in Kerr-lens modelocked experiments, requiring a considerable modification of the mode-locking techniques and reconsideration of the existing theories. The bandgap increase from Cr:ZnTe through Cr:ZnSe to Cr:ZnS resulting in the decrease of the nonlinear refraction index allows to find the optimum host crystal. In the paper important new aspects are discussed, such as the contribution of the cascaded second-order nonlinearity to the femtosecond pulse dynamics, the difference of this effect in case of single- and polycrystalline samples, as well as opportunities for the development of quasi-phase-matched structures based on Cr:ZnSe and Cr:ZnS. The spectroscopic, laser, material and nonlinear properties in these two materials are analyzed and compared to other chalcogenides, which are potentially interesting for laser applications.