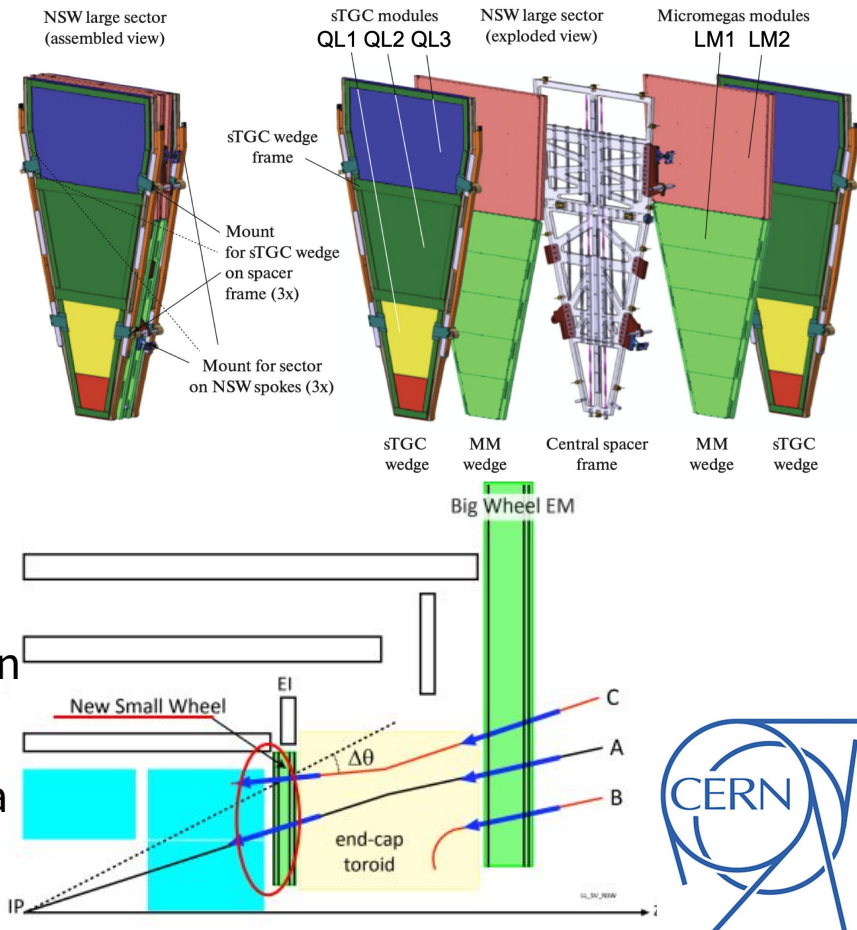


ATLAS sTGC

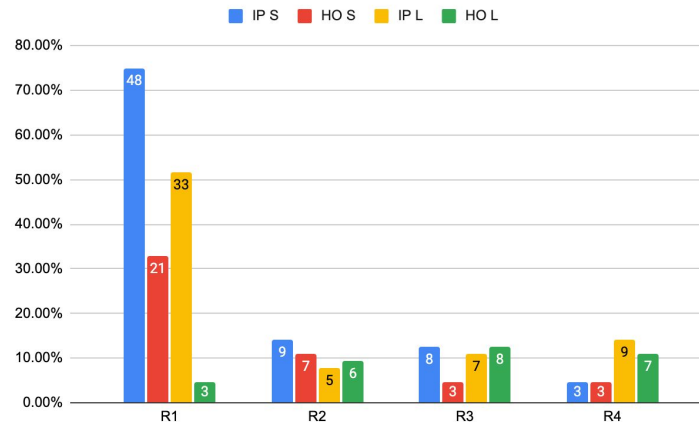
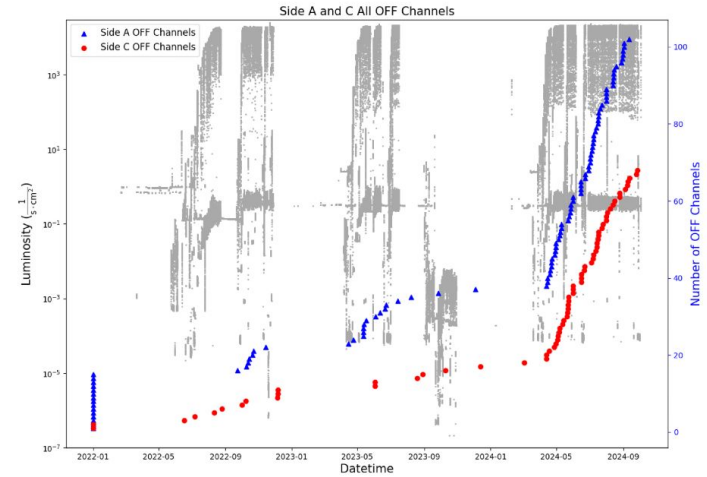
sTGC detector

