

Performance of the Tilecal cooling system

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(CERN)**

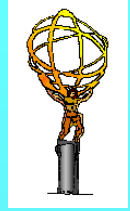
CERN ATLAS Week, February 2002



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Review - last ATLAS week

Cooling Unit in H8



return pipes

output pipes

control box

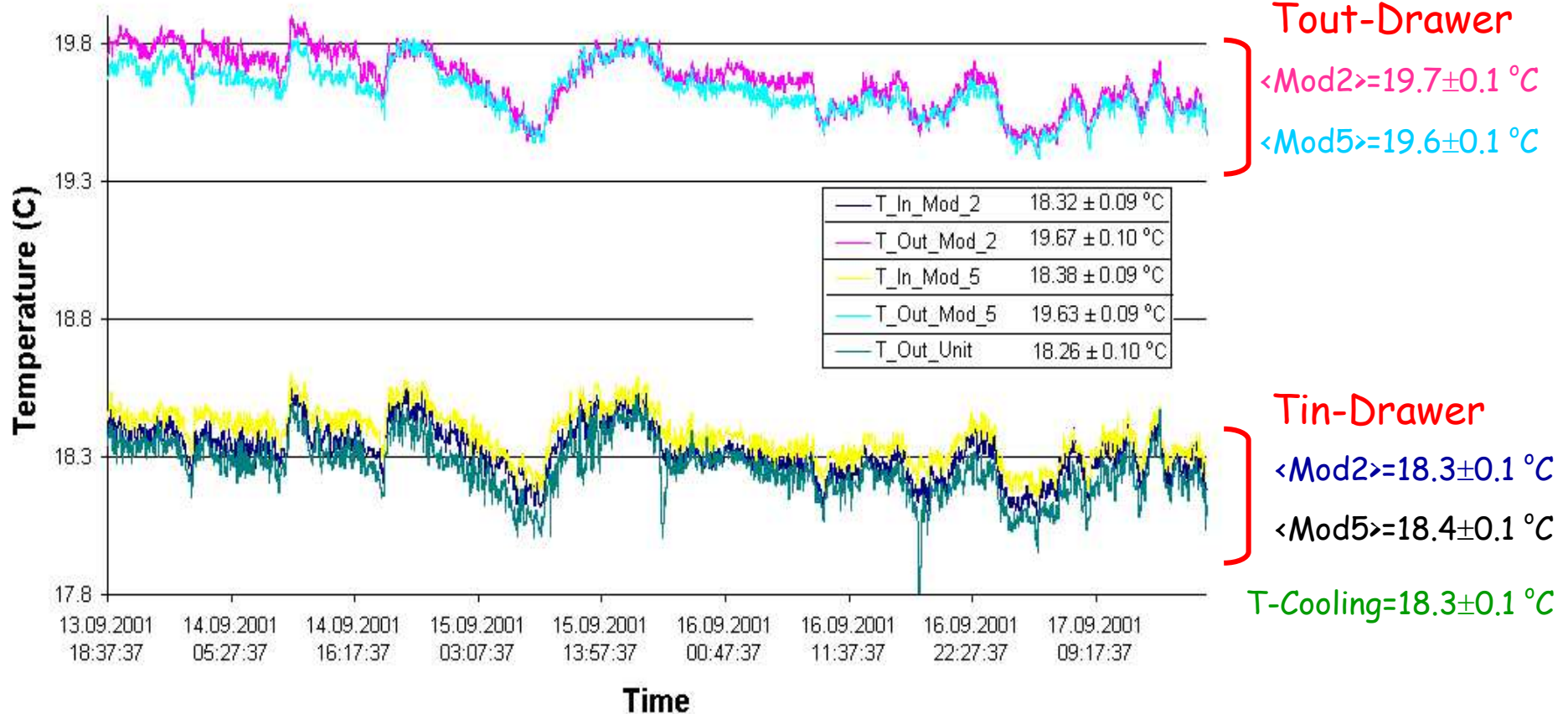
fridge unit

water tank

Stability of the system during data taking

