

PSB DUMP: PRELIMINARY DESIGN

LIU-PSB Meeting

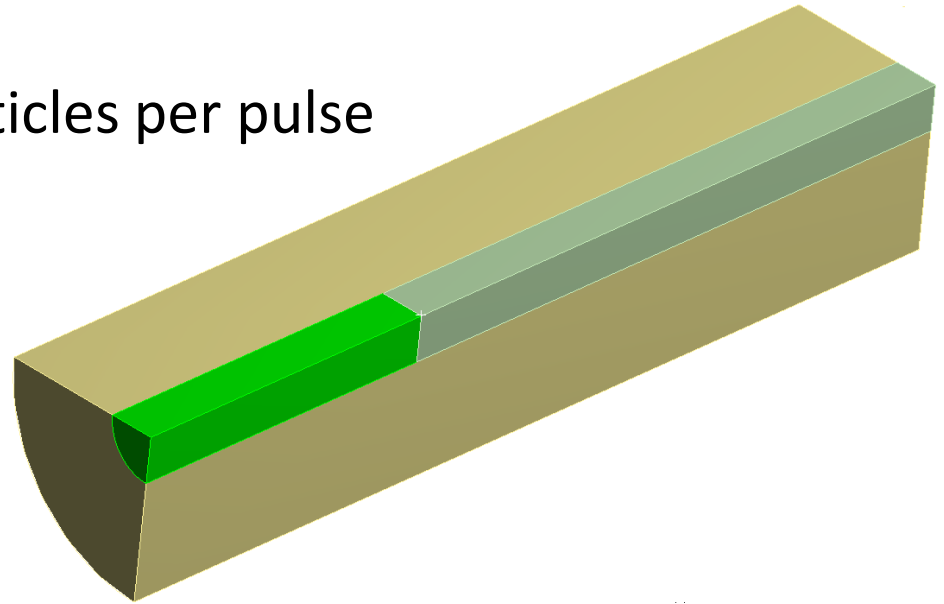
19-01-2012

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Preliminary design

- **Beam parameters:**

- Beam intensity: $1\text{E}14$ particles per pulse
- Beam energy: 2 GeV
- Pulse length: 181 ns
- Pulse period: 1.2 s
- Beam Power: 26.7 kW



- **Geometry:** a cylinder made of a heavy material, with an inner concentric cylinder made of a lighter material

- **Dimensions:** $\varnothing_{\text{inner cyl}} = 14 \text{ cm}$, $L_{\text{inner cyl}} = 0.5 \text{ m}$
 $\varnothing_{\text{outer cyl}} = 0.5 \text{ m}$, $L_{\text{outer cyl}} = 1.5 \text{ m}$

Preliminary design

- **Classic materials:**

- Copper or Cobalt-free Iron: *outer cylinder*
- Aluminium or a ceramic material: *inner core*

- **Layout:**

- A collection of several cylindrical blocks (not just one solid piece)
- Between 4 and 6 water pipes for cooling.

