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Generation of heavy ion beams using high-intensity short pulse lasers. GEORGE PETROV, Naval Research Laboratory, CHRIS MCGUFFEY, University of California-San Diego, ALEC THOMAS, KARL KRUSHELNICK, University of Michigan, Ann Arbor, FARHAT BEG, University of California-San Diego — A theoretical study of ion acceleration from high-Z material irradiated by intense sub-picosecond lasers is presented. The underlying physics of beam formation and acceleration is similar for light and heavy ions, however, nuances of the acceleration process make the heavy ions more challenging. At least four technical hurdles have been identified: low charge-to-mass ratio, limited number of ions amenable to acceleration, delayed acceleration and poor energy coupling due to high reflectivity of the plasma. Using two dimensional particle-in-cell (PIC) simulations, we observed transitions from Radiation Pressure Acceleration (RPA) to the Breakout Afterburner regime (BoA) and to Target Normal Sheath Acceleration (TNSA) akin to light ions. The numerical simulations predict gold ions beams with high directionality (<10 degrees half-angle), high fluxes ($>10^{11}$ ions/sr) and energy (>10 MeV/nucleon) from laser systems delivering >20 J of energy on target [1]. [1] G. M. Petrov, C. McGuffey, A. G. R. Thomas, K. Krushelnick, and F. N. Beg, Phys. Plasmas 23, 063108 (2016).

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