SAPIENZA
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ICF RMI – RTI target robustness YSO Lab-Astro

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MAGPIE experimental group

GAPS: Plasma group from ROME
part of the HiPER project: WP9

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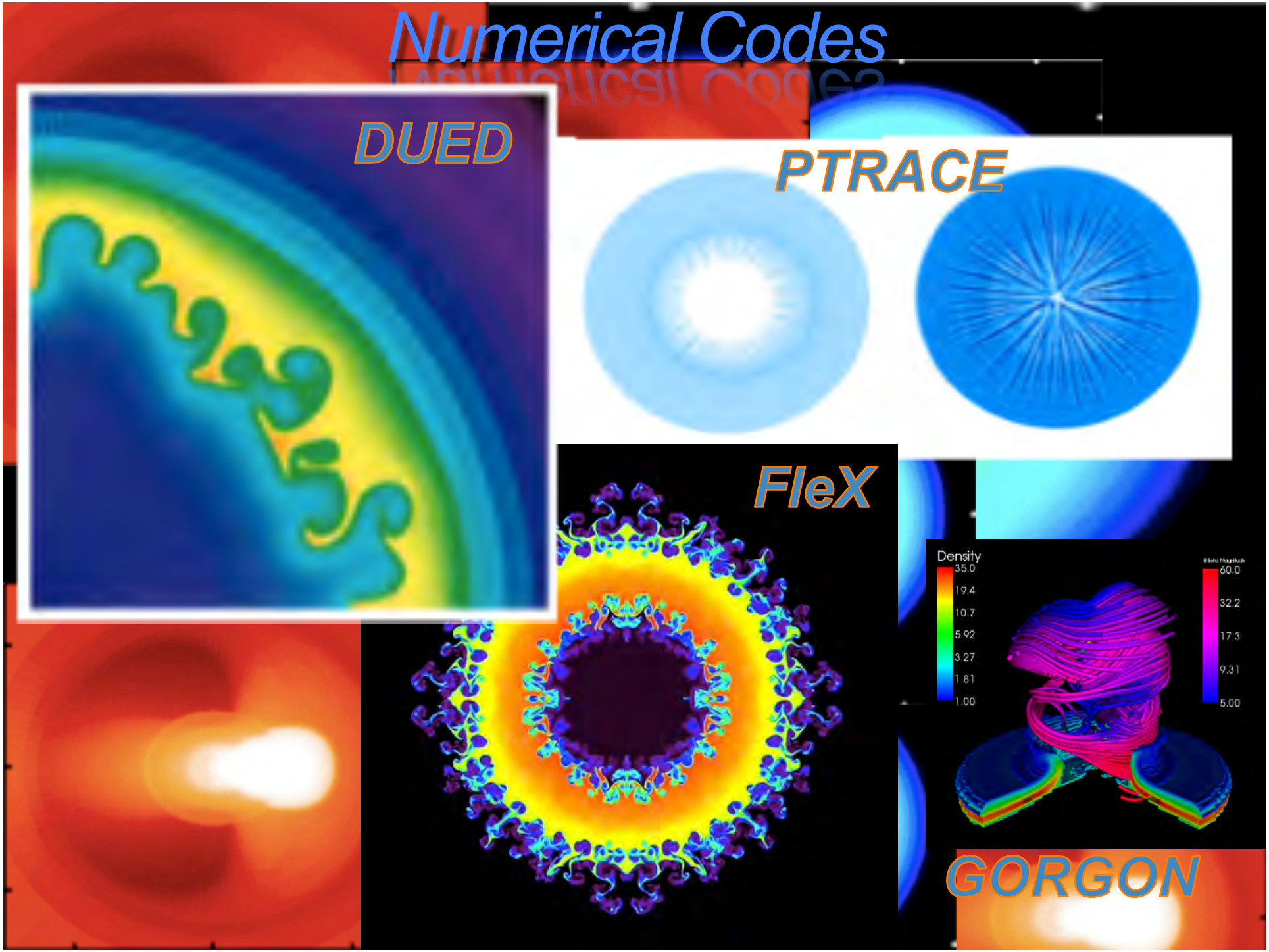
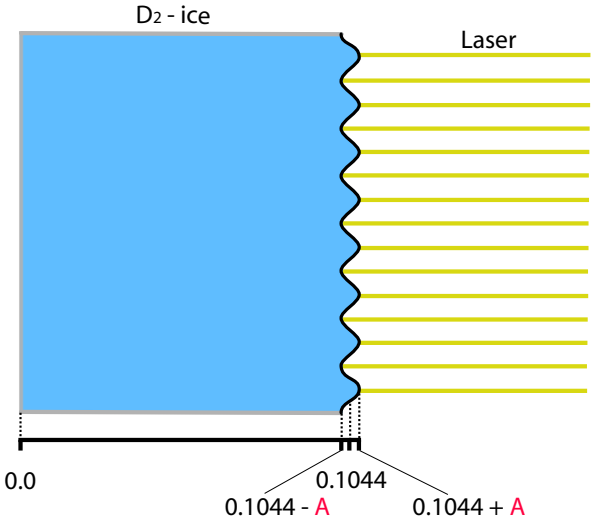
Numerical Codes



