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Energetic negative ion and neutral atom beams from intense laser-plasma interaction

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Negative ions play a major role in a number of areas of physics and chemistry, for high current tandem accelerators, for ion beam microscopy and lithography. Nowadays the neutral atoms are considered essential in the fusion experiments for additional heating of the plasma.
There is also a strong fundamental interest in negative ions: in this loosely bound system in screening of nucleus the inter–electronic interactions become relatively more important than the electron–nuclear interactions. In the interplay of these attractive and repulsive interactions the electron correlation plays an important role which may allow better understanding of atomic physics.
After reviewing the relevant background on negative ion acceleration mechanisms this presentation will discuss the results of recent experiments where scenario of "electron capture and loss"for the formation of negative ion and neutral atom beams with up to MeV kinetic energy has been validated and its generic nature was demonstrated [1, 2] by sending the fast positive ions accelerated from a laser plasma source through a cold liquid spray. Formed neutral atom and negative ion have nearly the same momentum as the original positive ion. .....

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