Hierarchy of beam plasma instabilities up to high beam densities for Fast Ignition Scenarios

ANTOINE BRET, ETSI UCastilla de la Mancha Spain, CLAUDE DEUTSCH, LPGP UParis XI France, BRET TEAM, DEUTSCH TEAM — We investigate the hierarchy of electromagnetic instabilities suffered by a relativistic electron beam (REB) passing through a plasma. We work in a fluid approximation and consider beam densities up to plasma ones. The hierarchy between instabilities is established in terms of only two parameters: beam relativistic Gamma factor and ratio \( \frac{N_b}{N_p} \) of beam to plasma densities. For \( \frac{N_b}{N_p} < 0.53 \), most unstable modes are a mix of Filamentation and 2-Stream instabilities. Beyond that limit, Filamentation may be dominating, depending on beam Gamma factor. Growth rates behavior for \( \frac{N_b}{N_p} \sim 1 \) leads to conclude that a Fast Ignition Scenario REB could experience a very high instability level at earliest stages of its journey through supercompressed DT core.