

The TOTEM detector at LHC

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The Totem Collaboration

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 National Institute of Chemical Physics and Biophysics NICPB, Tallinn, Estonia
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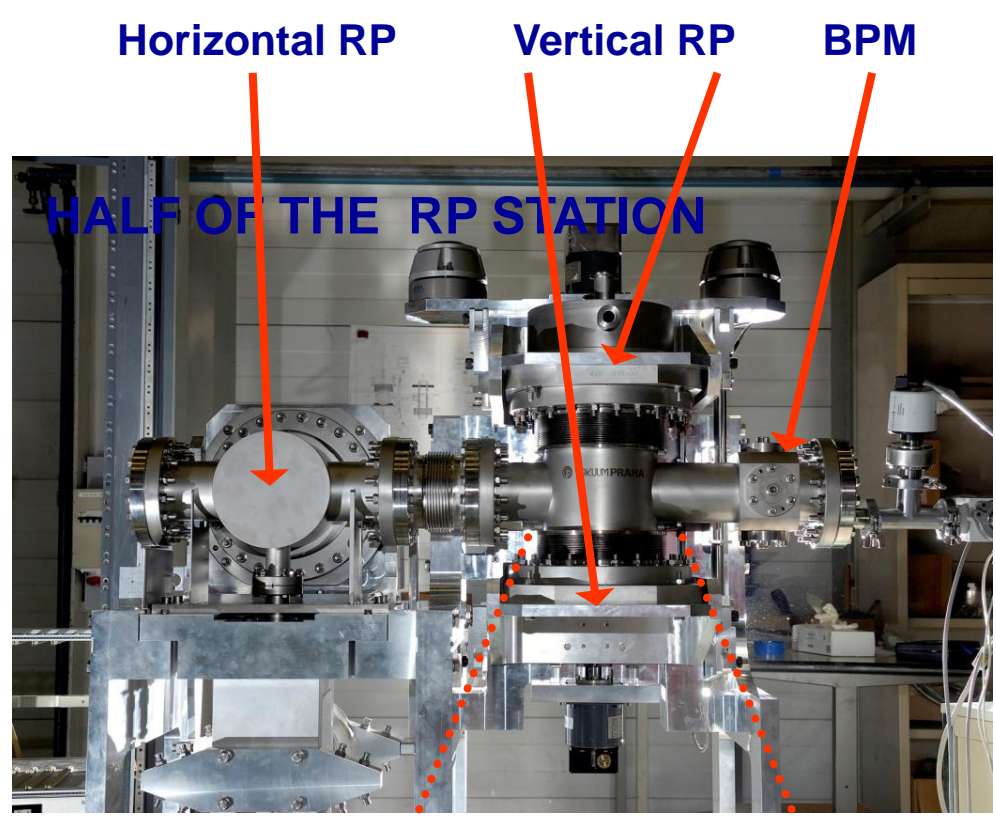