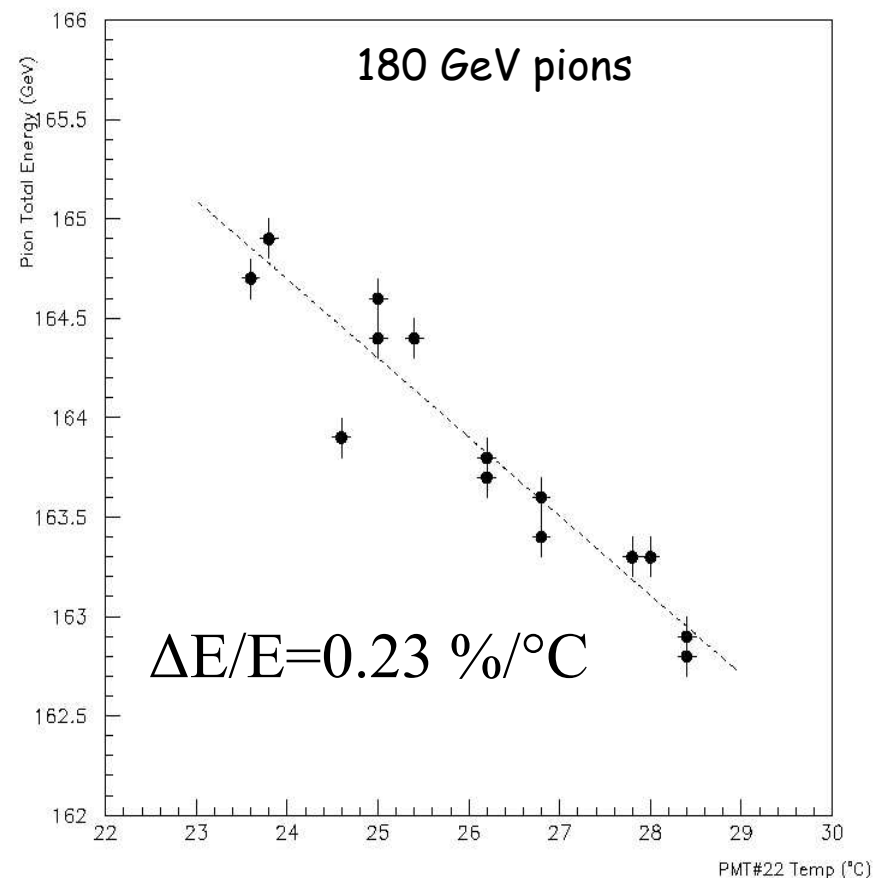
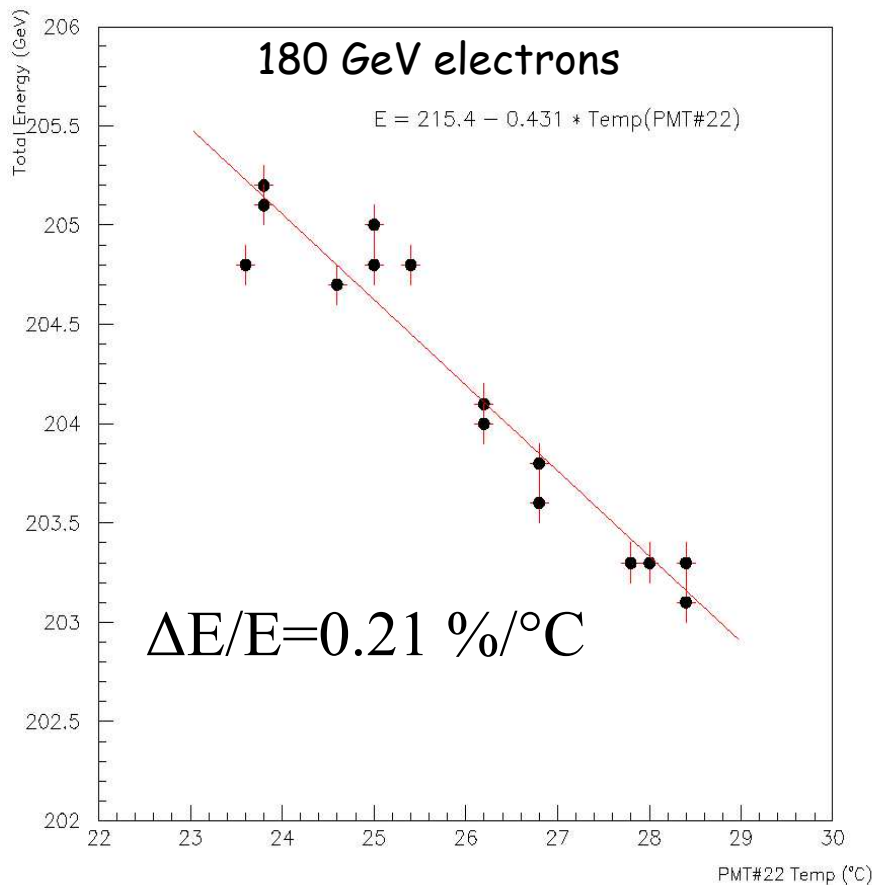


Temperature Stability 13th to 17 of September 2001

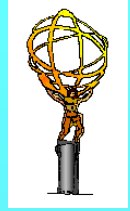


PMT gain variation versus temperature

total energy deposited versus temperature in PMT#22



$\Delta E/E = 0.2 \text{ \%} / ^\circ\text{C}(\text{PMT}) \Rightarrow \Delta E/E = 0.1 \text{ \%} / ^\circ\text{C}(\text{cooling})$