Mass flow required: around 4 m³/h

Preliminary thermal analysis

C: 1:Energy Deposition ALL - Cu + Alu @ 1.4GeV, 1E14 p+/pulse

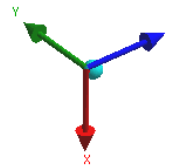
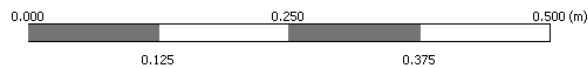
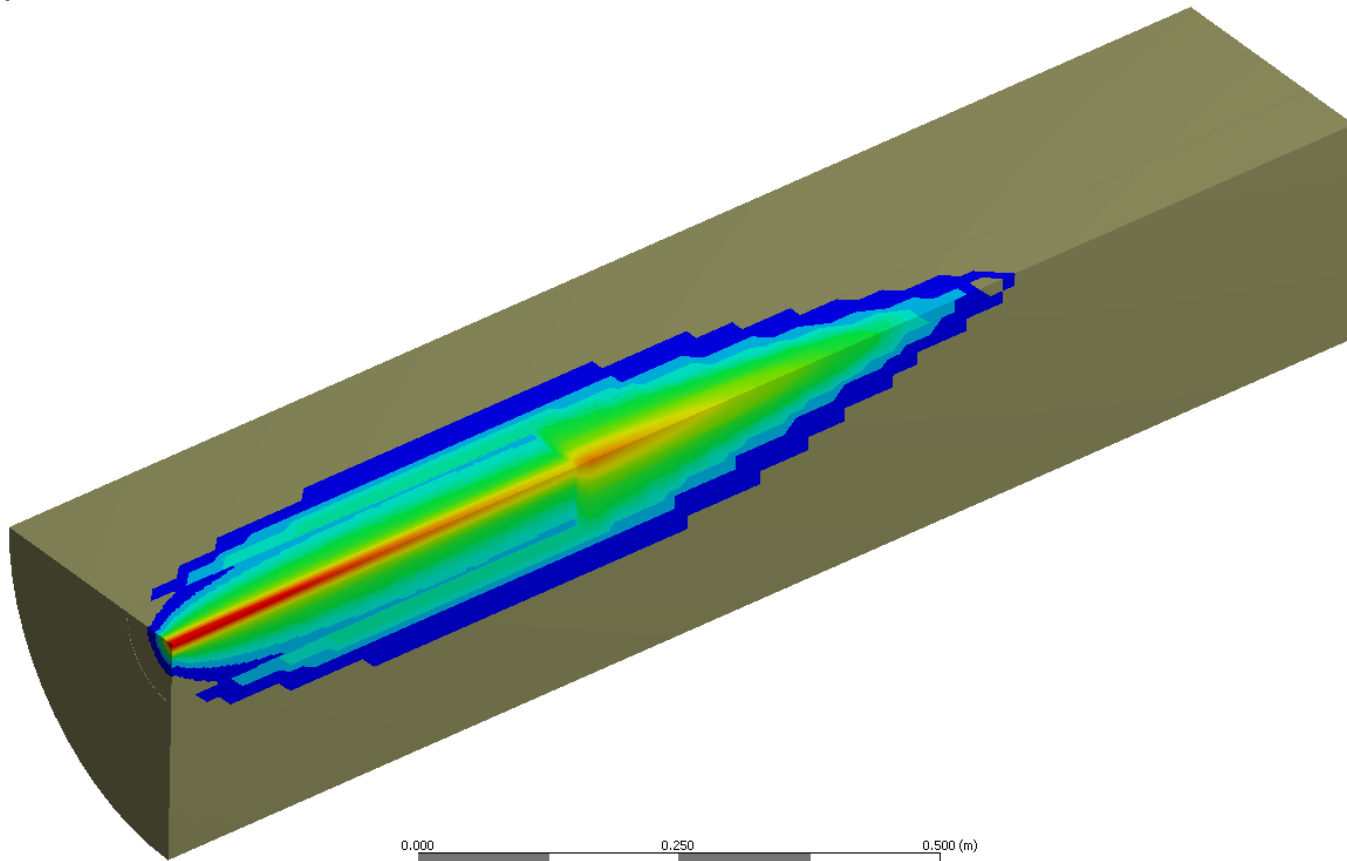
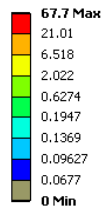
1st energy deposition [J/cm3/pulse]

Type: Temperature

Unit: °C

Time: 1.81e-007

18/01/2012 14:33



Preliminary design

- **Shielding:**

- Design in progress by RP (FLUKA simulations ongoing)
- With this preliminary design of the dump core, there's still a 50 cm gap between the dump and the wall, free to place the new shielding

- **Cabling needs:**

- Temperature sensor for water
- Temperature sensors for the core (1 or 2)
- Flow meter

Next steps

- Choice of materials
- Iterations with FLUKA and ANSYS simulations, in order to optimise the map of energy deposition and thermal stresses in the beam dump
- Final geometry and choice of materials
- Final design: beam dump core + shielding (from RP)