

Consiglio Nazionale delle Ricerche

Istituto per i Processi Chimico-Fisici

Area della Ricerca di Pisa

Avviso di Seminario

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ore 11:30

Auletta Seminari IPCF

Prof. Anatoly Ya. Faenov *

Multicharged Ions Spectra Data Center of VNIIFTRI, Mendeleevo,
Moscow region, 141570, Russia

terrà un seminario su:

HIGH-RESOLUTION X-RAY SPECTROSCOPY OF CLUSTERS AND POWDERS, IRRADIATED BY FEMTOSECOND LASER PULSES

Abstract. Recent results of investigations of radiation properties of clusters and different powder droplets, irradiated by super intensive fs laser pulses will be presented:

- High-resolution K-shell spectra of plasma created by superintense laser irradiation of micron-sized Ar clusters have been measured with an intensity above 10^{19} W/cm² and a pulse duration of 30 fs. It is found that hot electrons produced by high contrast laser pulses allow the isochoric heating of clusters and shift the ion balance toward the higher charge states, which enhances both the X-ray line yield of the He-like argon ion and the ion kinetic energy. The results of Los Alamos group modeling of such spectra will be presented.

- First observations of elongated (up to 8.5 mm) femtosecond laser self focused channeling in N₂O cluster media under sufficiently low laser intensity (10^{16} - 10^{17} W/cm²) is presented. Results are revealing a strong macroscopic effect on laser beams owing to their interaction with a gas of clusters. Different optical and X-ray methods used to confirm long laser channeling and to estimate plasma parameters along the laser propagation. Possible mechanisms responsible for the generation of strong oscillating electric fields in the cluster plasma are discussed.

- A new advantageous kind of target for irradiation of high-intensive laser pulses, consisting in a free gravitational flow of micrometric powder, is described and its main technical characteristics are discussed. At the first time it was demonstrated that under interaction of 50 fs laser pulses with aerogels, the plasma with density 7 times higher than solid density can be created. Strong increasing of plasma density with the shortening of the laser pulse duration and increasing of the laser pulse energy was found.

* co-author: T.A. Pikuz

per informazioni: antonio.giulietti@ipcf.cnr.it 050 315 2258