Planetary Physics Research Program at the Facility for Antiprotons and Ion Research at Darmstadt

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Abstract: Development of high power lasers have introduced a new, very interesting field of research named, laboratory astrophysics. Theoretical work based on detailed numerical simulations and analytic modeling has shown that the availability of strongly bunched and well focused energetic particle beams will allow scientists to study planetary physics in the laboratory in a similar manner. It has been shown with the help of 2D hydrodynamic simulations that employing the intense uranium beam that will be generated at the Facility for Antiprotons and Ion Research [FAIR] at Darmstadt in a few years time, it will be possible to achieve a low-entropy compression of a sample material to generate planetary core conditions (super-high densities, ultra-high pressures but relatively low temperatures). Implosion of hydrogen [1], water [2] and iron [3] have been studied to produce extreme physical conditions that have been predicted to exist in the hydrogen rich gas giants, water rich planets and iron rich Earth-like rocky planets, respectively. This talk presents an overview of this work and describes design of a proposed experimental scheme, LAPLAS [**La**boratory **Pla**netary **S**ciences], which is an important part of the High Energy Density Physics program at FAIR.

References

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