LHC-VAC

WAMPAC

(Warm Multipacting Calorimeter)

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Objectives

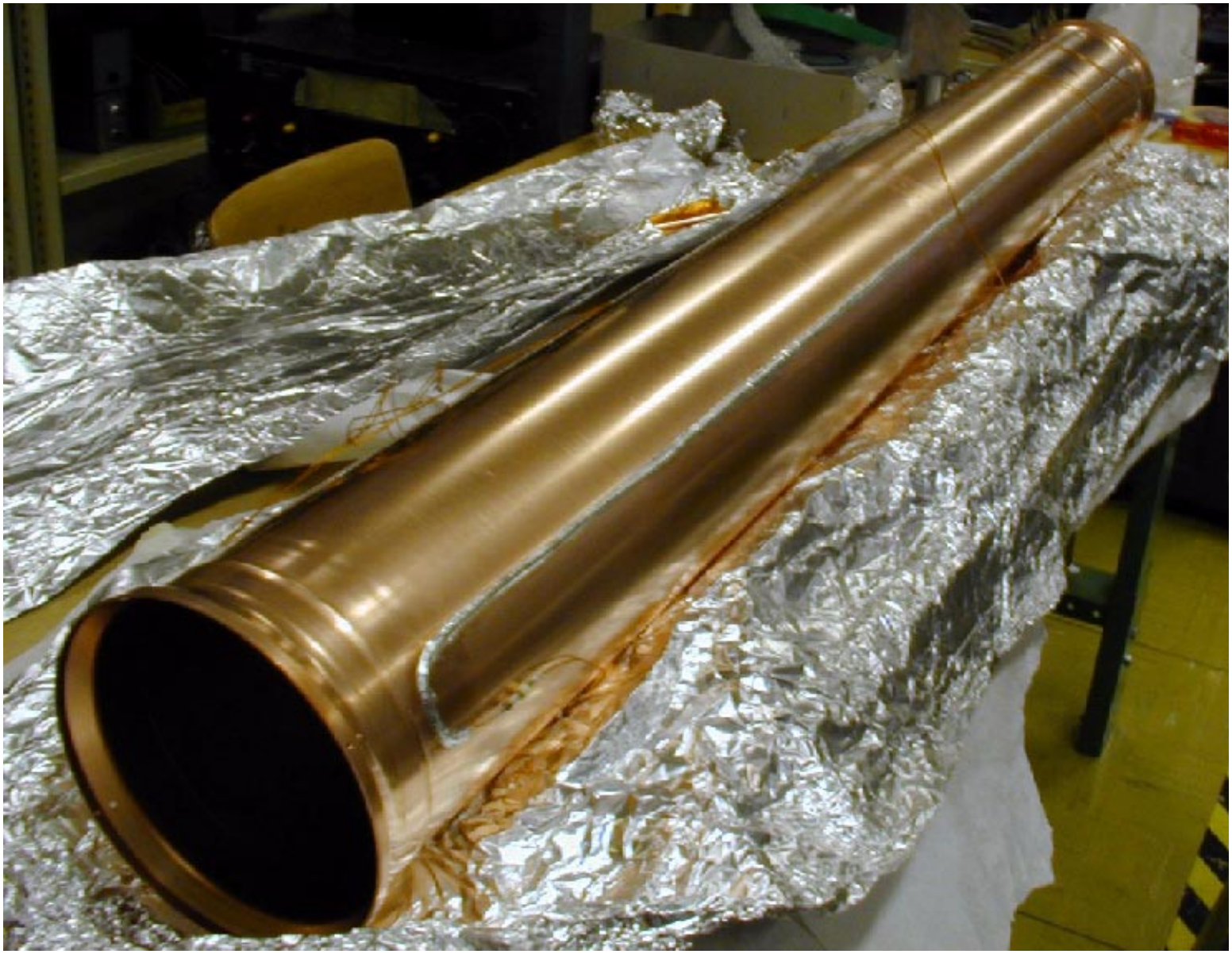
- Beam induced electron multipacting :
  - Measure heat load onto calorimeter at room temperature
  - Observe any “cleaning effect”
  - Benchmark electron cloud simulations
- Electron induced gas desorption :
  - Measure pressure increase
  - Observe any “cleaning effect”

