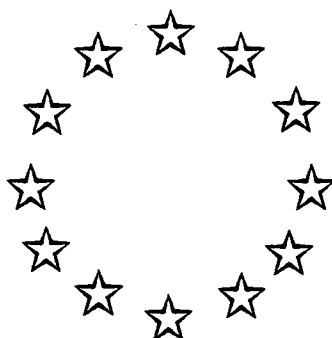


**INTERNATIONAL RESEARCH WORKSHOP
(EUROCONFERENCE)**



**GENERATION AND APPLICATION OF
ULTRASHORT X-RAY PULSES - II -**

**Pisa (Italy)
20-23 September 1995**



A B S T R A C T S

Sponsored by :

Human Capital and Mobility Program (Euroconference)

Commission of the European Communities

Università di Pisa, Dipartimento di Fisica, Italy

Istituto di Fisica Atomica e Molecolare, CNR, Pisa, Italy

Ecole Nationale Supérieure de Techniques Avancées, Palaiseau, France

Ecole Polytechnique, Palaiseau, France

Cassa di Risparmio di Pisa, Italy

INTERACTION OF INTENSE, SHORT PULSES WITH PREFORMED PLASMAS

M.Borghesi, L.A.Gizzi, A.J.Mackinnon, C.Meyer, O.Willi
Imperial College of Science, Medicine and Technology, London (UK)

The interaction of short laser pulses at relativistic intensities with plasmas is a subject of great topical interest. Several and important applications include production of coherent and incoherent x-ray sources, high harmonics generation, x-ray laser, particle acceleration¹. Recently a novel ICF scheme called the spark plug of fast ignitor has been proposed which applies high intensity, ultrashort laser pulses². For the success of this scheme a detailed understanding of the propagation of a short high intensity laser pulse in a preformed plasma is essential.

In a recent experiment performed at the Rutherford Appleton Laboratory initial experimental results of interest for the fast ignitor scheme were obtained. A green heating beam at moderate irradiance was used to explode a thin film and produce a high density plasma. A short, infrared CPA pulse was focused into the plasma at high intensity, at different stages of the plasma expansion. 1 ps resolution optical probing was used to measure the density profiles of the preformed plasma and to observe the density modification induced in the plasma by the short pulse. In addition the transmitted heating pulse and the interaction pulse were imaged onto an optical SC to observe under what conditions the short pulse was able to propagate through the plasma. The data indicates strong channelling and self focusing of the pulse.

¹P.Sprangle, E.Esarey, Phys. Fluids B 4 , 2241 (1992); C.J.Joshi, P.B.Corkhum, Physics Today, Jan 1995, p.35

²M.Tabak et al., Phys. Plasmas 1, 1626 (1994)