TOTEM total cross section and Elastic scattering Measurement

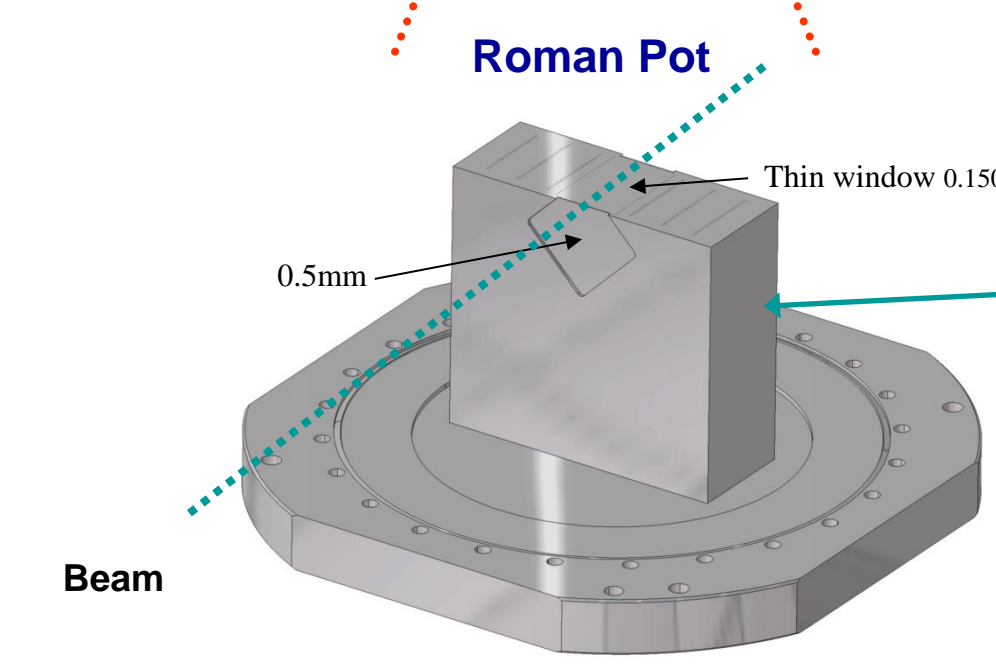


The TOTEM Experiment will measure the total pp cross-section, using the luminosity-independent method, and study elastic and diffractive scattering at the LHC. To achieve optimum forward coverage for charged particles emitted in the pp collisions at the interaction point IP5, two tracking telescopes, T1 and T2, are installed on each side in the pseudorapidity region $3.1 \leq |\eta| \leq 6.5$, and Roman Pot stations are placed at distances of 147m and 220m from IP5. Being an independent experiment, though technically integrated into CMS, TOTEM will first operate in standalone mode to pursue its own physics programme and, at a later stage, will develop a physics programme in common with CMS. This poster gives a description of the TOTEM detector system and shows the first data taken @ 2.36TeV.

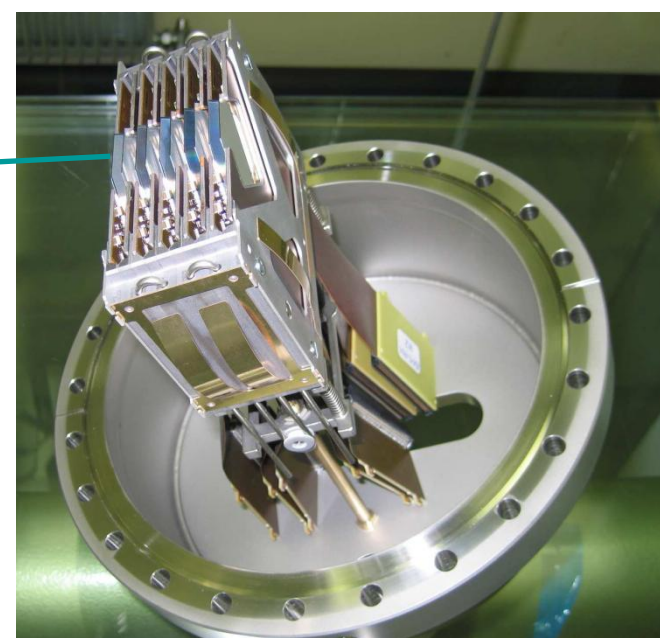
ROMAN POTS (Si)



- Measurement of very small proton scattering angles (few μrad)
- Vertical and horizontal pots mounted as close as possible to the beam
- BPM fixed to the structure gives precise position of the beam
- Detectors at 220m installed and working



