ATLAS HGTD TB report

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on behalf of the ATLAS HGTD group
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HGTD detector

- HGTD designed for operation with $<\mu> = 200$ and 4000 fb$^{-1}$ and improve the ATLAS performance in the forward region using precise timing measurements
  - Located at $z=\pm3.5$ m between the barrel and the end-cap calorimeters and covering the region $2.5<\eta<4.0$
  - Silicon-based timing detector technology chosen due to the space limitations
  - 35-70 ps/hit at the start and end of lifetime ($2.5\times10^{15} n_{eq}/cm^2$)
  - Operated at -30 °C to mitigate impact of irradiation
- Two instrumented double-sided layers mounted in two cooling/support disks per end-cap
  - Three ring layout
  - HGTD hybrid module connected through flip-chip bump bonding process (hybridization)
    - LGAD sensor: excellent time resolution <30 ps before irradiation
    - ALTIROC ASIC: provide TOA and TOT measurements, target time resolution <25 ps
  - Module overlap between layer sides
• Test beam @PS in T10 beam line (28\textsuperscript{th} March – 6\textsuperscript{th} April)
  o LGAD sensor tests (at -30 °C) – Sensor FDR in May
    - Irradiated LGADs at different fluences from different vendors
    - Use different geometries: single pad, 2×2, 5×5
    - Study the performance in terms of CC/time resolution/efficiency
  o Requirements: (thanks to A. Rummler)
    - Using ACONITE EUDET telescope + thermal box + TLU
    - N2 flushing for cooling box
    - External PI stage + light-tight box used for time reference system
    - Table for DAQ and PS
    - ~600 V for LGADs and ~2.5kV if new timing reference is used
    - Particle type: hadrons
    - Typical beam size: ~1×1 - 2×2 cm\textsuperscript{2}
    - Intensity: 10\textsuperscript{5} particles/spill
BACKUP SLIDES