Chirped standing wave acceleration: High-energy ion control

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We propose a novel ion acceleration scheme, based on the controlled motion of an electron layer out of an initially neutral solid target. The electron layer can be directly steered by a standing laser wave formed in front of a reflecting surface. We demonstrate that for a properly chosen pulse chirp the standing wave's field nodes can be made to travel, dragging along the electron layer, which in turn accelerates the residual ions to high energies. Energies of order 100 MeV are demonstrated to be feasible even for nowadays available intensities of 10^20 W/cm^2 and a scaling law for higher laser intensities and layer densities is presented, promising stable GeV-level energy gains of dense ion bunches, for soon-to-be available laser intensities.