

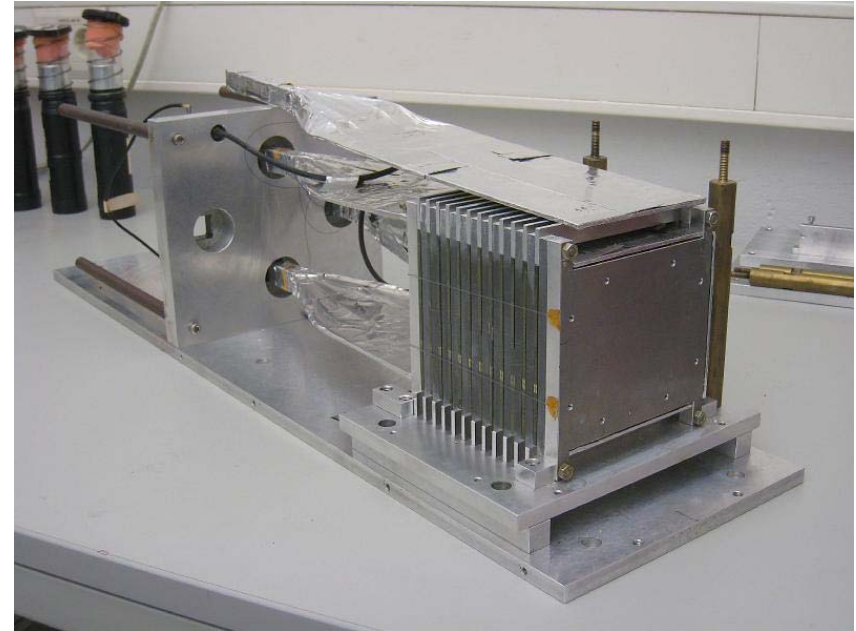
TPOL Calorimeter inspected

Summary report

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POL2000 meeting, 10th February 2010

The TPOL Calorimeter - The socalled 'spare'

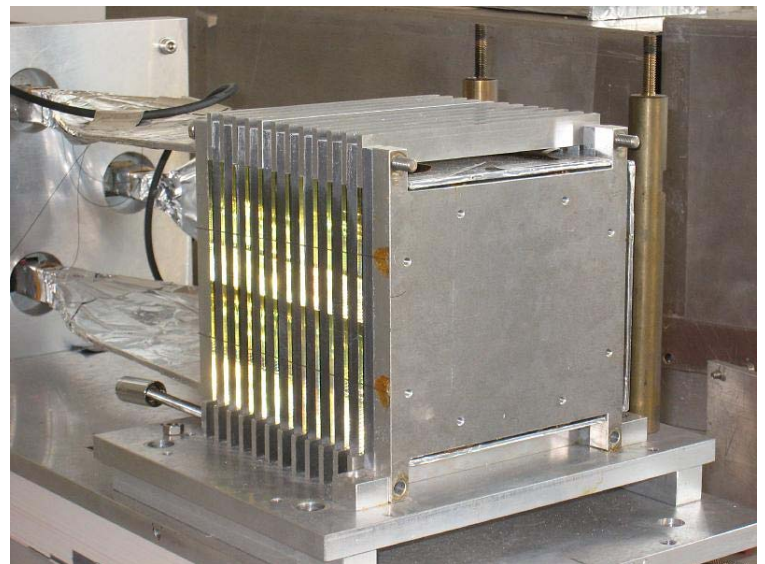
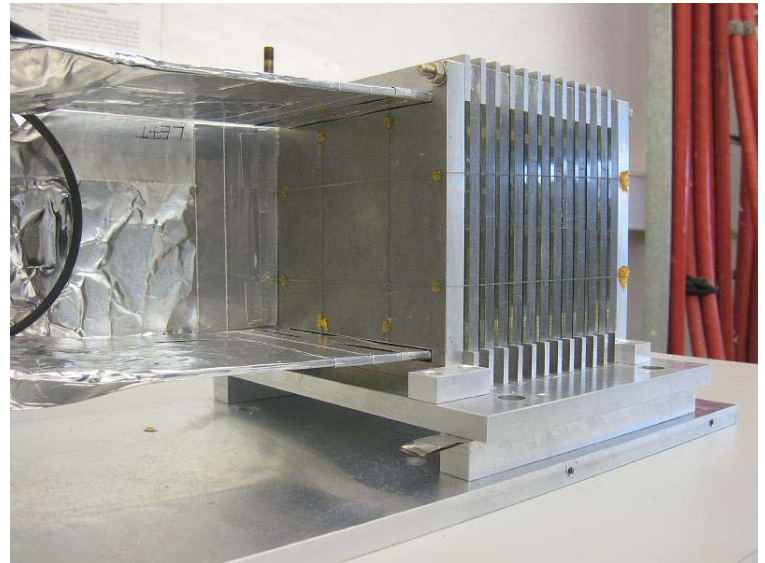
- Details known about the calorimeter
 - According to internal paper by Ruh et.al. calorimeter should be identical to the original one
 - Old one described in NIMA-329(1993)79
- Supposed composition
 - 12 layers of tungsten/scintillator layers
 - 120x50x2.6mm³, two plates optically decoupled on top of each other
 - $\rho=1.06\text{g/cm}^3$, $R_0=41.31\text{cm}$, $R_M=9.41\text{cm}$
 - Absorbers: Tungsten alloy (Densimet17)
 - 60x55x6.2mm³
 - $\rho=17.16\text{g/cm}^3$ (...manufactures dates)
 - 90.5% W, 6.5% Ni, 3.0% Fe (Densimet D170)
 - $R_0=0.413\text{cm}$, $R_M=1.016\text{cm}$
 - Absorbers set into Lead frames
 - 120x100x6.2mm³
 - $\rho=11.35\text{g/cm}^3$, $R_0=0.561\text{cm}$, $R_M=1.602\text{cm}$
 - Scintillators wrapped with Mylar foil and placed in air spaces
 - Mylar 10 μm thick
 - Spacers 3mm thick → 0.4mm air per layer