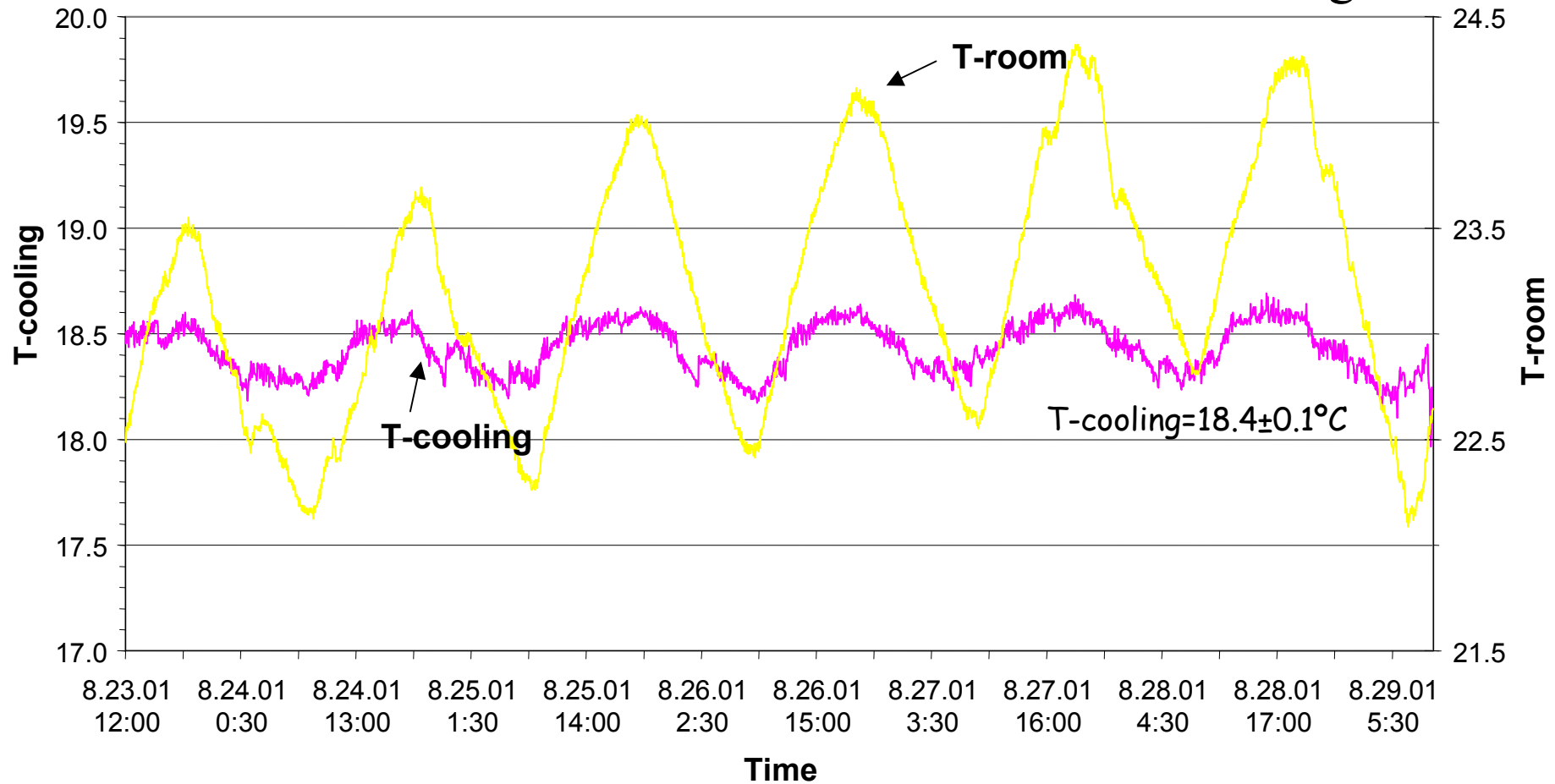
Influence of the ambient Temperature on the Cooling Unit

