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ICF Fast Ignition with Ultra-Relativistic Electron Beams
CLAUDE DEUTSCH, LPGP UParis XI, JEAN-PIERRE DIDELEZ, IPN UParis XI, ULTRA-RELATIVISTIC COLLABORATION — In contradistinction to mean-stream fast ignition scenario, based on collisional stopping in the compressed DT-fuel of relativistic electron beams(REB) in the 1-2 MeV energy range(ER) [1], we consider an ultra-relativistic extension of the Malkin-Fisch [2] attempt at using REB in the several tenths of MeV ER, and stopping them in target through strong induced Langmuir turbulence. We first stress the substantial and inelastic stopping arising from electron-positron pairs(Trident process). Above 100 MeV ER, bremsstrahlung and hard Gammas turn significant(cone scenario). We focus specifically on D and T nuclei electro disintegrating firstly in nucleons, and thereafter with negative pion production included. Then, it appears attractive to envisage pion-catalyzed DD,TT and DT fusion in a very dense and hot plasma surrounding with reduced alpha-sticking. The claim gets supports from the many available Debyelike multiatomic plasma orbitals involving D and T nuclei, pions and eventually electrons. A careful balance of the many collective(turbulent) and nonhadronic inelastic nuclear channels concludes the evaluation of such an approach to REB-driven scenarii for ICF fast ignition.
[1] C Deutsch, H Furukawa, K Mima, M Murakami and K Nishihara, PRL 77,2483(1996) and K V Starikov and C Deutsch PoP 14,022704 (2007) [2] V N Malkin and N J Fisch PRL 89, 125004 (2002)

Claude Deutsch
LPGP UParis XI

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