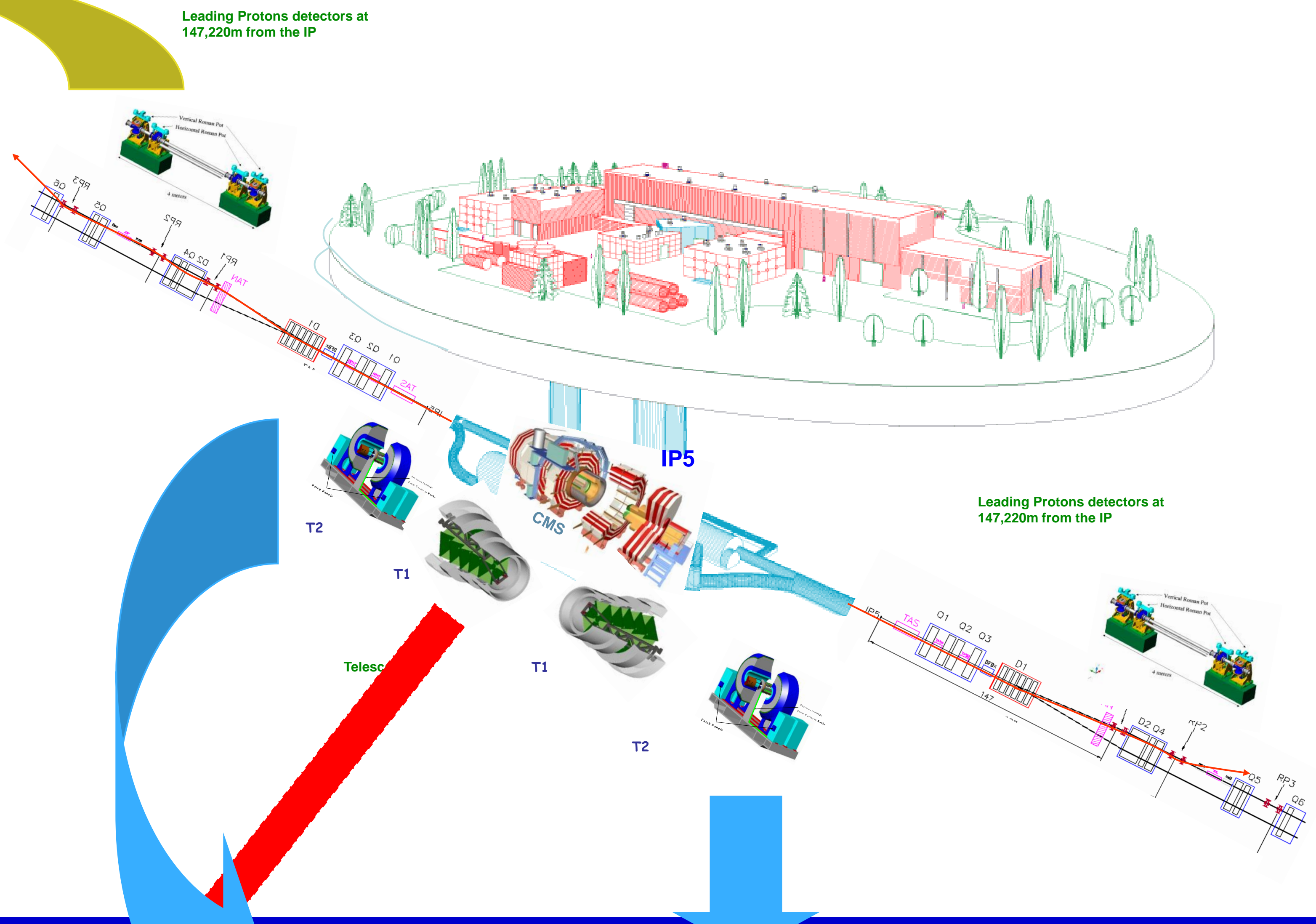
10 planes of edgeless detectors



- Leading proton detection at distances down to $10 \times \sigma(\text{beam}) + d$
- Need "edgeless" detectors that are efficient up to the physical edge to minimize "d"
- $\sigma(\text{beam}) \approx 0.1\text{-}0.6 \text{ mm}$ (optics dep.)

β^* [m]	$ t_{\text{min}} $ [GeV^2]	$ \Delta t/t_{\text{min}} $ $d = 50 \mu\text{m}$	$ \Delta t/t_{\text{min}} $ $d = 500 \mu\text{m}$
0.5	4.93	1.8%	18.3%
2	1.70	3.0%	32.1%
90	$30.3 \cdot 10^{-3}$	1.5%	16.0%
1535	$0.69 \cdot 10^{-3}$	10.2%	124%

