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Negative ion beam generation in laser plasma interactions SOPHIE JEQUIER, Universite Bordeaux - CNRS - CEA, Centre Lasers Intenses et Applications, CELIA, UMR 5107, 33405 Talence, France, VLADIMIR TIKHONCHUK, Universite Bordeaux - CNRS - CEA, Centre Lasers Intenses et Applications, CELIA, UMR 5107, 33405 Talence, SARGIS TER-AVETISYAN, ELI- Extreme Light Infrastructure, Institute of Physics, 18221 Prague, Czech Republic — Detection of a large number of energetic negative ions and neutral atoms have been reported in recent intense laser plasma interaction experiments. These particles were produced from fast positive ions (proton, carbon, oxygen) accelerated from a laser produced plasma when they were passing through a cold spray of water or ethanol [S. Ter-Avetisyan et al., Appl. Phys. Lett. 99, 051501 (2011)]. The negative ions formation is strongly related to the fast positive ions, and it is explained by a process of a single electron capture - loss. Double charge exchange, elastic scattering and energy loss phenomena have been neglected since their cross sections are much smaller. Assuming independent atoms approximation, we study populations evolution through the interaction zone analytically and numerically by solving the rate equations using cross sections drawn from literature. Taking into account the energy distribution of the incident ions, the calculations give the final energy distribution for the different species that can be compared to experimental spectra. First results obtained for hydrogen in the water case indicate that this model can explain the main observed features. The results concerning the carbon and oxygen ions will be also presented as well as refinement of the cross sections since some cross sections are missing for these energies.

Sophie Jequier
Universite Bordeaux - CNRS - CEA,
Centre Lasers Intenses et Applications,
CELIA, UMR 5107, 33405 Talence

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