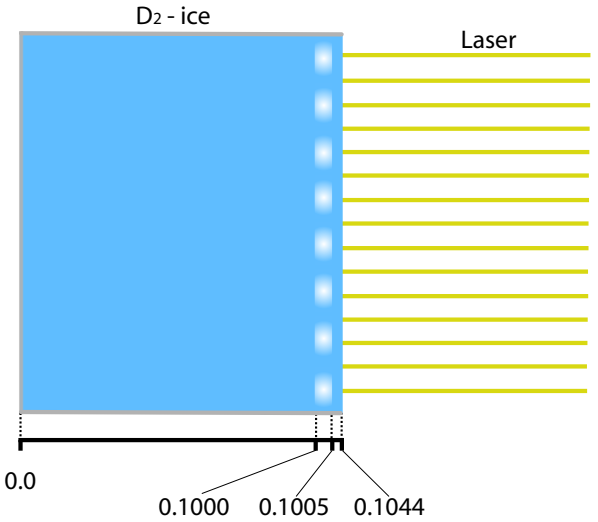
Ablative Richmyer-Meshkov Instability

System set-up

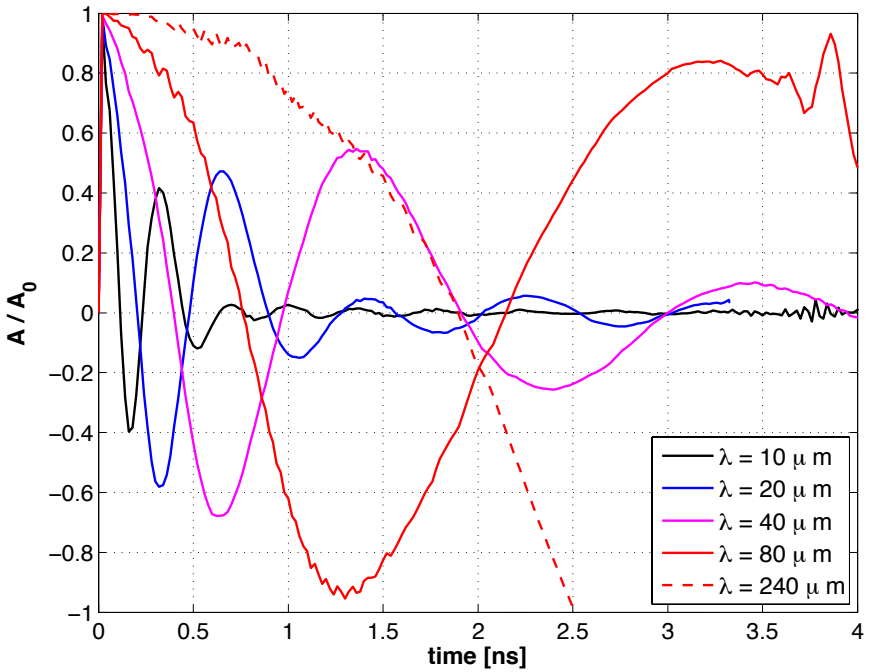
- Surface Roughness:
  - $A_0 = 10^{-5}$ cm
  - $A(r=R,\theta)=A_0 P_l(\theta)$
  - R = 0.1044 cm [HiPER]
  - Material: D_2-ice, T=20 K