Influence of the ambient Temperature

T-cooling & T-room vs. Time

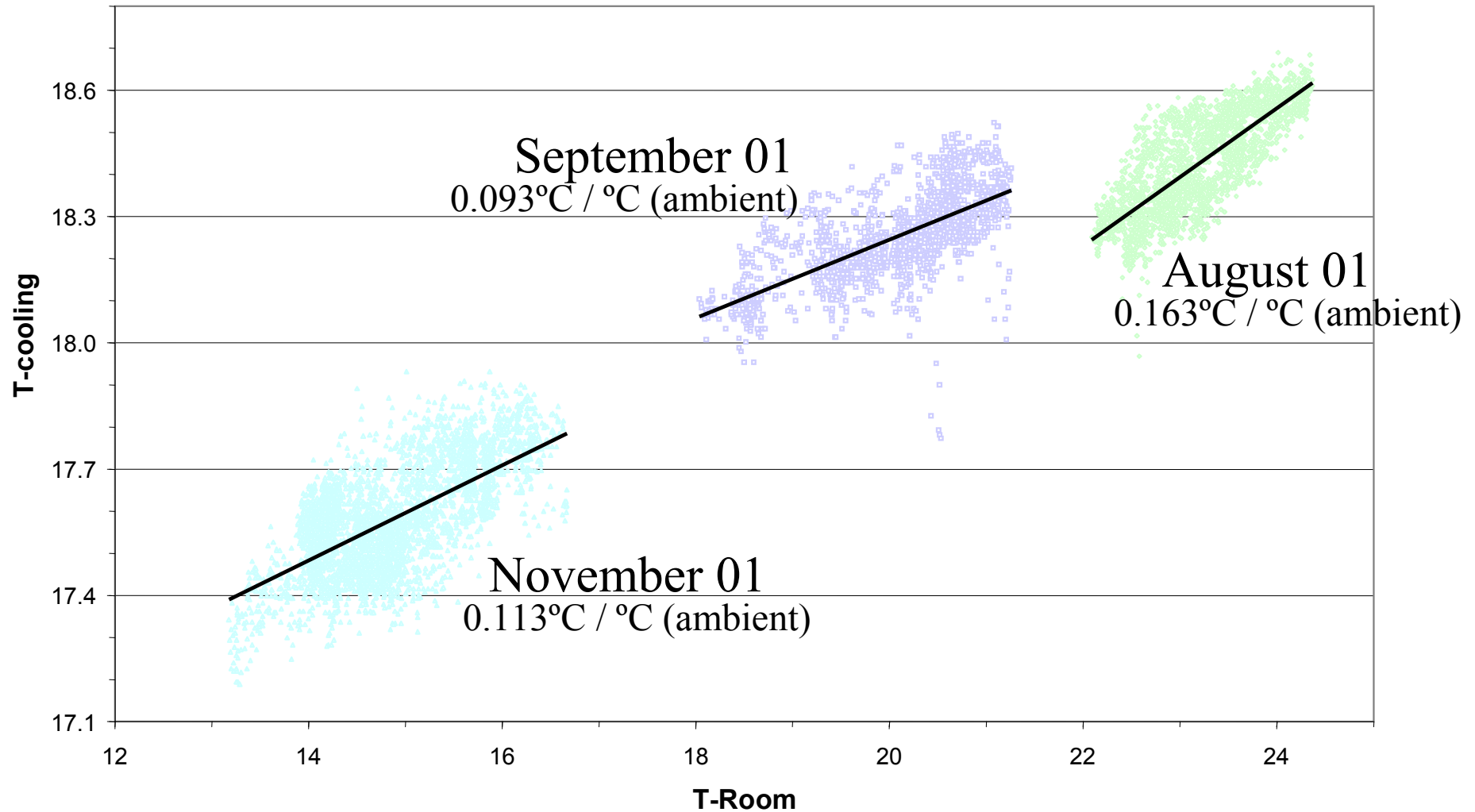


August

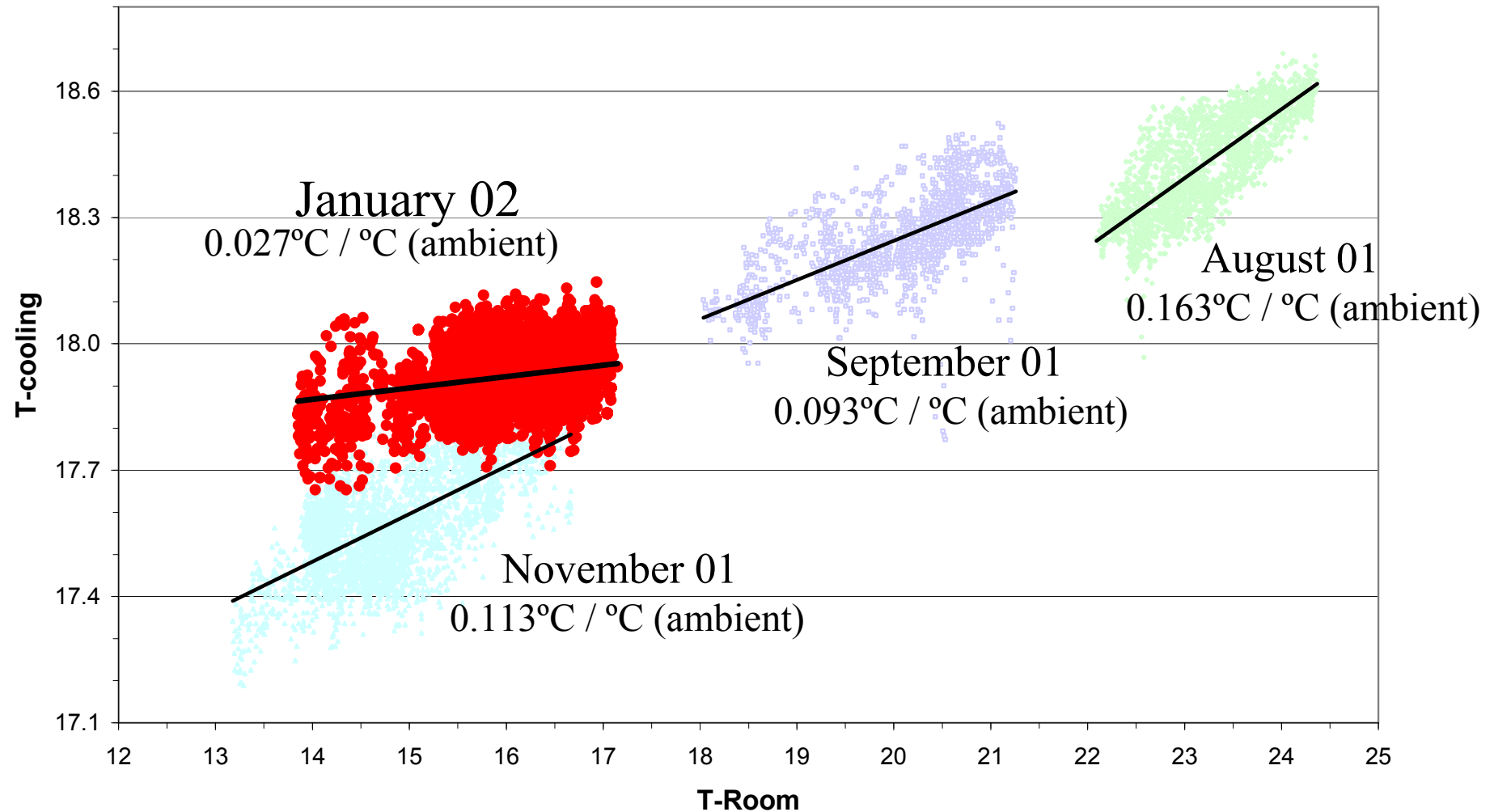


Influence of the ambient Temperature

T-cooling vs. T-Room



Improved Isolation





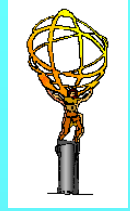
	Cooling water change per °C(ambient)
August	0.163°C
September	0.093°C
November	0.113°C
January (improved Isolation)	0.027°C



