Effect of beam-pipe temperature

Mock-up ready

First study: effect of the beam pipe temperature

➔ Only transparent polycarbonate dummies

➔ Set beam pipe temperature with chiller

- Measure with PT100
- Chan 5 (inlet) and 2 (outlet) in graph

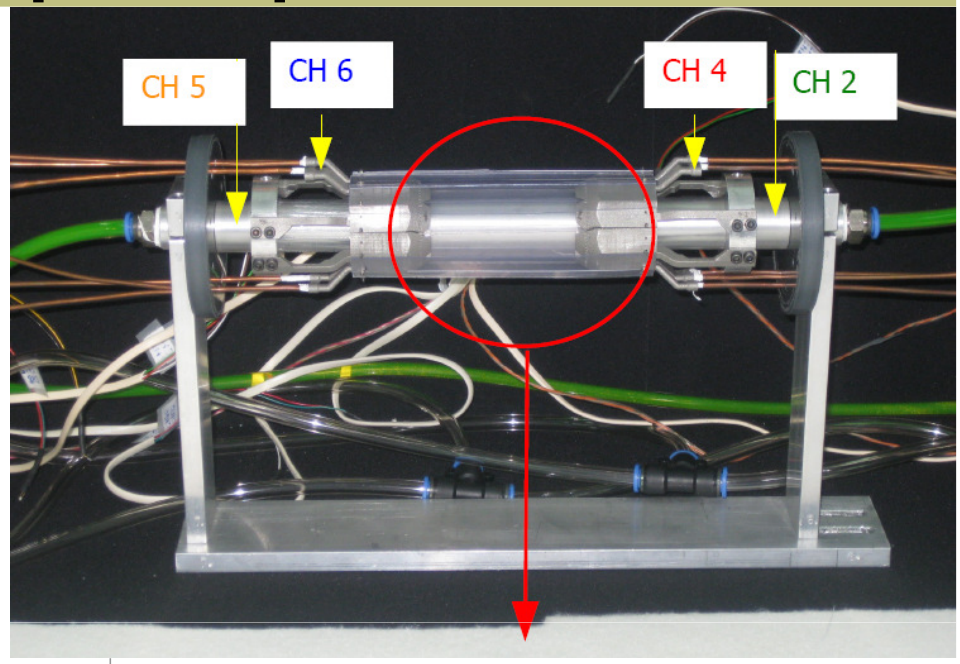
➔ Cooling blocks at room temperature

- Also measured with PT100
- Chan 4 and 6 in graph

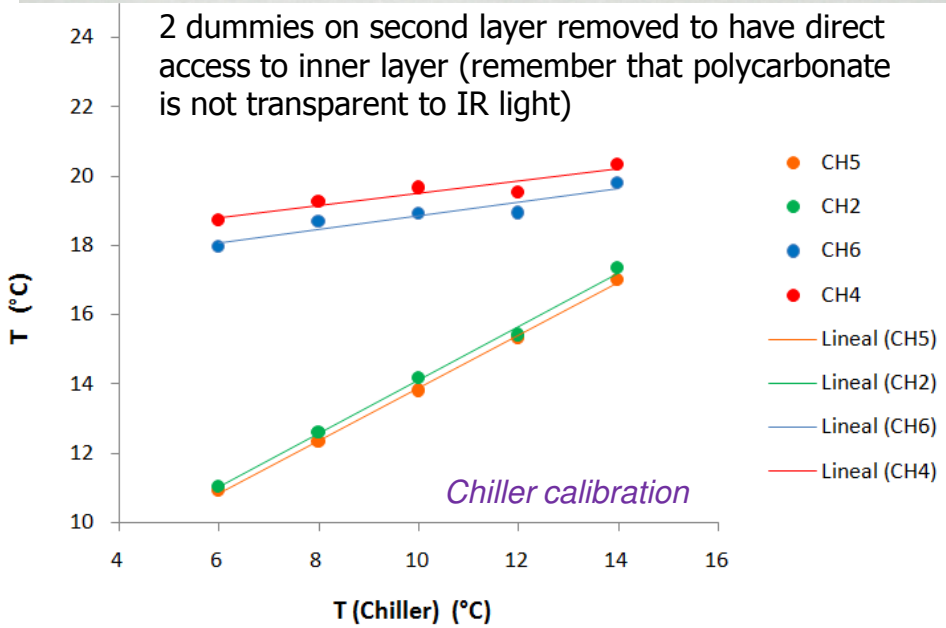
➔ Measure temperature on first layer (closest to beam pipe) with IR camera

➔ First measurements with >0 temperatures

➔ In the near future, cool down the end flanges and repeat.