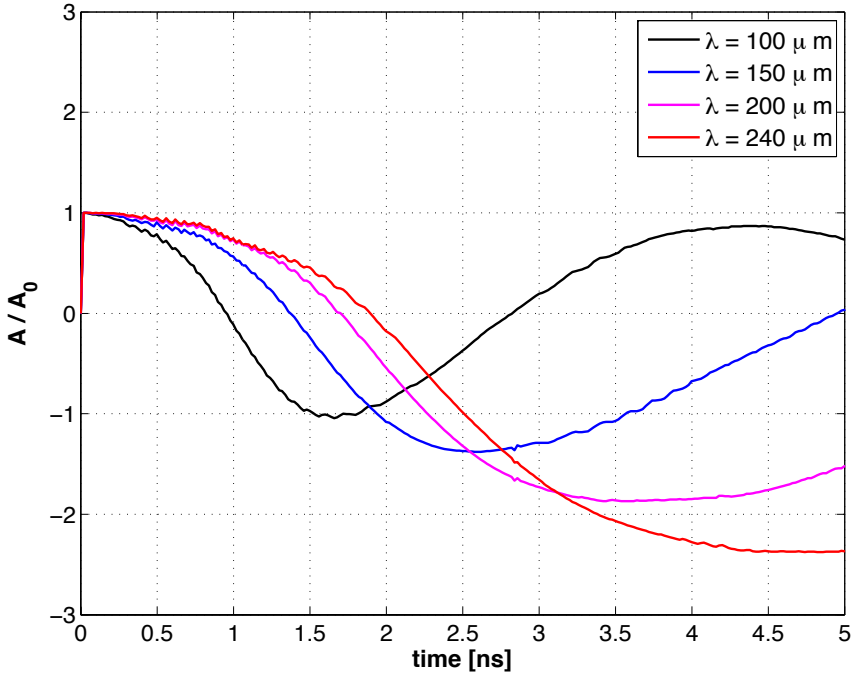


- Density non homogeneity:
  - $\rho(r) = \rho(r) * A_0 \cos(l\theta)$
  - $A^* = 2\ 10^{-7}$ g/cm^3
  - ($A_0 = 5\ 10^{-11}$ cm)
  - R = 0.1044 cm