- sTGC - small-strip thin gap chambers
 - Multi-wire proportional chamber
- Part of the ATLAS NSW along with the MM
- Installed in ATLAS during LS2 as part of Phase I upgrade
- sTGC already crucial to trigger path, allowing ATLAS to function with high pileup without increasing thresholds
- NSW also allows high eta standalone muon reco and aids with reduction of fakes
- Will be even more necessary in HL-LHC era



sTGC detector - this year

- A number of HV failures observed since installation in 2022
- Seemed to drastically increase this year - cause still unknown
- Could be a number of different effects but there seems to be at least some correlation with radiation
- Aging test at GIF++ one of a number of tests ongoing



sTGC setup at GIF++

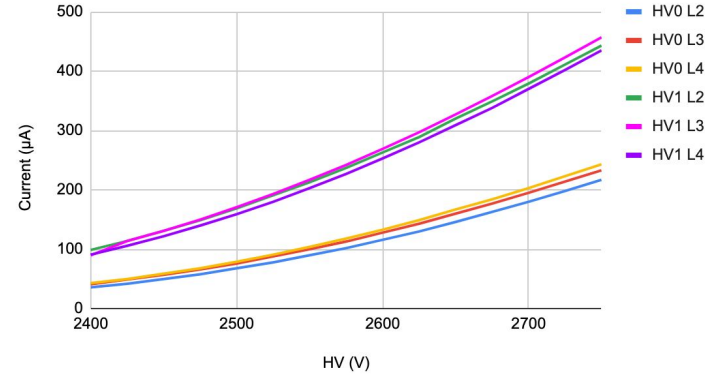
- Installed on a stand with MM chamber
- Adjacent to the source on the downstream side
- Flushing 45:55 npentane-CO₂ mixture, as is used at P1
 - Npentane provided by ATLAS gas team
- Chamber kept at 2.75 kV
- Current ~10x what is seen with the high intensity pp beams at P1