Experimental layout

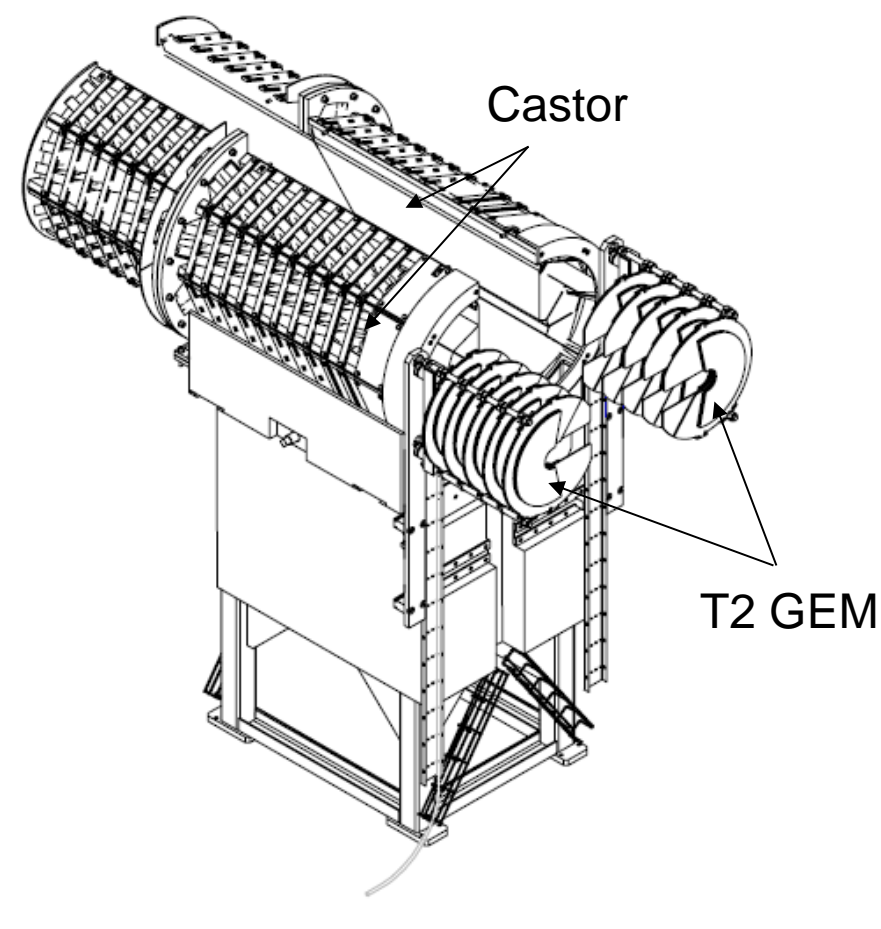
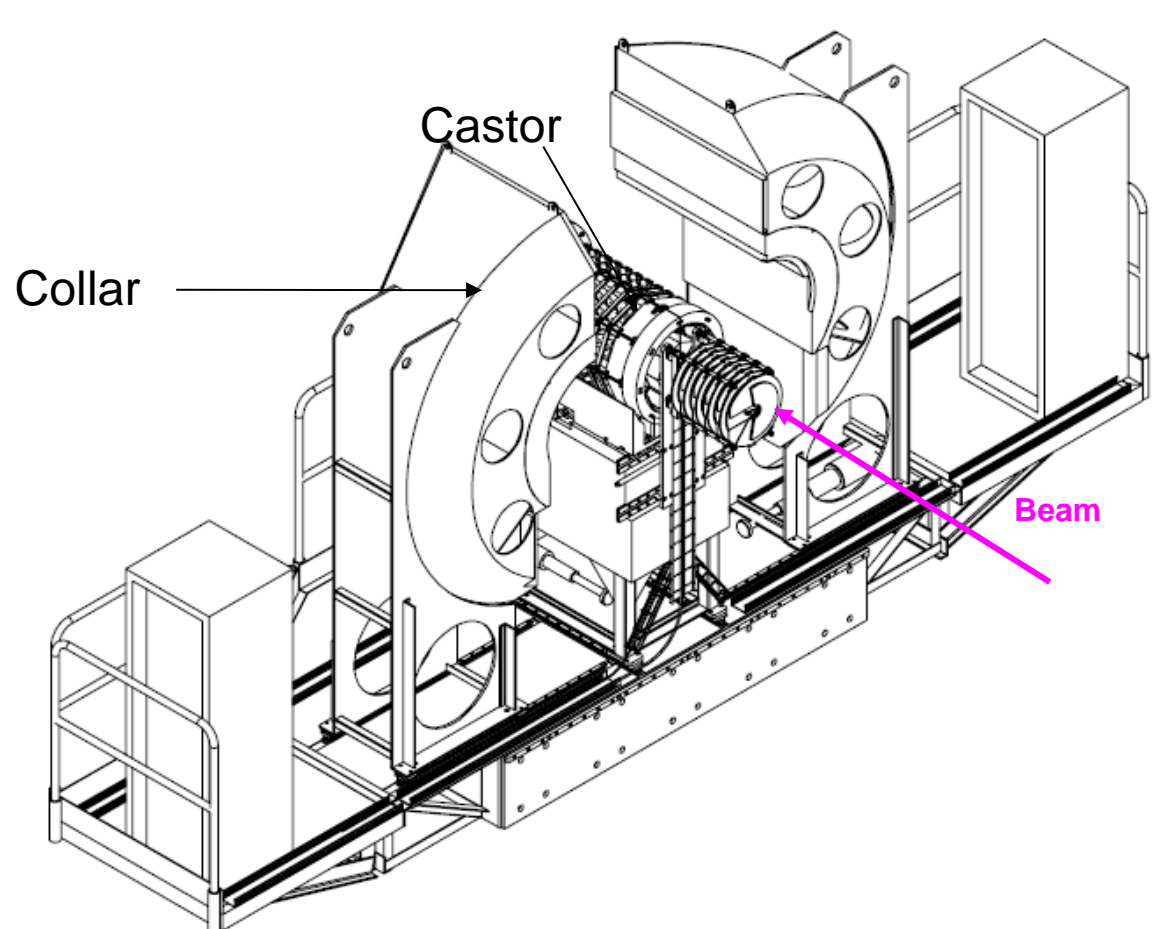