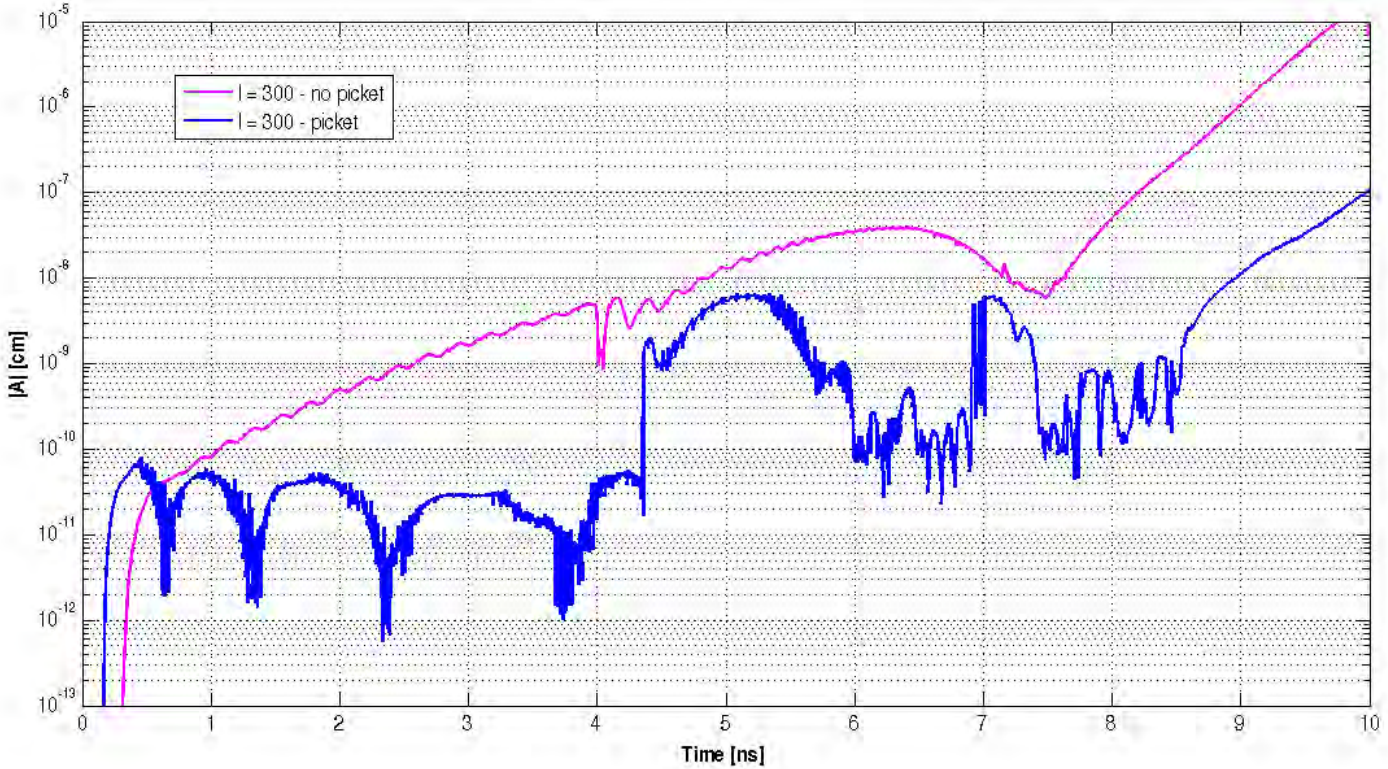
Ablative Dumping





- L_0 – thermal conduction effect
- $\tau_{dumping} \sim 1/kV_a$
- $T_\omega \sim k\,(V_a V_{bl})^{1/2}$ V_{bl} is the blow-off velocity ($x > L_0$)