Summary

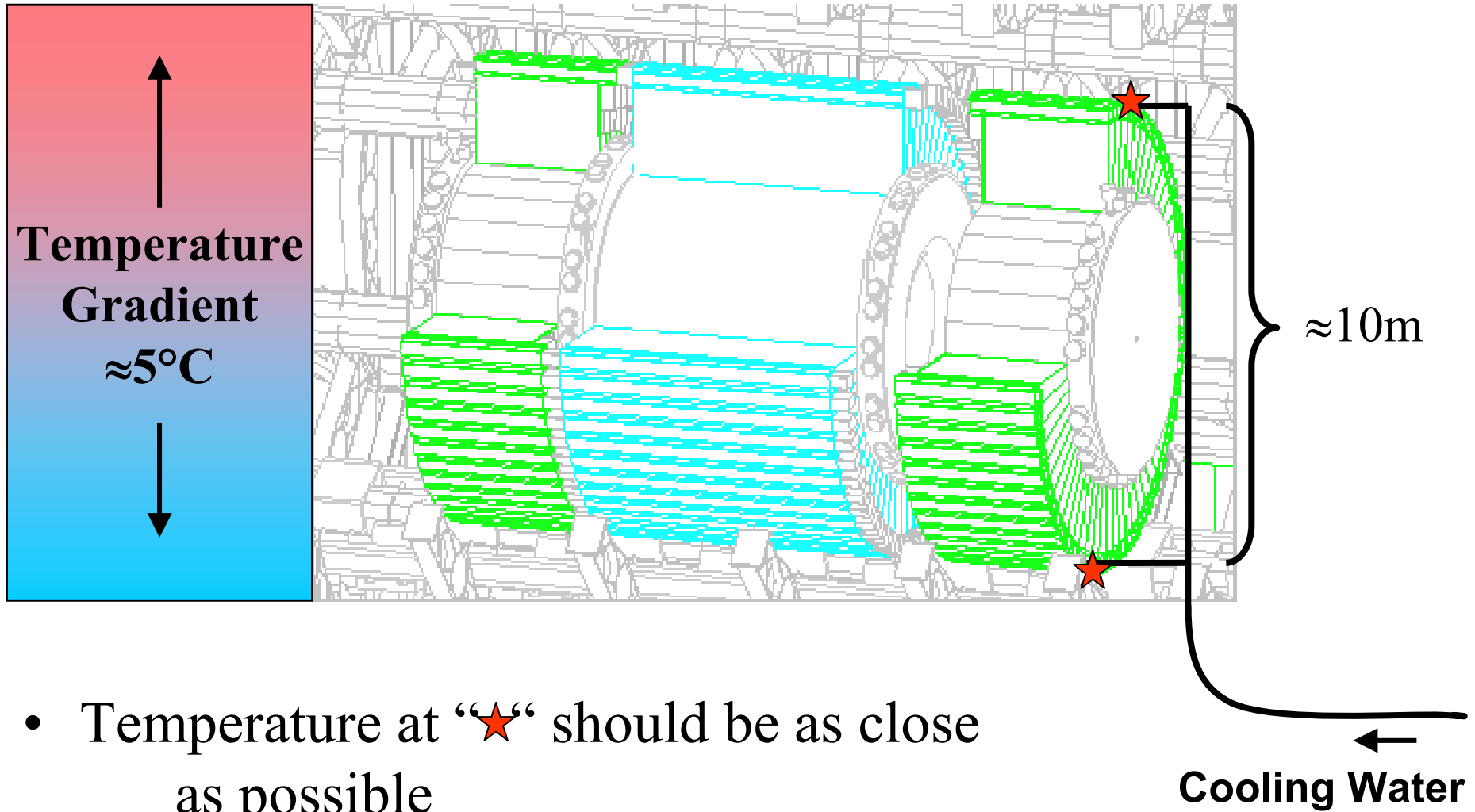


- For an **ambient temperature change of 10°C** we found a **Cooling water change of 1.2 °C**
 - This dependence is a problem during the calibration of the modules because they will be calibrated at different places and times
 - It does not affect the ATLAS detector because there will be no noticeable changes of the ambient temperature in the pit
- **We minimized this effect with improved isolation of the controller sensor**
 - **new values: 0.3°C per 10°C(ambient)**



