



**HEP 2013  
Stockholm  
18-24 July 2013**



Contribution ID: 605

Type: **Talk presentation**

## **Precision Tracking with small-strip Thin Gap Chamber (sTGC): from Test Beam to ATLAS NSW Upgrade**

*Friday 19 July 2013 12:30 (15 minutes)*

The super-LHC (sLHC) is expected to operate with a luminosity of  $7 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$  after the forthcoming luminosity upgrade which will increase by approximately a factor five, both the physics event rate and the beam background. It is essential to update the present inner most Muon Spectrometer components in the forward region to cope with these high rates. The small-strip Thin Gap Chambers (sTGC) has been chosen to provide both a fast trigger and high precision muon tracking for the ATLAS New Small Wheel (NSW).

Developments of sTGC detector have been carried out over the past years, different chambers have been tested with cosmic rays, in test beam and under different irradiations. Large prototypes ( $1.2 \times 0.8 \text{ m}^2$ ) containing four gas gaps, each gap providing pads, strips and wires, yielded a position resolution better than  $70 \mu\text{m}$  at perpendicular incidence angle and less than  $130 \mu\text{m}$  for 30 degrees incidence angle. The results have been repeated with different front-end electronics and have been confirmed during a combined TGC-sMDT test beam where sMDT provided precision tracking. The detectors have been shown to withstand a high total irradiation dose equivalent to 6 Coulomb/cm of wire. The tests of a new electronic chain (including the new VMM chip under development by BNL) have also been realized. The results of these various tests are presented.

The new, 8 layer sTGC and 8 layer MM (MicroMegas) based, ATLAS New Small Wheel (NSW) muon detector under high beam background will be reviewed and dedicated simulation studies will be presented. The simulation includes the response of the detector and the readout electronics. These studies show that the 8 layer sTGC detector provides robust precision tracking with high efficiency, where the expected muon PT resolution is around 10% for muons with 1TeV transverse momentum.

**Author:** CURATOLO, Maria (Istituto Nazionale Fisica Nucleare (IT))

**Presenter:** BENHAMMOU, Yan (Tel Aviv University (IL))

**Session Classification:** Detector R&D and data handling

**Track Classification:** Detector R&D and data handling