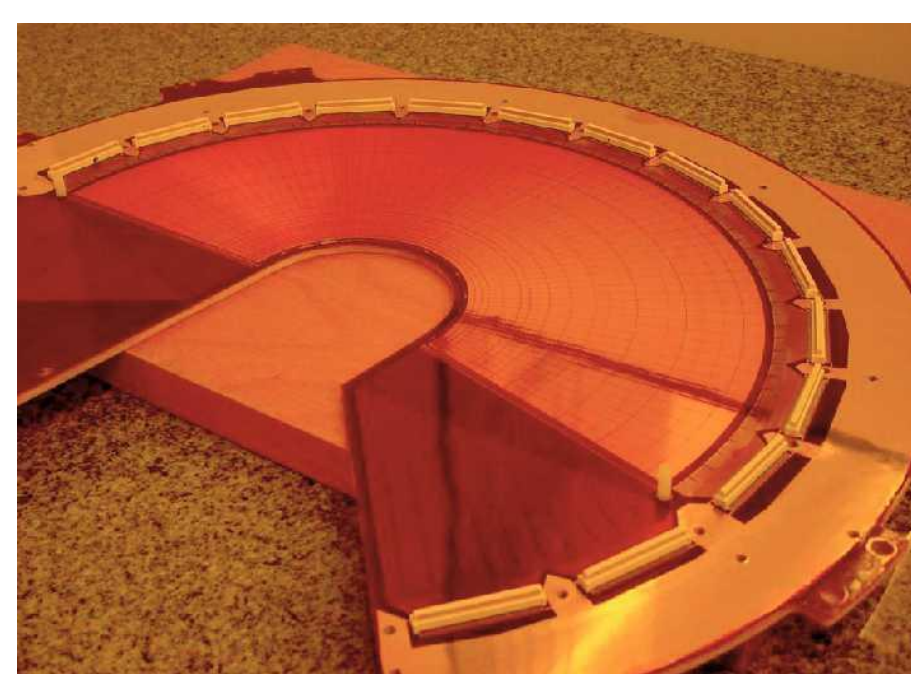
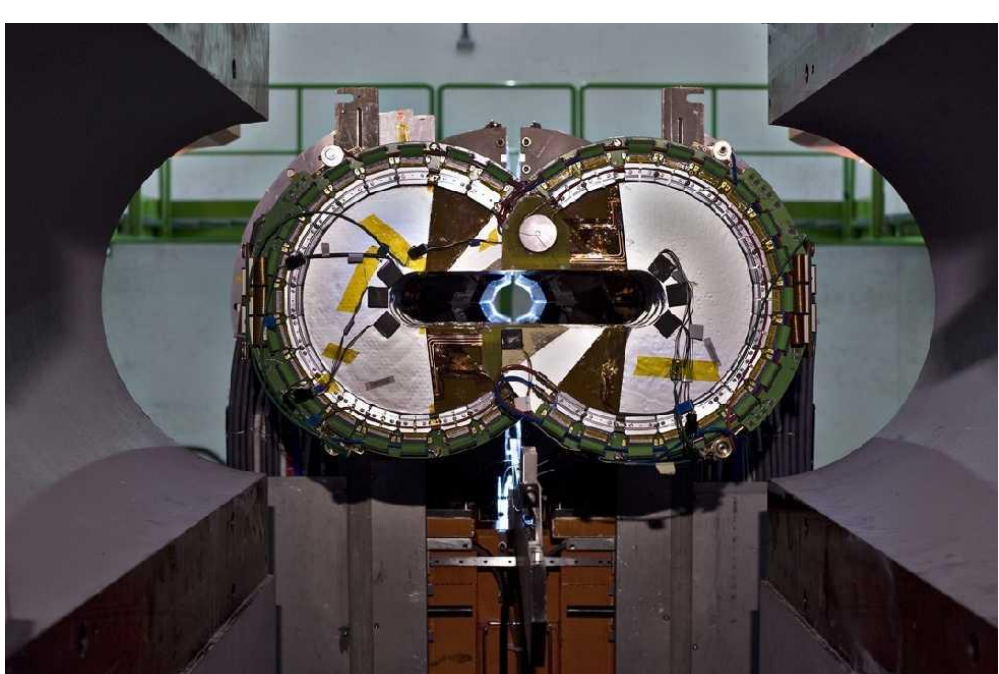