- Composition is thus
 - $\rho=11.86\text{g/cm}^3$ per layer
 - $R_0=0.583\text{cm}$, $R_M=1.380\text{cm}$
 - 1.58 R_0 per layer, 18.9 R_0 over 12 layers
- Inside Lead frames
 - $\rho=7.95\text{g/cm}^3$ per layer
 - $R_0=0.828\text{cm}$, $R_M=2.219\text{cm}$
 - 1.09 R_0 per layer, 13.0 R_0 over 12 layers

The TPOL Calorimeter - Opening for Inspection

- Questions arose based on comparisons of data with Geant simulation, if this composition is actually true
- Opening of the calorimeter on 25th January 2010 with inspection of the first two absorber layers
 - Front screws glued to the rods, stack fixed with screws from back
 - Took out the rods and inserted them again from behind
 - Nylon filaments were glued to the aluminum front plate
 - Cut the glue to loosen the filaments
 - Lead and aluminum front plate were 'caked'
 - Cut with scalpel at upper left edge
 - Scintillators wrapped in foil
 - Unwrapped scintillators of first layer for inspection



The TPOL Calorimeter - A Look at its Entrails

- Measured sizes and thicknesses of first two absorber layers
- Absorbers
 - $59.9 \times 54.9 \text{ mm}^2$ ($\pm 0.02 \text{ mm}$)
 - 6.2 mm ($\pm 0.01 \text{ mm}$) thick
 - weight 349 g ($\pm 2 \text{ g}$) both plates
 - $\rho = 17.1 \text{ g/cm}^3$ (ca $\pm 0.2 \text{ g/cm}^3$)
 - consistent with Densimet
- Lead frames
 - weight 633 g and 626 g ($\pm 2 \text{ g}$)
 - $\rho = 11.25 \text{ g/cm}^3$ (ca $\pm 0.4 \text{ g/cm}^3$)
 - consistent with pure lead
 - the two inspected frames differ a bit
 - inner height is different
 - in first frame absorber is decentral with 0.5 mm shift upwards, in second it is central
- Scintillator stacking
 - No visible gap between the two plates, Mylar foil neatly folded



The TPOL Calorimeter - A Look at its Entrails

- Measured sizes and thicknesses of first two absorber layers
- Scintillators
 - 119.9x49.9mm²
 - 2.5mm thick --- this is thinner!
 - weight of two plates = 32g ($\pm$ 2g)
 - consistent with polystyrene density
 - Measurements with and without Mylar foil
 - consistent with 10 μ m thickness
 - Color clear, shiny, light blue
 - no coloring, no yellowing, not even in the center where the beamspot was during running
 - from optical inspection no hint to any radiation damage



Many thanks to Jan for his help
during the inspection!