

Proposition de stage

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Ion beam interactions with matter

The characteristics of charged particles interacting with other materials have been studied since the discovery of their existence and vast amounts of experimental data has been accumulated on this topic. However, ion interactions with dense plasmas are still untouched. The main reason is that the bunch length of existing particle sources produced by conventional accelerator (typically ns) are too long to probe such dense plasmas before they disassemble. However, many theories exist for ion interaction in warm plasmas, although unchecked. To overcome this difficulty, we have developed for several years a new, compact, low-cost, experimental platform that utilizes short pulse laser produced ion beams which have different, but complementary, characteristics compared to conventional accelerators. Such laser-based platform, by producing very short ion bunches, presents the potential to finally breakthrough in studying the temporal dynamics and interactions with plasmas. The project will focus on performing measurements of the energy loss of protons and alpha particles after passing through several types of un-heated and heated low- Z , dense gases, using a new technology that we have recently developed. We expect such data to finally allow us to benchmarking the codes and semi-empirical theories that specialize in this regime. The intern will participate to various levels in this program depending on the duration of his/her stay and his/her level. In particular an experiment on this topic is planned in July 2014 at the LLNL laboratory (California, USA).