

SOME PHYSICAL PROCESSES AT HIGH ENERGY DENSITIES, WORTH INVESTIGATING BY INTENSE HEAVY ION BEAMS

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High energy densities in matter can be generated by different methods. Review of modern experimental techniques, such as methods of shock compression, multi-step shock compression, isochoric heating and others is given. A special attention is pointed out to possibilities of intense heavy ion beams in high-energy-density matter research. Due to the unique feature of energy deposition process of heavy ions in dense matter (volume character of heating) it is possible to generate high entropy states in matter without necessity of shock compression. Previously, such high entropy states could only be achieved by using most powerful shock wave generators like nuclear explosions or powerful lasers. This novel technique of heavy ion heating and expansion [1] allows one to explore new fascinating regions of the phase diagram including liquid phase, evaporation region with the critical point and strongly coupled plasmas.

1. D.H.H. Hoffmann, V.E. Fortov, I.V. Lomonosov, V.B. Mintsev, N.A. Tahir, D. Varentsov, J. Wieser, "Unique capabilities of an intense heavy ion beam as a tool for equation-of-state studies", *Phys. Plasmas*, 9 (2002) 3651-3655.