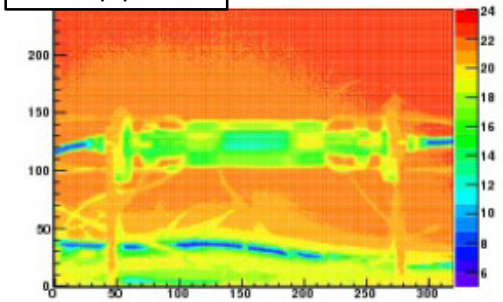
2 dummies on second layer removed to have direct access to inner layer (remember that polycarbonate is not transparent to IR light)



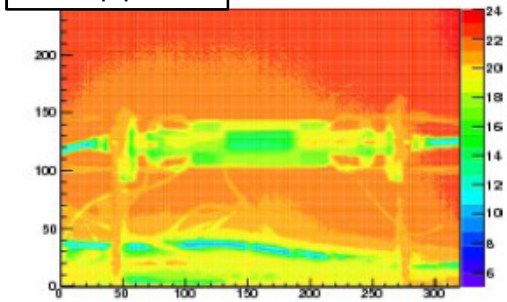
Results

Thermal images:

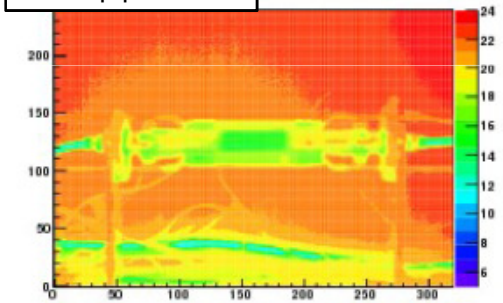
Beam-pipe 6°C



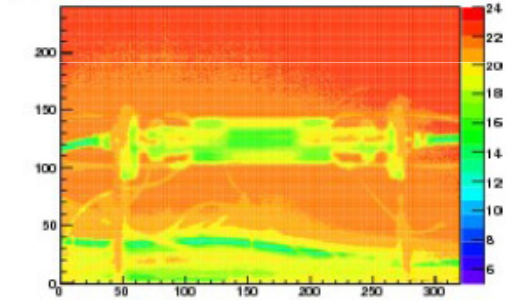
Beam-pipe 8°C



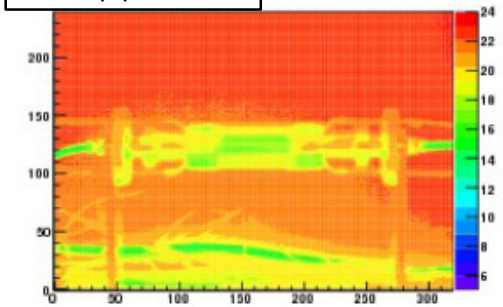
Beam-pipe 10°C



Beam-pipe 12°C

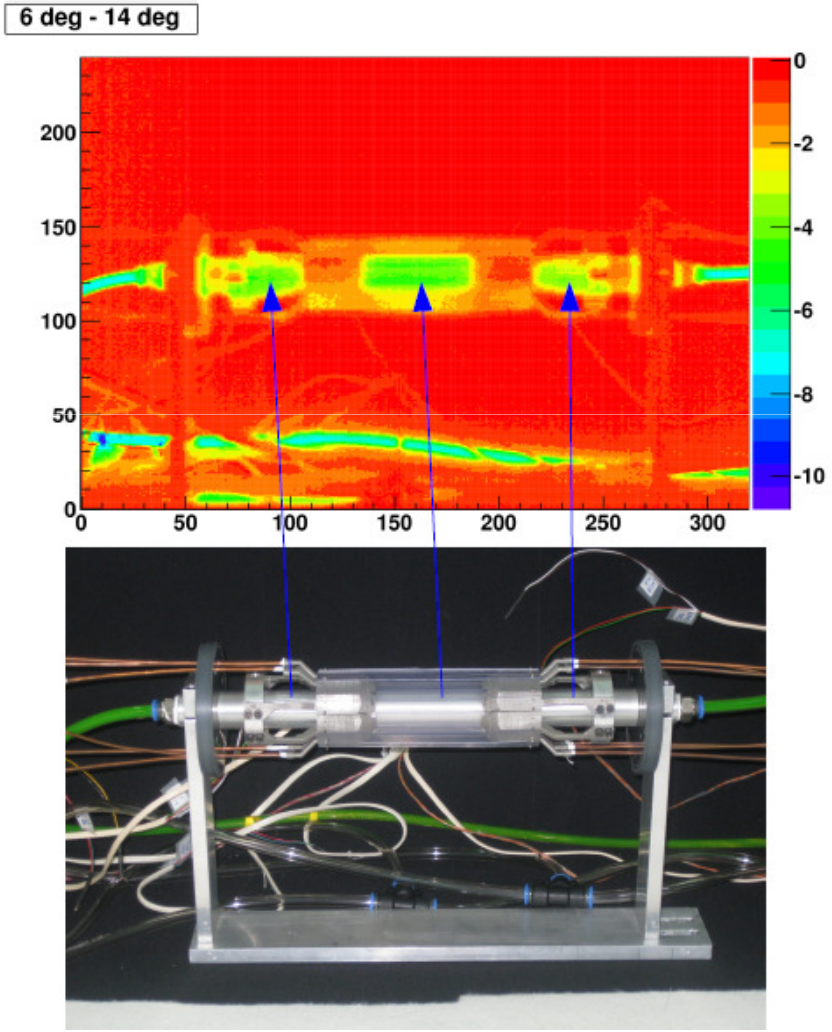


Beam-pipe 14°C



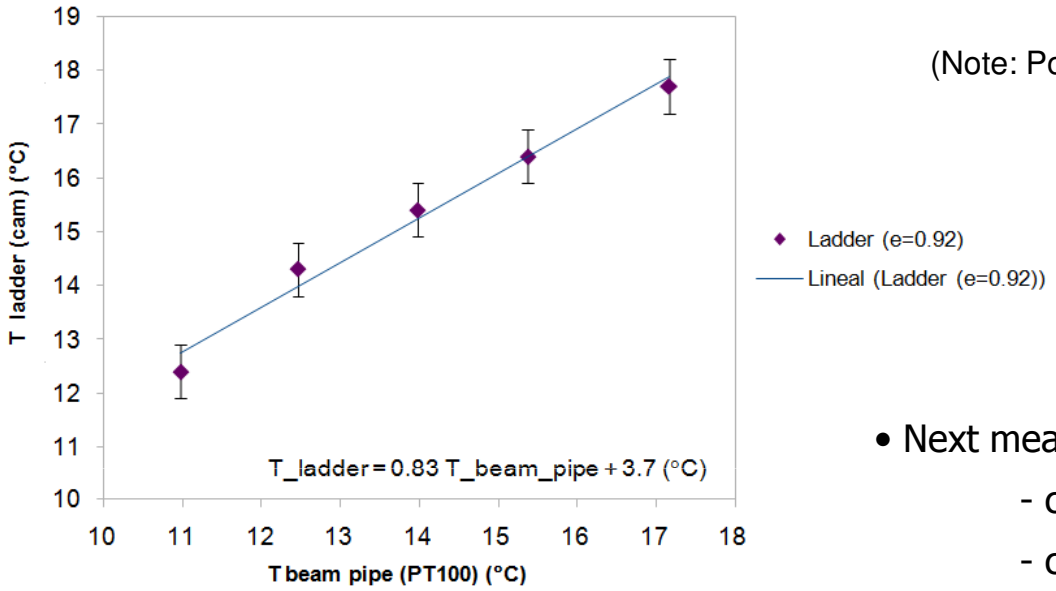
From 6 °C to 14 °C
in steps of 2 °C

Temperature difference
between 6 °C and 14 °C



Conclusions

- It seems that the beam pipe temperature has some impact on the first layer (to better quantify) :



(Note: Polycarbonate dummies $\varepsilon \sim 0.65$)

- Next measurement:
  - cool Beam-pipe (~15°C)
  - cool cooling-blocks (~8°C)
  - measure effect on first layer

→ Problem: leaks when trying to cool the cooling blocks (pores from the sinterization procedure, air and cooling pipes connected, damaged pipes when making the pin holes)

- Tried to sold them without success, at present holes and air pipes sealed with glue (tested)
- Cooling tests expected in the coming days.
- Air regime studies with a new mockup (in process of fabrication).

- Tests with AlSi10Mg material for the cooling blocks (better thermal conductivity) when arrives.