

Abstract Submitted  
for the DPP05 Meeting of  
The American Physical Society

**Studies of High Energy Density Matter Including Strongly Coupled Plasmas Using Intense Heavy Ion Beams at the GSI Darmstadt and Future FAIR Accelerator Facilities** NAEEM TAHIR, GSI Darmstadt, Germany, CLAUDE DEUTSCH, LPGP, Orsay, France, VLADMIR FORTOV, VIKTOR GRYAZNOV, IPCP, Chernogolovka, Russia, DIETER HOFFMANN, GSI Darmstadt, Germany, IGOR LOMONOSOV, IPCP, Chernogolovka, Russia, ROBERTO PIRIZ, UCLM, Ciudad-Real, Spain, ALEXANDER SHUTOV, IPCP, Chernogolovka, Russia, PETER SPILLER, GSI, Darmstadt, Germany, MAURO TEMPORAL, UCLM, Ciudad-real, Spain, SERBAN UDREA, DMITRY VARENTOV, TU Darmstadt, Germany, GSI DARMSTADT COLLABORATION, LPGP, ORSAY COLLABORATION, IPCP CHERNOGOLOVKA COLLABORATION, TU DARMSTADT COLLABORATION, UCLM, SPAIN COLLABORATION — Detailed numerical simulations and analytic work have shown that an intense heavy ion beam that will be generated at the future FAIR facility at Darmstadt, that will have an intensity of  $2 \times 10^{12}$  uranium ions per bunch with a bunch length of 50 ns and a particle energy of 0.4 - 2.7 GeV/u, will be a very efficient tool to create high-energy-density (HED) states in matter including strongly coupled plasmas. These theoretical studies have shown that using this ion beam one will be able to study those regions of the phase diagram that are either very difficult to access or are even inaccessible using the traditional methods of shock compression.

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Date submitted: 06 Jun 2005

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