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**Studies of High Energy Density Matter Using Intense Ion Beams: The HEDgeHOB Collaboration**

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Extensive theoretical work done over the past years that included sophisticated 2D and 3D numerical simulations as well as analytic modeling, has shown that intense heavy ion beams are an excellent tool for creating large samples of High Energy Density (HED) matter with fairly uniform physical conditions [1]. It has been found that one may employ an ion beam using two very different experimental configurations that are named **HIHEX** [2,3] and **LAPLAS** [4,5]. The former scheme involves isochoric and uniform heating of matter by an ion beam that is followed by isentropic expansion of the heated material. Using this technique, one can access the entire phase diagram including those regions which can not be accessed by traditional methods of shock waves. The second scheme considers a multiple shock reflection technique that allows one to achieve a low-entropy compression of a test material like hydrogen or water which generates physical conditions that are expected to exist in the interior of giant planets. Interesting physical problems like Rayleigh-Taylor and Richtmyer-Meshkov instabilities have also been investigated in detail.This work has provided the necessary basis for the **HEDgeHOB** scientific proposal for experiments at the Future Facility for Antiprotons and Ion Research [**FAIR**], at Darmstadt. [1] N.A. Tahir et al., PRE 60 (1999) 4715. [2] D.H.H. Hoffmann et al., PoP 9 (2002) 3652. [3] N.A. Tahir et al., PRL 95 (2005) 035001. [4] N.A. Tahir et al., PRE 62 (2001) 016402. [5] A.R. Piriz et al., PRE 66 (2002) 056403.