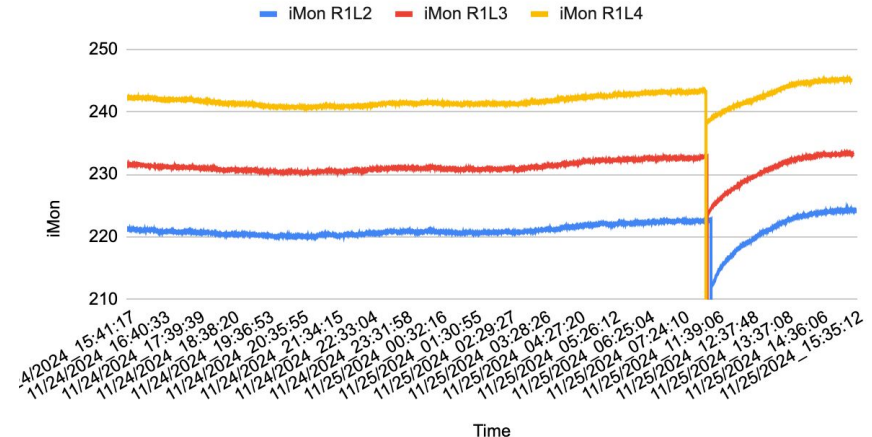
sTGC testing so far

- Verified that the chamber stills supports HV at nominal values with CO2 only (three years since last testbeam)
- Flushd with npentane and HV on
 - Npentane tank temperature and pressure monitored on a regular basis
- Performed an HV scan
- Verified that current returns to 0 with the source off as expected
- Observe some fluctuations in the current likely related to atmospheric conditions

Six active layers, source filter 1, HV scan



iMon vs. Time



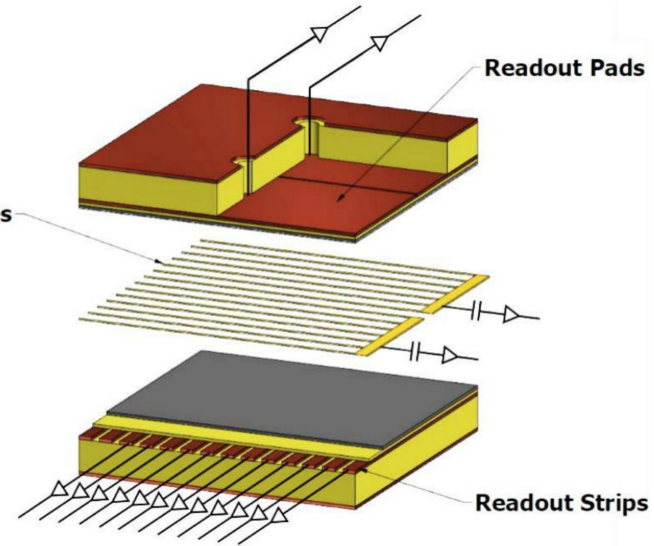
sTGC plans for next year

- Continue aging test with npentane
- If no failures appear, eventually try reducing the gas flow (suggestion for what might be an issue at P1)
- If similar failures to those at P1 appear - try various recovery procedures
- If failures are permanent - eventually open chamber to investigate
- Hope to add a second chamber somewhere in the bunker next year for irradiation but no npentane as a control