T2 telescope (GEM)

$5.3 < \eta < 6.5$

- 65(ϕ) x 24(=1560 pads)
- Pads: $\Delta\eta\Delta\phi = 0.06 \times 0.015\pi$
- 2x2 mm² → 7x7 mm²
- Strips: 256 (width/pitch: 80/400 μm)

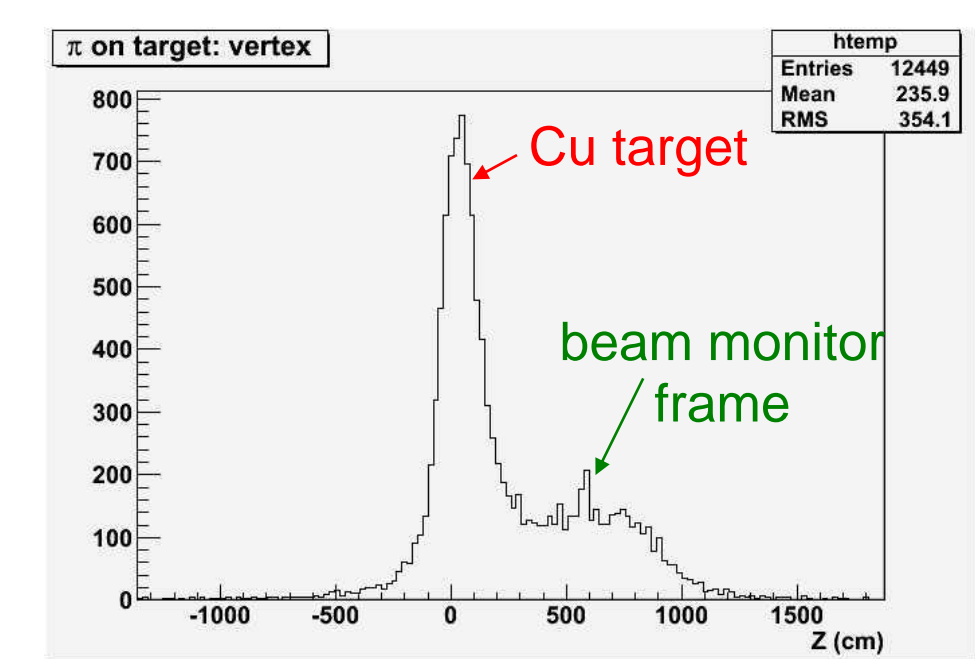
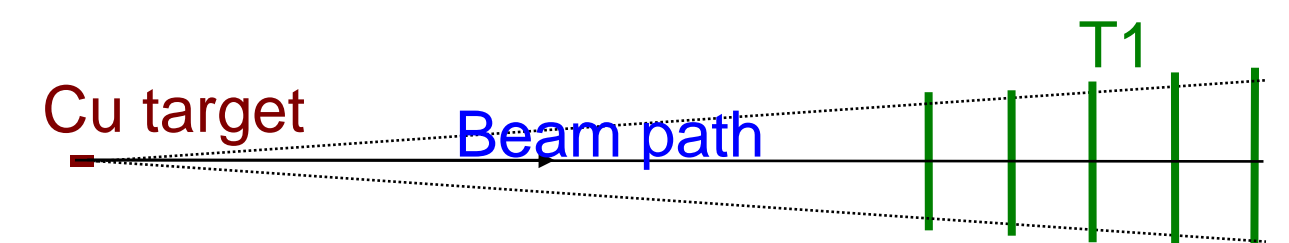
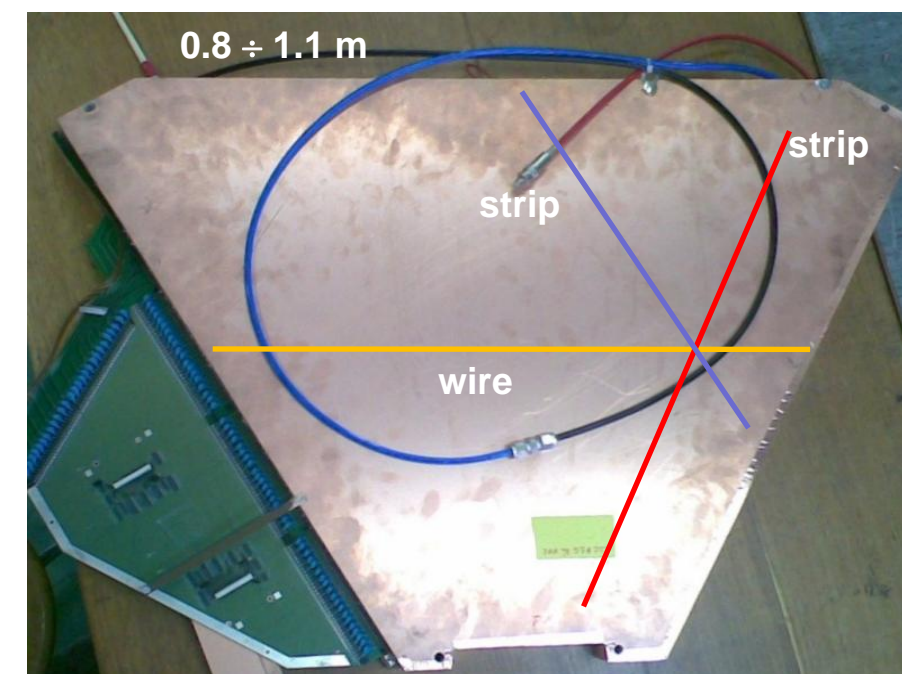
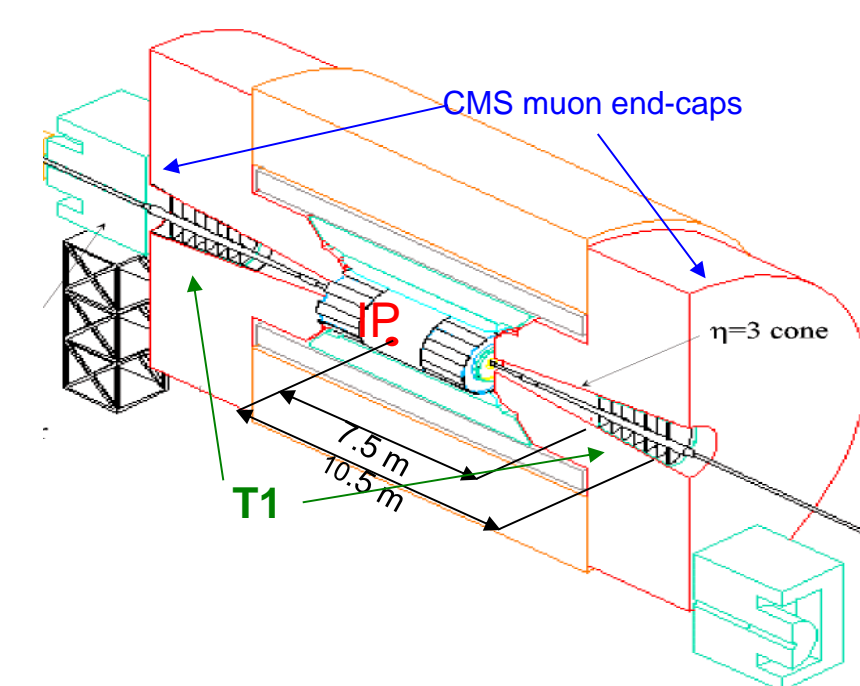
T2 telescope is fully installed at IP5



