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Intense Laser Cluster Interaction: Quasi-monoenergetic High Energy Ion Production[1] AYUSH GUPTA, THOMAS ANTONSEN, JOHN PALASTRO, Institute for Research in Electronics and Applied Physics, University of Maryland, College Park, MD, T. TAGUCHI, Setsunan University, Osaka, Japan — We investigate the production of energetic ions in the interaction of intense short laser pulses with gases of van der Waals bound nanoscale atomic clusters using a 2-D electrostatic particle-in-cell (PIC) code [1-2]. The clustered gas strongly absorbs the laser pulse energy efficiently producing x-rays, extreme ultraviolet radiation, energetic particles and fusion neutrons. Cluster heating in an intense field is dominated by a collision-less resonant absorption process that involves energetic electrons transiting through the cluster. Cluster ions are accelerated by the space charge field created by the extraction of energetic electrons. Our simulations show that strong electron heating is accompanied by the generation of a quasi mono-energetic high-energy peak in the ion kinetic energy distribution function. We will present the mechanism for emergence of a beam-like ion energy distribution with high-energy ions.

[1] Taguchi, T., et al., Physical Review Letters, 2004. **92**(20)
[2] Antonsen, T.M., et al., Physics of Plasmas, 2005. **12**(5)

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