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Collisionless Magnetic Reconnection as an Ion Acceleration Mechanism of Low-β Laboratory Plasmas[1] EMANUELE CAZZOLA, CmPA, KULeuven, Belgium, DAVIDE CURRELI, University of Illinois at Urbana-Champaign, USA, GIOVANNI LAPENTA, CmPA, KULeuven, Belgium — In this work we present the results from a series of fully-kinetic simulations of magnetic reconnection under typical laboratory plasma conditions. The highly-efficient energy conversion obtained from this process is of great interest for applications such as future electric propulsion systems and ion beam accelerators. We analysed initial configurations in low-beta conditions with reduced mass ratio of mi = 512me at magnetic fields between 200G and 5000G and electron temperatures between 0.5 and 10eV. The initial ion density and temperature are kept uniform and equal to 10^{19} m^{-3} and 0.0215eV (room temperature) respectively. The analysis has shown that the reconnection process under these conditions can accelerate ions up to velocities as high as a significant fraction of the inflow Alfven speed. The configuration showing the best scenario is further studied with a realistic mass ratio in terms of energetics and outflow ion momentum, with the latter featured by the traditionally used specific impulse. Finally, a more detailed analysis of the reconnection outflow has revealed the formation of different interesting set of shock structures, also recently seen from MHD simulations of relativistic plasmas and certainly subject of future more careful attention.

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