IF/P-09 · X-ray and Fusion Yields at the Impact of Atomic Clusters on Targets

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Abstract: We have studied the center-of-mass collisions of two equimolar deuterium-tritium clusters of radius r, concentration n, and incident velocity v, and have assumed that as a result of the impact of the two clusters a region of hot plasma is created, of temperature T. Theoretical curves are given for the power and spectral intensity of the bremsstrahlung radiation generated at the impact of the deuterium-tritium clusters, as a function of their radius, mean energy per particle and concentration of particles in the cluster, for different values of the gain parameter G and of the compression parameter F. In order to estimate the importance of the radiative processes, we have compared the energy radiated during the time of inertial confinement with the initial energy of the region of impact. We have also investigated the problem of the spectral distribution of the radiation emitted in the region of impact. The radius of the incident clusters and the required initial energy have been represented as functions of the temperature T for different values of the parameters F, G.

IF/P-10 · High Laser Fusion Gain by Skin Depth Interaction Mechanism with Suppression of Prepulses for Avoiding of Relativistic Self-Focusing

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Abstract: Measurements of the ion emission from targets irradiated with neodymium glass and iodine lasers were analysed and a very significant anomaly observed. The fastest ions with high charge number Z which usually are of MeV energy following the relativistic self-focusing and nonlinear-force acceleration theory, were reduced to more than 400 times lower energy when 1.2 ps laser pulses of about 1 Joule were incident. We clarify this discrepancy by the model of skin depth interaction in contrast to the relativistic self-focusing theory. This was indicated also from the unique fact that the ion number was independent of the laser intensity. Consequences are not only for the fast ignitor laser fusion conceptor the >10 MeV gammas and protons for a new category of nuclear reactions with TW to PW laser pulses, but much more for an improvement of experiments with the hitherto highest laser fusion gain measurements by Norreys et al (1998).

IF/P-11 · The Interaction of Super-Intense Quasi-Neutral Particle Beams with Plasma: A Numerical Investigation

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Abstract: Due to the unique properties of the recently discovered sheath laser-ion source the investigation of super-intense quasi-neutral ion beams interacting with plasma has become of substantial interest. Novel experiments in parameter regimes that bear relevance for future ion based Fast Ignition concepts bcan be envisioned. Simulations in two and three spatial dimensions of quasi-neutral ion beams interacting with a coronal plasma are presented for a number of parameters. Beam-plasma instabilities are found. Ion beam instabilities, ion beam energy loss in plasma, and the focusability of quasi-neutral ion beams will be discussed. The implications of the results for an ion based Fast Ignition concept are addressed. *This work has been done with corporate support of General Atomics, with support of the Max-Born-Institute of Nonlinear Optics in Berlin, the University of Dusseldorf, and the Queens University of Belfast.