T1 telescope (CSC)

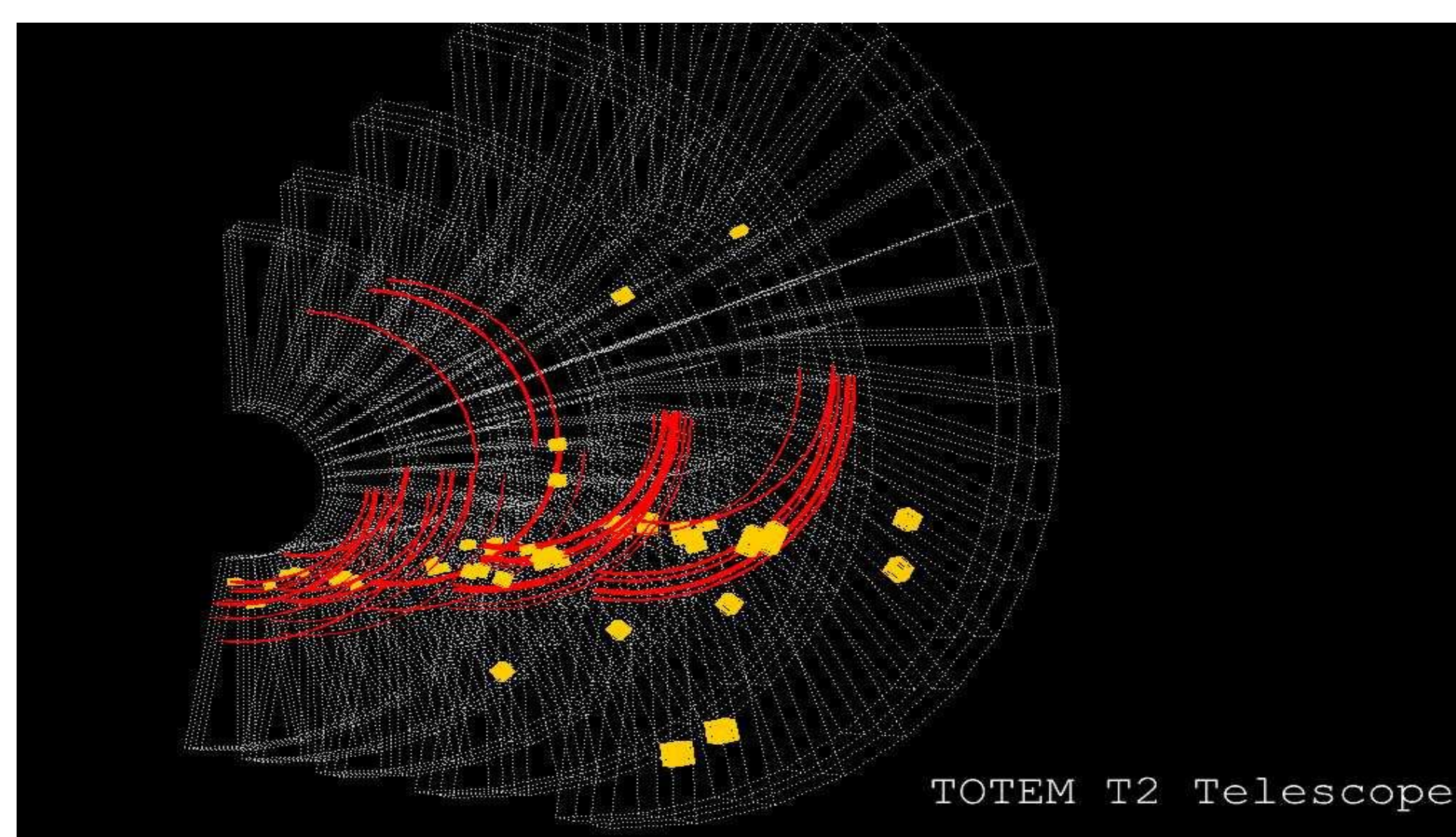
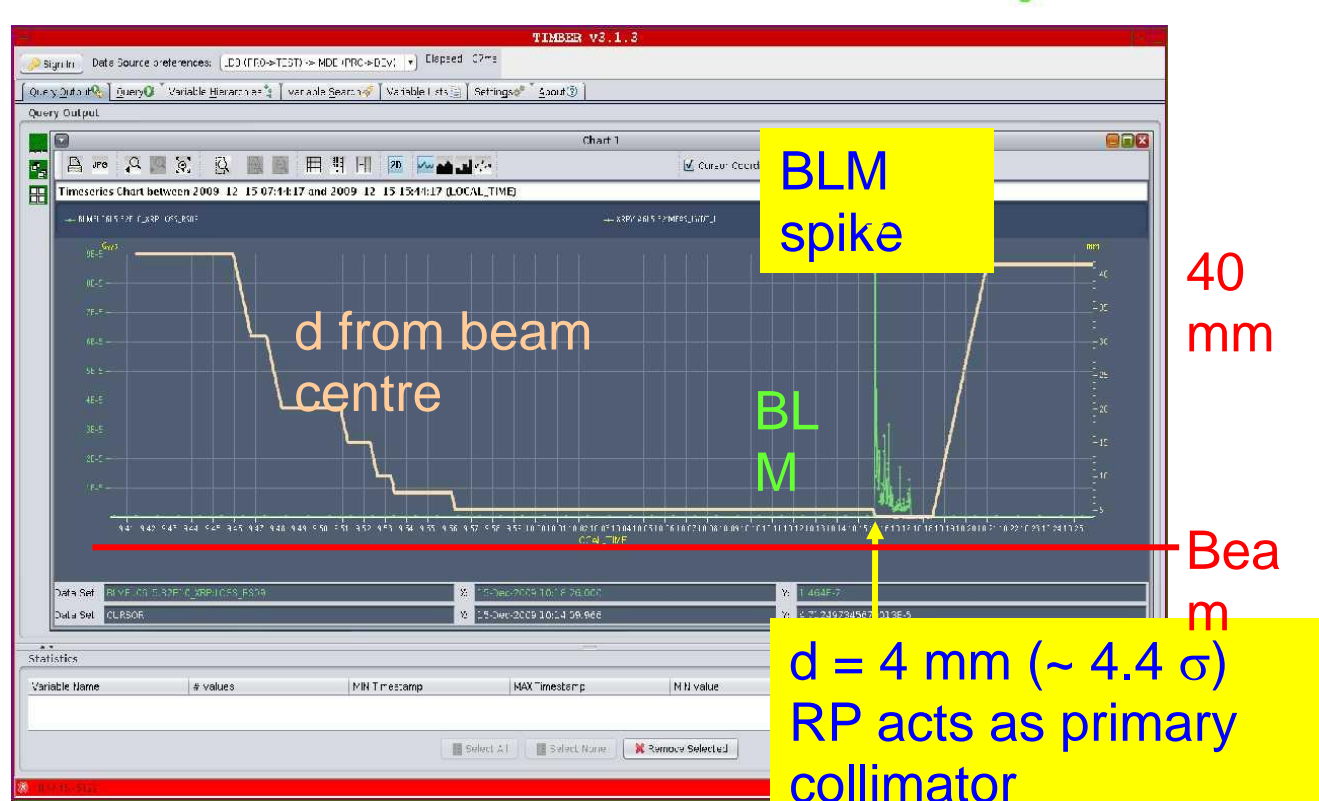
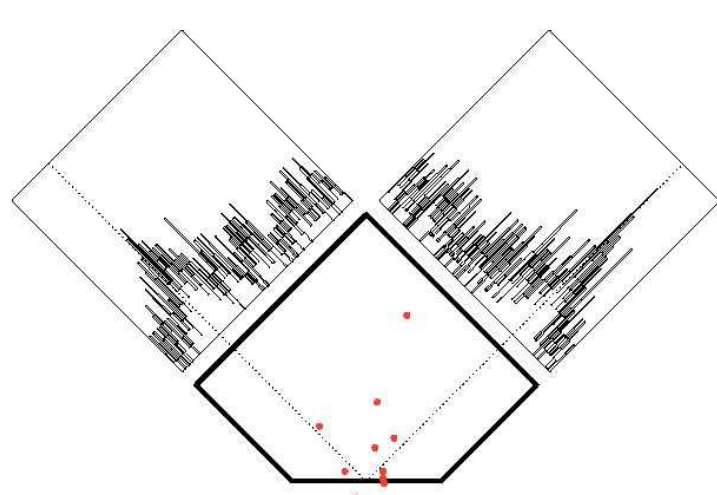
$3.1 < \eta < 4.7$

- 5 planes with measurement of 3 coordinates per plane
- 3 deg rotation and overlap between adjacent planes
- Primary vertex reconstruction allows background rejection
- Trigger with anode wires
- Completed one side, currently under test at H8 (CERN, North Area) under the same geometry of IP5.



Can you show us any result?
 Yes, we can! We have collision data @ 2.36 TeV

Roman Pot



T2 Telescope