Hardware

- Installed in BA4
- Standart SPS vacuum chamber
  - Cu calorimeter, 1.3 m long, 140 mm ID, 0.5 mm thick
  - 5 Type E thermocouple
  - Heater for calibration
  - Bayart Alpert Gauge
  - Electron collector disk (Cu, 30 mm, expected current ~ 10 nA)
  - Solenoid field

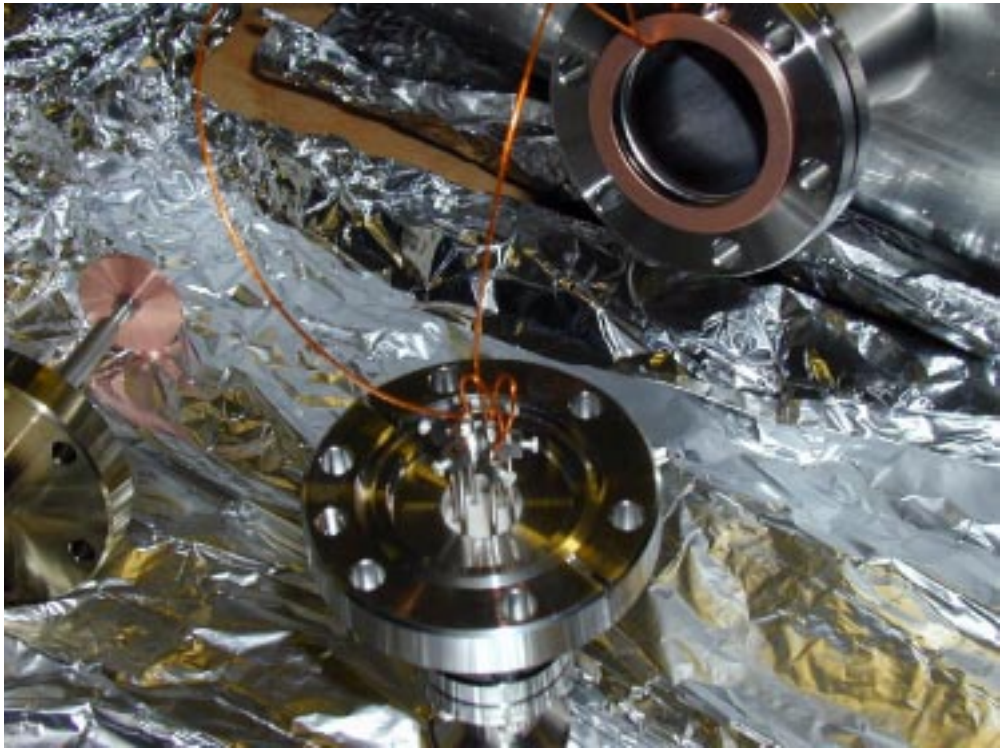
- Datas NEEDED
  - On line acquisition of beam current
  - On line status of the machine : type of beam (SFTPRO, TSTLHC …), beam characteristics

