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Stochastic Heating in High Intensity Laser-Plasma Interaction: Theory and PIC Code Simulations ALAIN BOURDIER, CEA/DIF BP12, 91680 Bruyeres-le-Chatel, France, DAVID PATIN, ERIK LEFEBVRE — The basic physical processes in laser-matter interaction, up to 10^{17} W/cm2, are now well understood, on the other hand, a large number of issues remain open in the study of the relativistic interaction regime above. Thus, the relativistic motion of a charged particle in a high intensity electromagnetic wave is studied in order to find conditions for stochastic heating to take place in laser-matter interaction. The Hamiltonian formalism is used, the Chrikov criterion allows predicting conditions for the onset of stochastic acceleration. Then, considering a high intensity wave and/or a lowdensity plasma, PIC code simulations results confirm, in the conditions previously defined, the occurrence of stochastic heating. Finally, it is shown that stochastic heating can help accelerating protons.

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