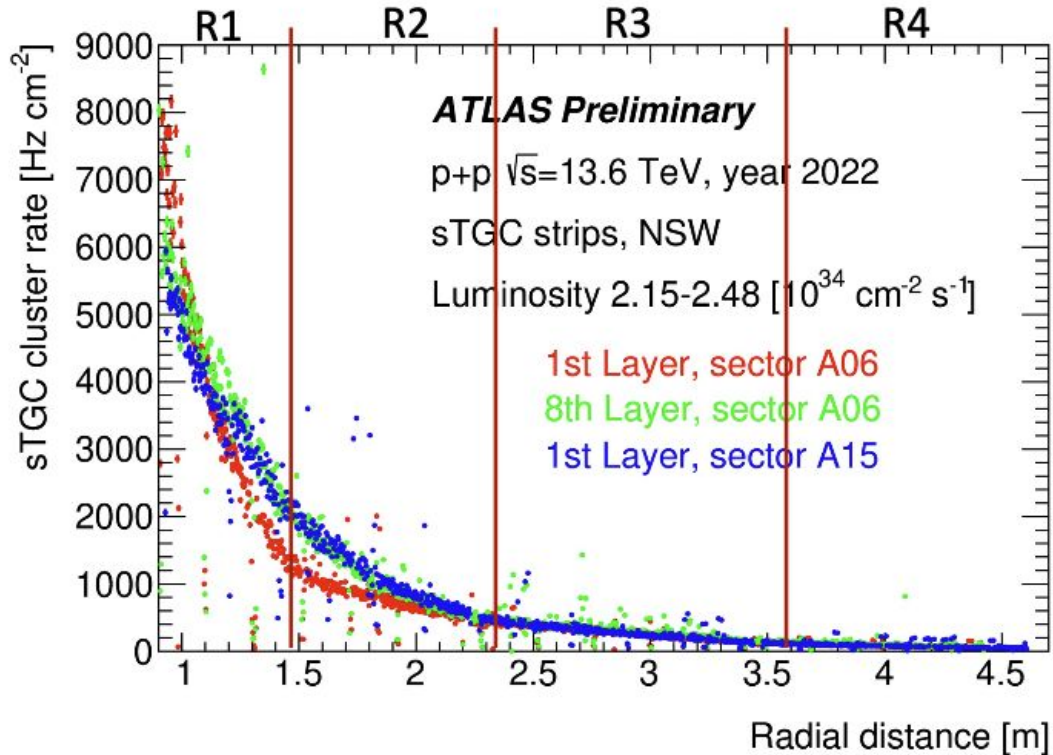
Backup

sTGC technology

- sTGC - TGC detector type, with a configuration of a multiwire proportional chamber, but with wire to cathode pitch smaller than wire-wire pitch
- What is an STG layer made of?
 - Two cathode planes (sprayed with graphite)
 - Voltage between cathode and wire
 - Pad cathode plane - for readout + trigger
 - Strip cathode plane - providing track positioning
 - Wire groups - providing a second coordinate

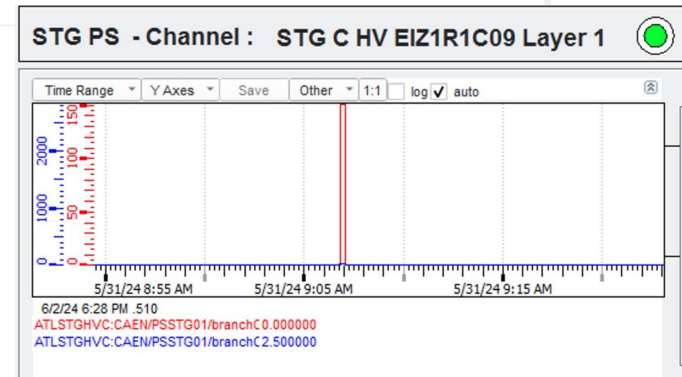
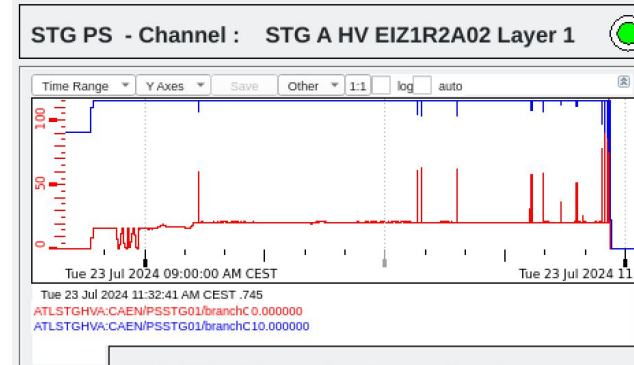


sTGC Rates at P1



HV - channel failure

- Most channels that are failing, do so by developing Ohmic-type behavior - current increasing as voltage does
- Often discharges are observed in channels before this begins
- A few channels have shorts
- Two channels show no current response



sTGC detector - previously at GIF++

- Reception tests at CERN - all chambers that are now in the sTGC in the NSW were test at GIF++
 - Flushed with npentane and performed a test with radiation for 30 minutes with HV on, check that all returns to normal when source is back off
- Previous testbeams, most recently in 2021 tested sTGC performance under a variety of conditions
 - Changing readout parameters
 - Tilt angle of the chamber
 - Strip and pad thresholds
 - At different HV
 - different filter on the source