Effects of ambient temperature on non-isolated pipes

ATLAS - Setup

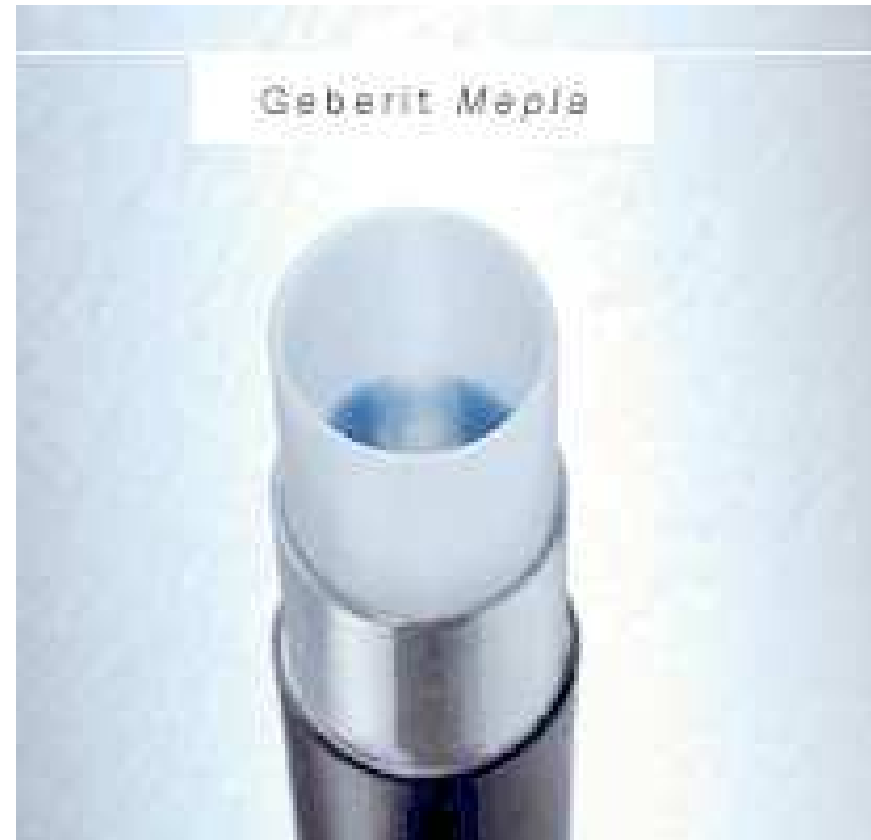


- Temperature at “★” should be as close as possible

Mepla tube characteristics



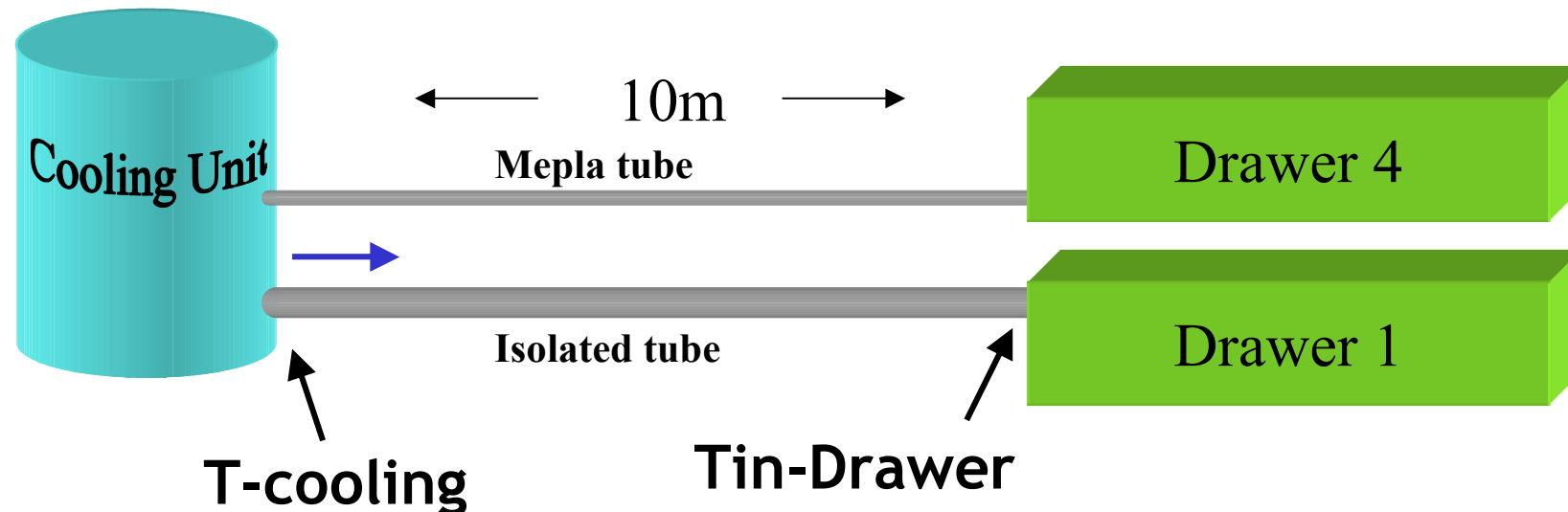
- 3 layer pipe (PE-Al-PE)
- Fast easy installation
- Bendable, stable
- Corrosion resistant
- Combines advantages of plastic and metal pipes
- Foreseen for ATLAS
- satisfy TIS requirements



