High energy density physics research at the UCLM: The GSI Collaboration

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UCLM group on Fluids and Plasmas at UCLM

- Our group is composed by 6 researchers and 1 technician. Five of us dedicate to theoretical research and/or numerical simulations. The other one is dedicated to the experimental research in our laboratory on high energy density matter created by means of an exploding wire experiment. Lab at UCLM: Initial equipments given by GSI.

- Every member of the group is involved in one or more collaborations:

a) GSI Darmstadt- Germany (HED physics - LAPLAS)- Naeem Tahir

b) State Key Lab. of Explosive Sci. and Technology – China (hydroinstabilities, shocks)- YuanBo Sun

c) ILE- Japan (hydroinstabilities)-Takayoshi Sani

d) CEA - France (ICF target design and related physics)- Benoit Canaud

e) Harvard University - USA (colisionless shocks, plasma instabilities)- Ramesh Narayan

f) Instituto Técnico Lisboa - Portugal (colisionless shocks, plasma instabilities)- Luis Silva

g) Linköping University - Sweden (colisionless shocks, plasma instabilities)- Mark Dieckmann

h) University of Buenos Aires - Argentina (Exploding wire experiments)- Luis Bilbao

i) Other groups at UCLM (numerical simulations)- Juan José López Cela

Laboratory Planetary Sciences (LAPLAS)

- Collaboration with GSI starts in 2000 with the aim to provide theoretical support to the numerical simulation work at GSI. Our contact person at GSI is Dr. Naeem A. Tahir. Around 120 paper in international journal has been published in 22 years.

- The main subject is the LAPLAS experiment and, in less extent, HIHEX experiment:

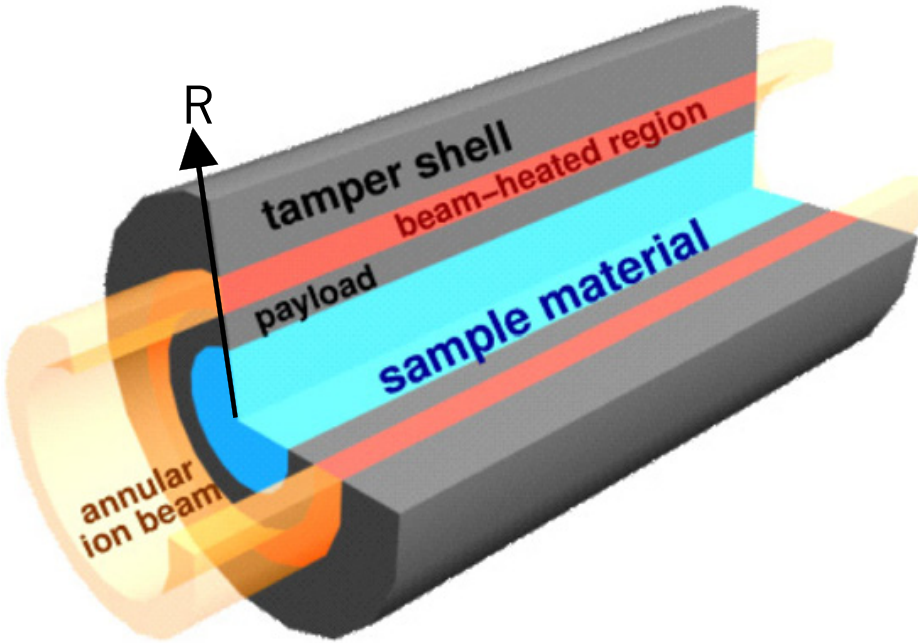
Shell: W

Samples: H, Fe, H_2O, C

Annular focal spot: wobbler system, beam stoppers, focal spot shaping, full focal spot

Implosion velocity: 10^5 cm/s

Acceleration: $2x10^{12}$ cm/s^2

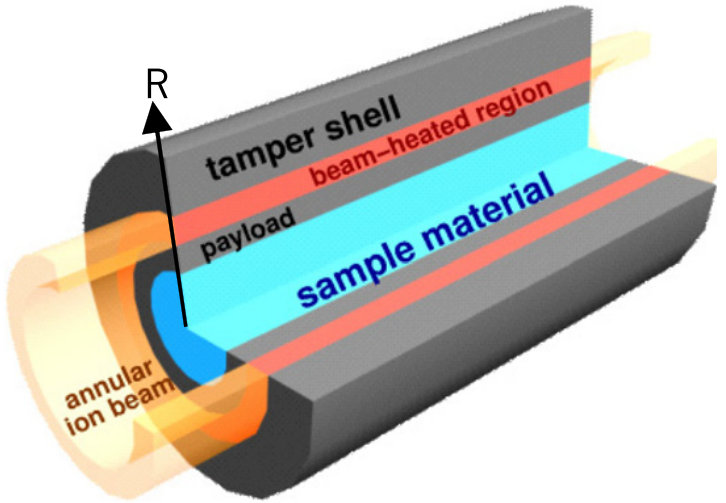


UCLM- GSI join research fields

1) 1D modelling of the implosion dynamics and comparisons with GSI 2D simulations.

2) Generation of annular focal spot- symmetry:

a) Wobbler system: rotation, frequency, energy distribution in the focal spot.
b) Beam stopper in the central region.
c) Shaped focal spot.
d) Full focal spot.



3) 2D behavior of the implosion:

a) Hydrodynamic instabilities: RTI, and RMI in acceleration and stagnation phases, Bell-Plesset.
b) Optimal shell materials.
c) Interpretation of GSI 2D simulations.

4) Transient shock waves: formation and decay.

5) Proposal of experiments on HED material science using hydro-instatbilities.

Benefits of the collaboration

- Participation in the design of the experiments to be performed at FAIR.

- Possibility to propose new experiments.

- Direct involvement in the realization of the experiments.

- Integration in an international community.

- International visibility.

- Opportunities for PhD students and postdocs.

- Opportunity to conform a more integrated Spanish community on HED physics: mutual collaboration, coordinate projects, internal mobility of PhD students and postdocs. GSI support.

- More opportunities for financial support in Spain.

THE RIGHT TIME FOR COORDINATE SPANISH ACTION IN ICF ?!