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Laser Radiation Pressure Acceleration of Ions by a Slow Electromagnetic Wave and Ion Beam Instabilities[1] S.S. BULANOV, University of California, Berkeley, CA, C.G.R. GEDDES, C.B. SCHROEDER, E. ESAREY, W.P. LEEMANS, Lawrence Berkeley National Laboratory, Berkeley, CA, S.V. BULANOV, T. ZH. ESIRKEPOV, M. KANDO, QuBS, Japan Atomic Energy Agency, Kizugawa, Kyoto, Japan, F. PEGORARO, University of Pisa, Pisa, Italy — When the radiation pressure of a laser pulse accelerates the ions in a plasma, the ion velocity cannot exceed the pulse group velocity, which can be considerably smaller than the speed of light in vacuum. This is demonstrated in two cases: (1) a thin foil target irradiated by high intensity laser light and (2) the hole boring produced in an extended plasma by a laser pulse that is accompanied by the formation of a collisionless shock wave. It is found that the beams of ions accelerated at the collisionless shock wave front are unstable against Buneman-like and Weibel-like instabilities, which result in the broadening of the ion energy spectrum.

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S. S. Bulanov
University of California

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