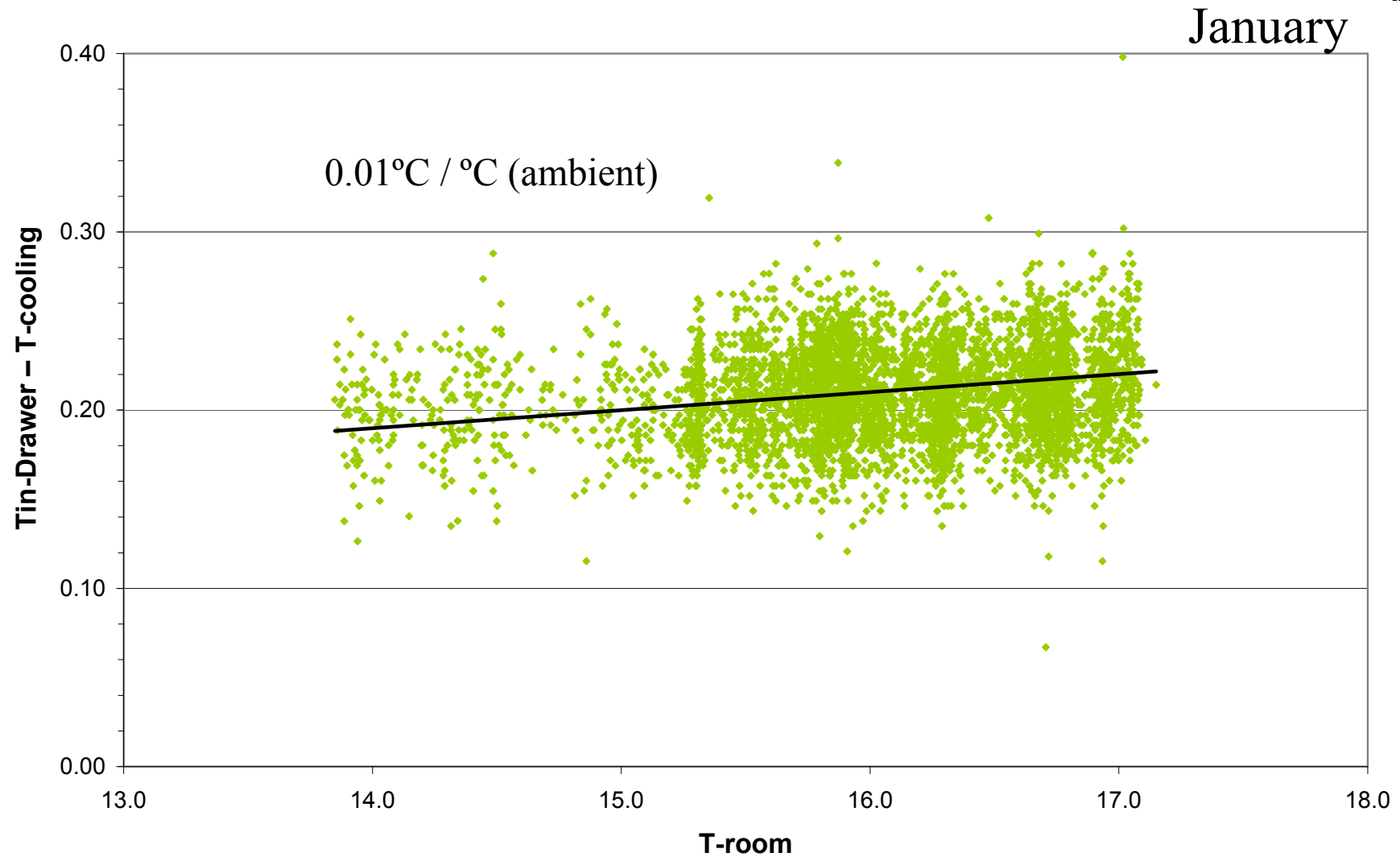
Non-isolated Mepla Tube Test



- One isolated tube was replaced with a **10m non-isolated Mepla tube**
- Difference between Tin-Drawer and T-cooling was measured → ambient effects on CU removed



