



Thermal issues

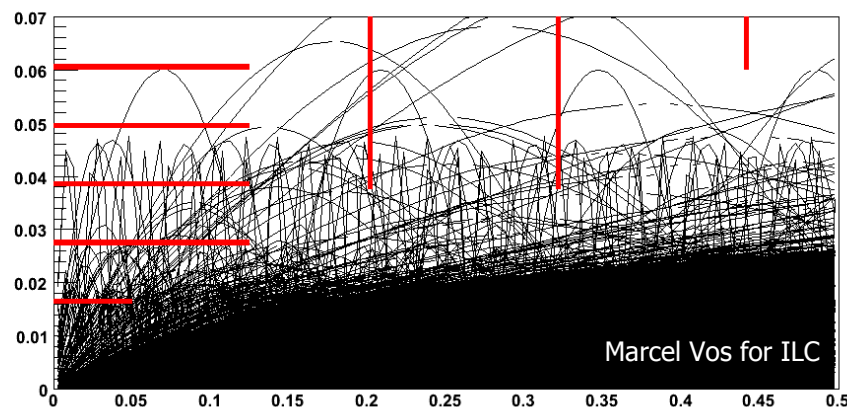
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- Distance of the layers to the beam pipe must be determined by physics performance and not by the cooling.
- This has influence on thermal issues (up/down cooling) and mechanical
- We need simulation → Background studies, radiation damage, occupancy



Sometimes is better to be a bit far...

As far as I now, unfortunately, the composition and geometry of the beam pipe is still unknown...

● Prior numbers required



- Composition and geometry of the beam pipe
- Power consumption per channel for the DCD/DHP and Switchers
- Dimensions of the chips
- Size and composition of the bumps
- Underfilling?
- Distance to the beam pipe
- Which temperatures can we tolerate in the chips/sensor?

- Are all of them available?
- When can we collect all of them in a common database?
- Do we need a specific thermal/mechanical Twiki?
- Create a thermal/mechanical mailing list to keep everyone informed of all the steps



Options

o Two options have arised:

1.- "Up" cooling (chip heat optimization)

Chips covered with a TPG foil

Diamond sheet at the very end of the upper part of the ladder

- Complex mechanical design
- Small area for heat conduction in the sensor (enough space on the ends (DCD+DHP))?

2.- "Down" cooling (sensor heat optimization)

Chips underfilled and bump material optimized

Diamond sheet covering all the lower part of the ladder's end (even the balcony)

- Are the chips cool enough?
- Is this distance to the beam pipe acceptable?

3.- Combined cooling 1+2 ???

My opinion: Choose the simplest that works... but not now!

We need to finish our measurements and simulations first!



● Studies in Valencia



- ✓ Characterization of materials: Cu, Al, TPG
- ✓ Variation of sensor's temperature with/without TPG underneath the ladder
- ✓ Sensor's temperature as a function of the one of the cooling block.
- ✓ Sensor's temperature as a function of speed of air
- ✓ Preliminary studies with the temperature of the air
- ✓ Influence of the power cycling in the temperature of the sensor

Done

- Studies of heat transfer through the bump bonding
 - Real dummy chips in Valencia
 - ANSYS geometry implemented
- Final studies of the temperature of the air
- Self weight bowing
 - ANSYS geometry implemented
 - Metrology could be done
- TPG under the SW balcony

Future

PLAN: Build a common simulation validated with measurements