Cu Calorimeter

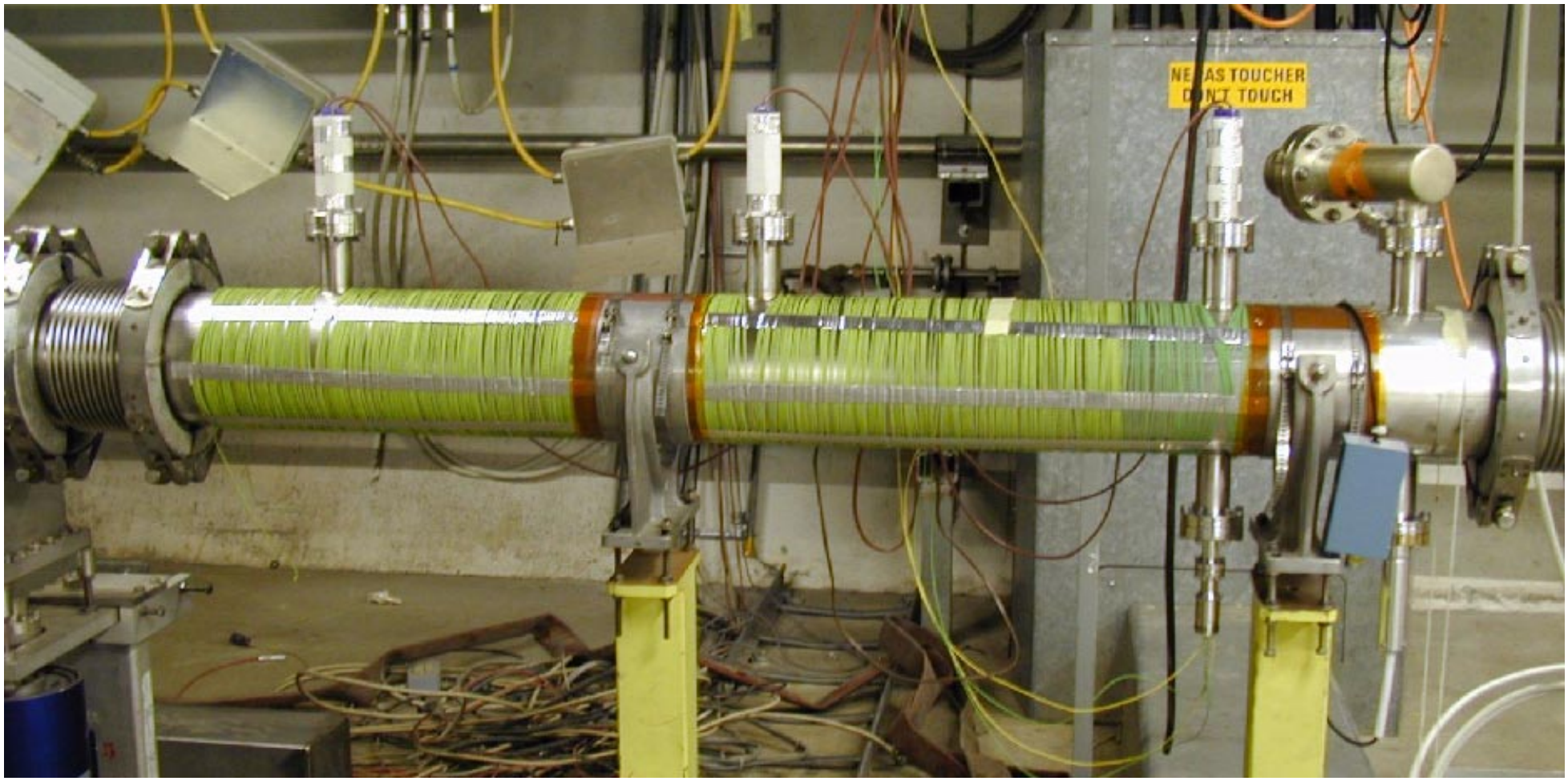


Cu Calorimeter

Cu Collector
Thermocouple feedthrough

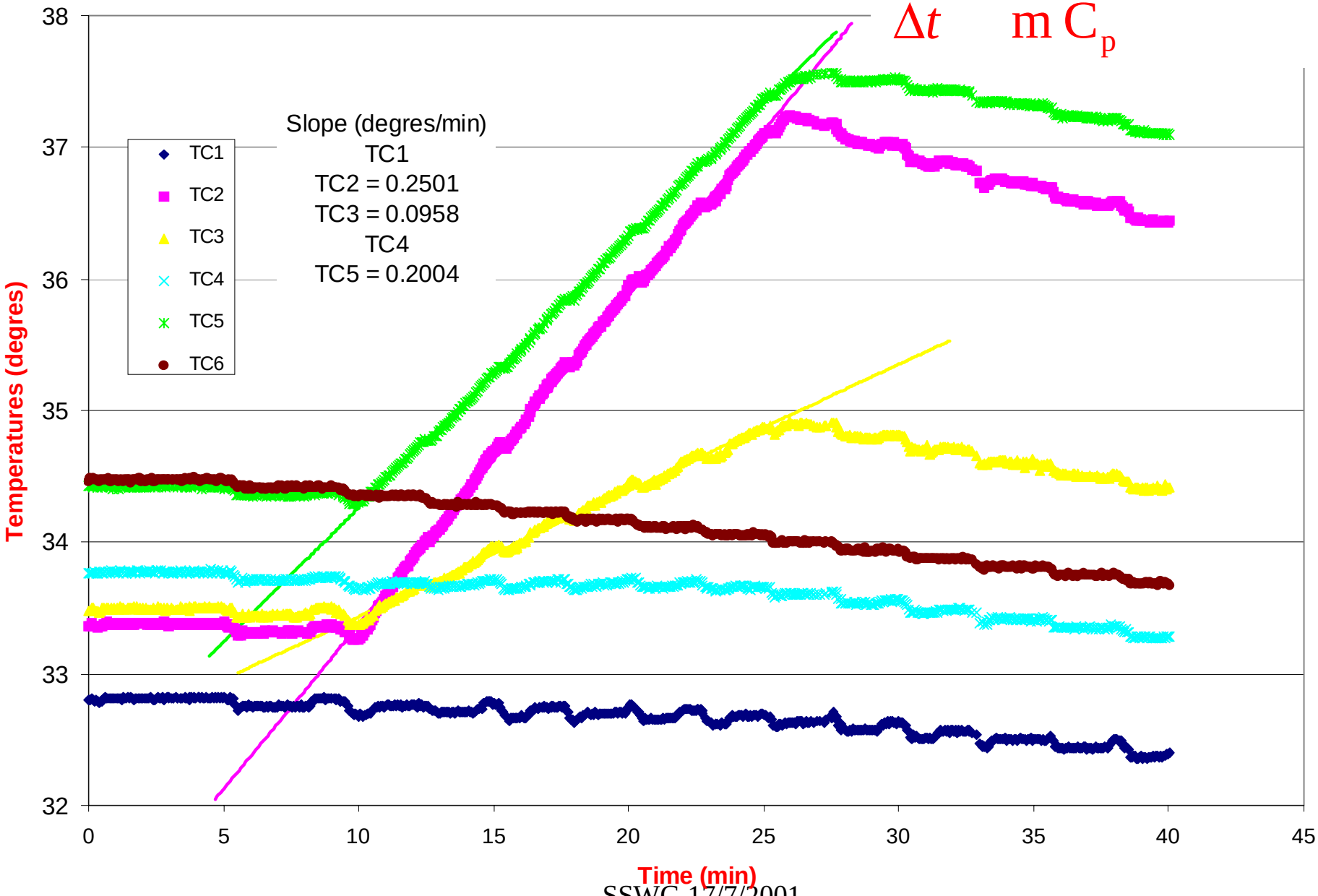


WAMPAC in BA4



#1 Calibration : Q = 5 W

$$\frac{\Delta T}{\Delta t} = \frac{\dot{Q}}{m\,C_p} = 0.25\ \text{K/min}$$



LHC type beam

- Assuming :
  - Operating above multipacting threshold
  - Constant beam characteristics
  - Duty cycle d ~ 10 %
  - Heat load ~ 1 W/m
- Necessary running time
  - To observe an increase of 1 degre is :

$$\Delta t = \frac{m\, c_p\, \Delta T}{\dot{Q}\, L}\,\frac{1}{d} = \frac{3\times 400\times 1}{1\times 1.33\times 3600}\,\frac{1}{0.1} = 2.5\ \text{hours}$$

Standart beam

- Check :
  - wall current power loss
  - closed orbit distortion
  - ...