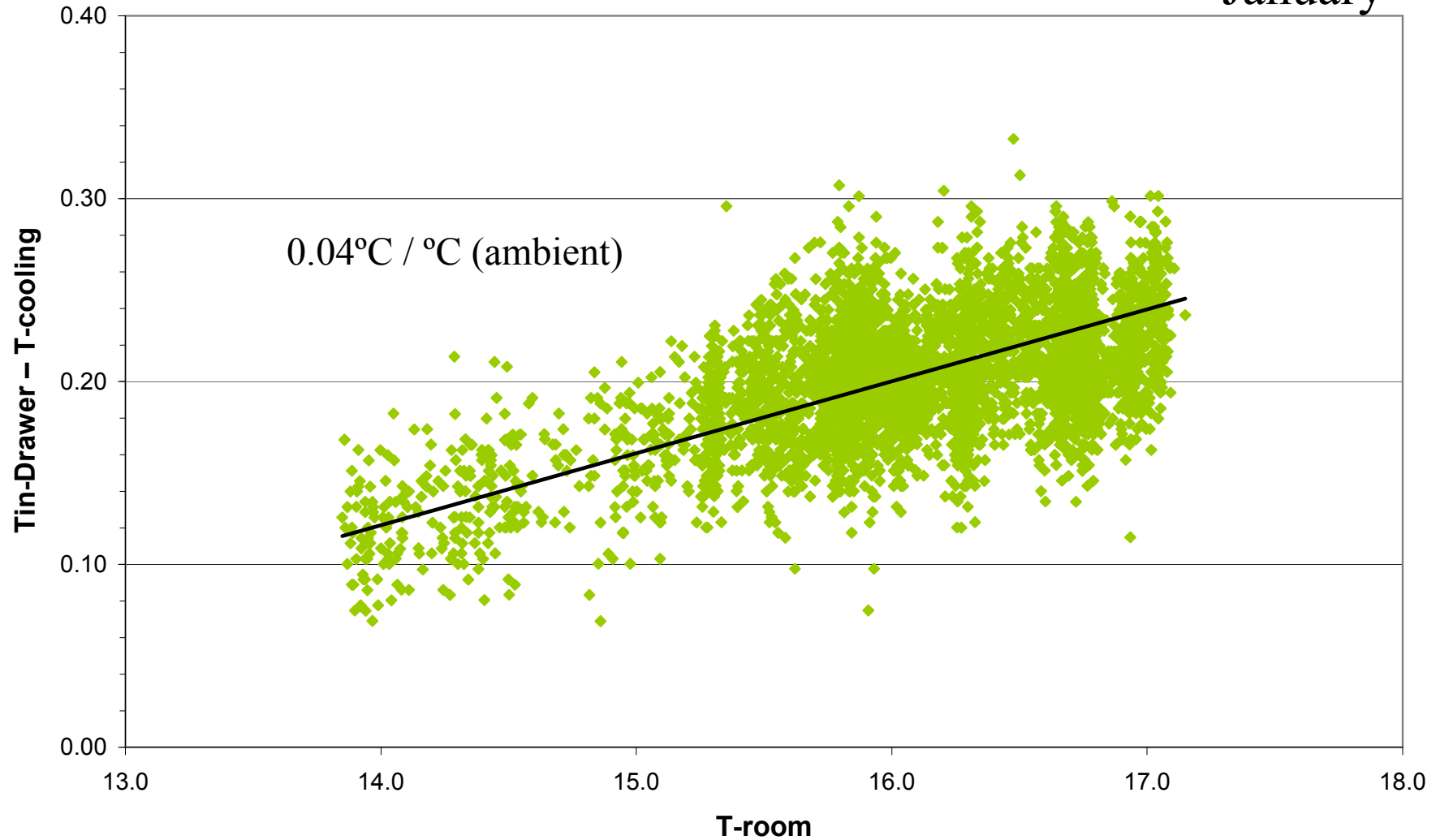
Isolated Tube



Non-isolated Mepla Tube



January

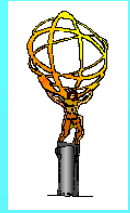


Summary



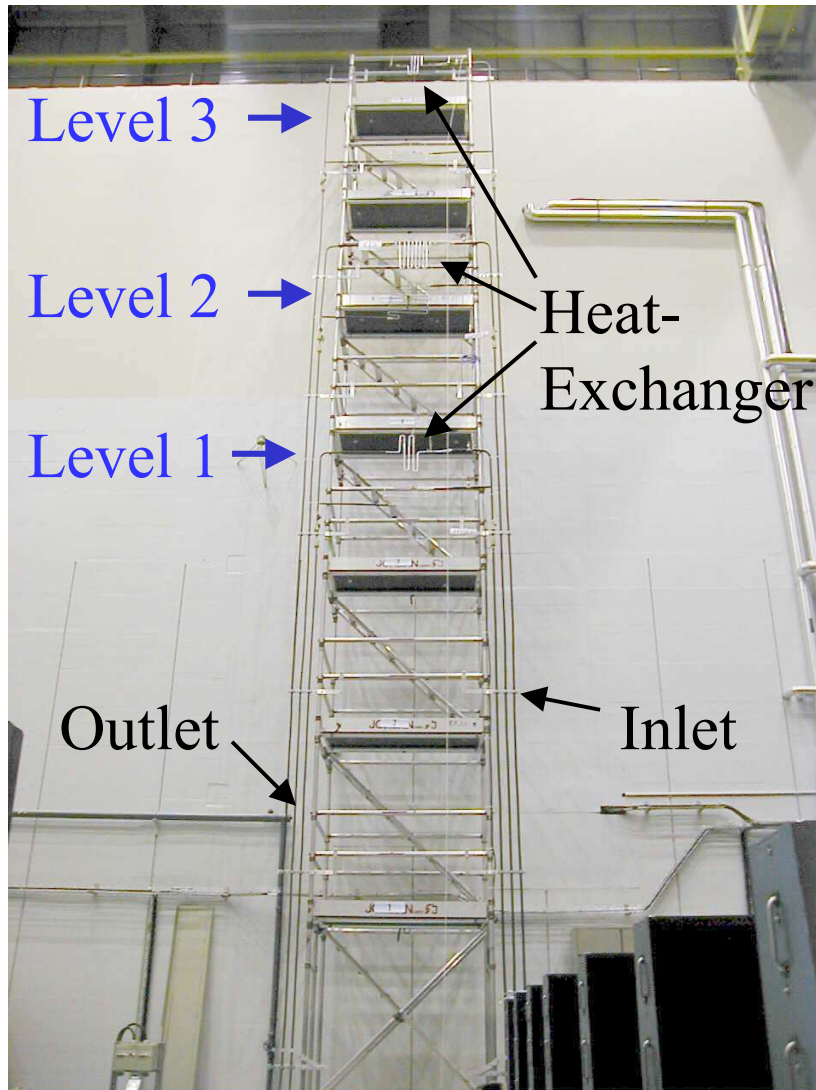
	Temperature pick-up per °C(ambient)
isolated tube	0.01°C
non-isolated Mepla tube	0.04°C

- Expected temp-gradient in pit $\approx 5^\circ\text{C}$
=> less than 0.2 °C temperature difference
between lowest and highest module
- Maximum change of PMT temperature $\approx 0.1^\circ\text{C}$



Cooling Pilot Project in B185

Cooling Pilot Project



- Real Size Test
- Bldg. 185
- 15m scaffolding
- Piping done
- Installation ready
end of March
- Tests until Sept.02
(finished before PRR)