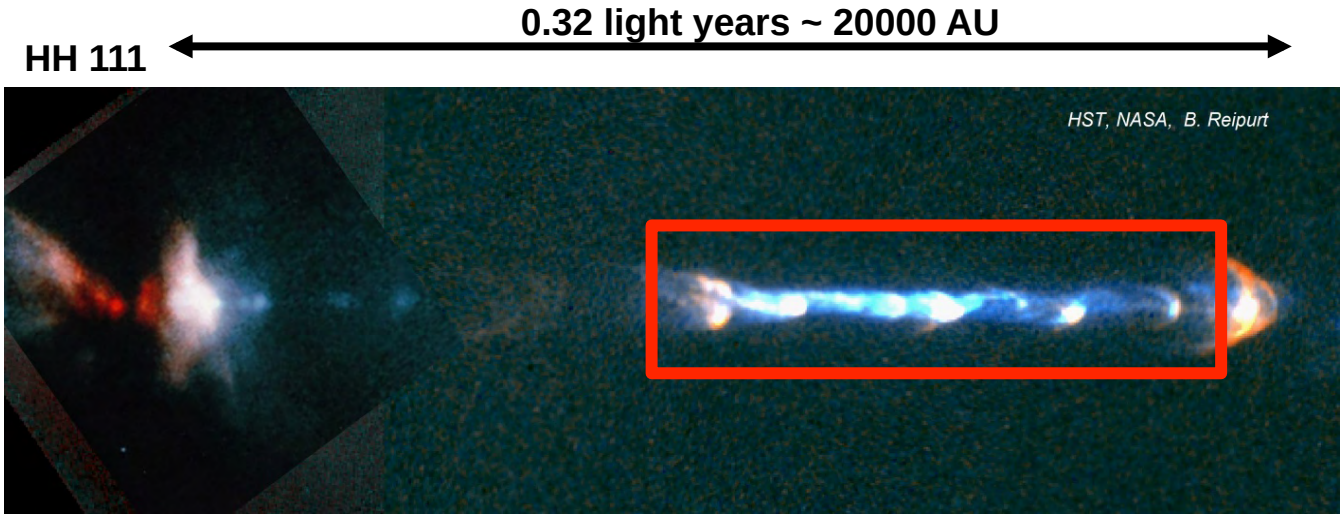
The Picket does its job!



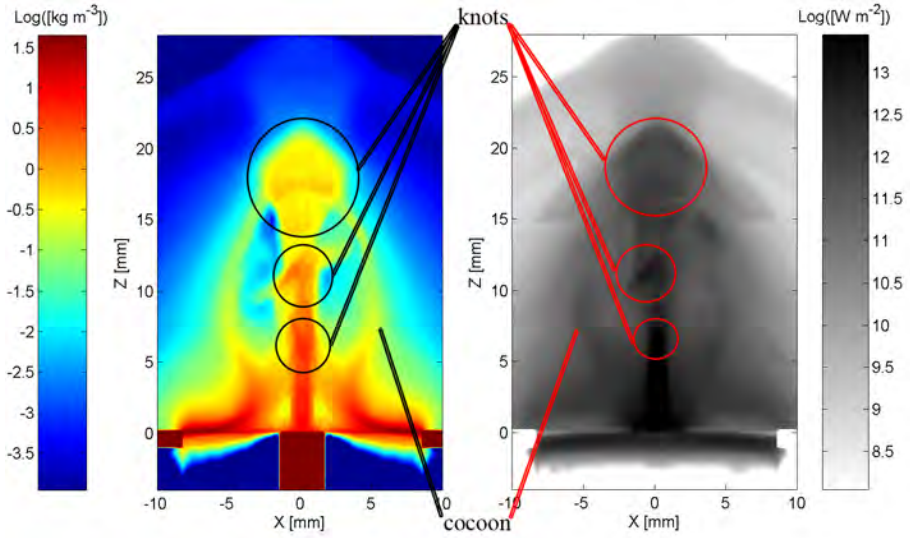
- The picket mitigates the growth; a smaller final amplitude is measured
- The picket mitigates the first part and does not allow the RMI to grow. Several amplitude inversion occur.
- Although the RTI slope is similar the final amplitude is 2 order of magnitude smaller

Laboratory - Astrophysics

Astrophysical Motivations



- HH111
- Pulsed jet structure
- Bow-shock
- HD problem, or MHD problem?
- B-field structure and importance (Lynden-Bell model)
- Experiment that can reproduce these pulsed knots



B-field Structure

- The magnetic field intensity decays with time
- The bubble expands thus the magnetic energy is spread over a bigger volume -> less confinement (~55 T at ~285 ns)
- Magnetic field confines only at the early stages

(MHD ➔ HD later stage?)

- Current reconnection
- Magnetic reconnection
- Loose of azimuthal structure