

Gas Gain Monitoring Status Report

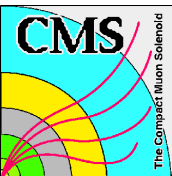
Stefano Bianco

For the CMS Frascati group

- *Broken gap replaced, now all 12 gaps OK*
- *Turned on yesterday on open loop gas*
- *Results on sensitivity of charge distribution and avalanche/streamer fraction under change of mixture*
- *To do:*
 - *Move to separate HV system (clone Roberto's SW)*
 - *Setup Air contamination line*
 - *Integrate with CMS DCS*

Twiki page:

<https://twiki.cern.ch/twiki/bin/view/CMS/RpcGasGain>

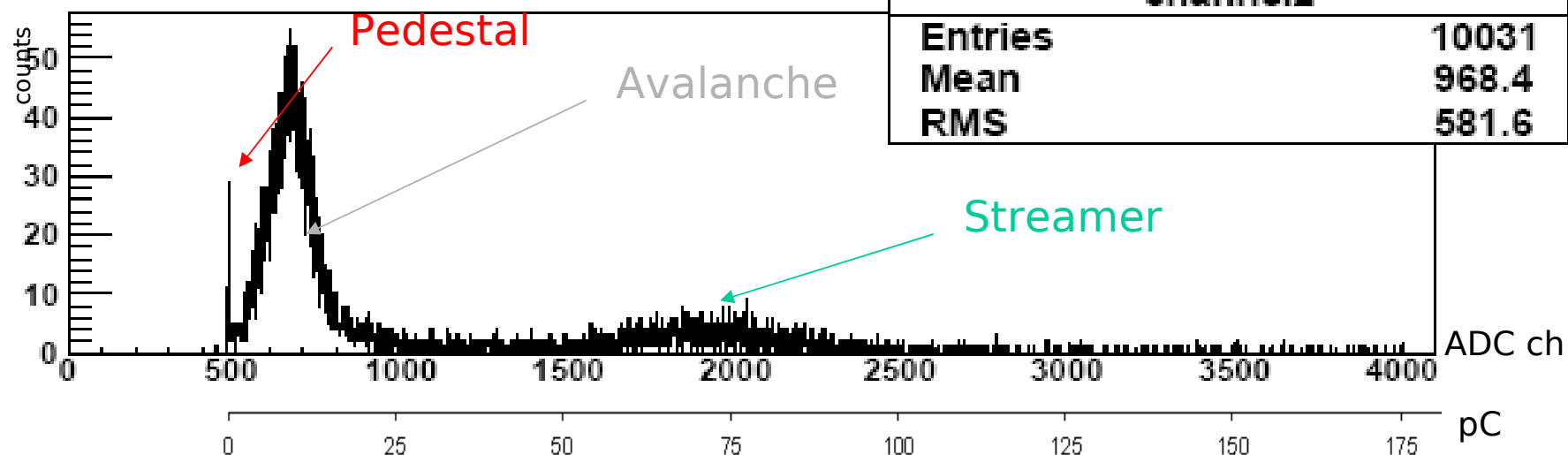


Gas Gain Monitor

Cosmic Rays charge distribution

RUN = 211-HV_{eff}=10200V-Gate=100ns - T=22°C - RH=50% - 26 October 2007 11:48

Charge distribution of Channel 2



- ✓ **VERY CLEAN AVALANCHE PEAK**
- ✓ **EXPLORING NOW OPTIMAL QUANTITIES FOR WORK POINT MONITORING**
- ✓ **STREAMER/AVALANCHE FRACTION VERY SENSITIVE TO WORK POINT CHANGES**
- ✓ **FIT ADC DISTRIBUTIONS WITH GAUSSIANS/LANDAU -**
- ✓ **SHALL TRY AD-HOC PARAMETRIZATIONS**
 - ✓ (M.Abbrescia et al. Nucl.Instrum.Meth.A431:413-427,1999)



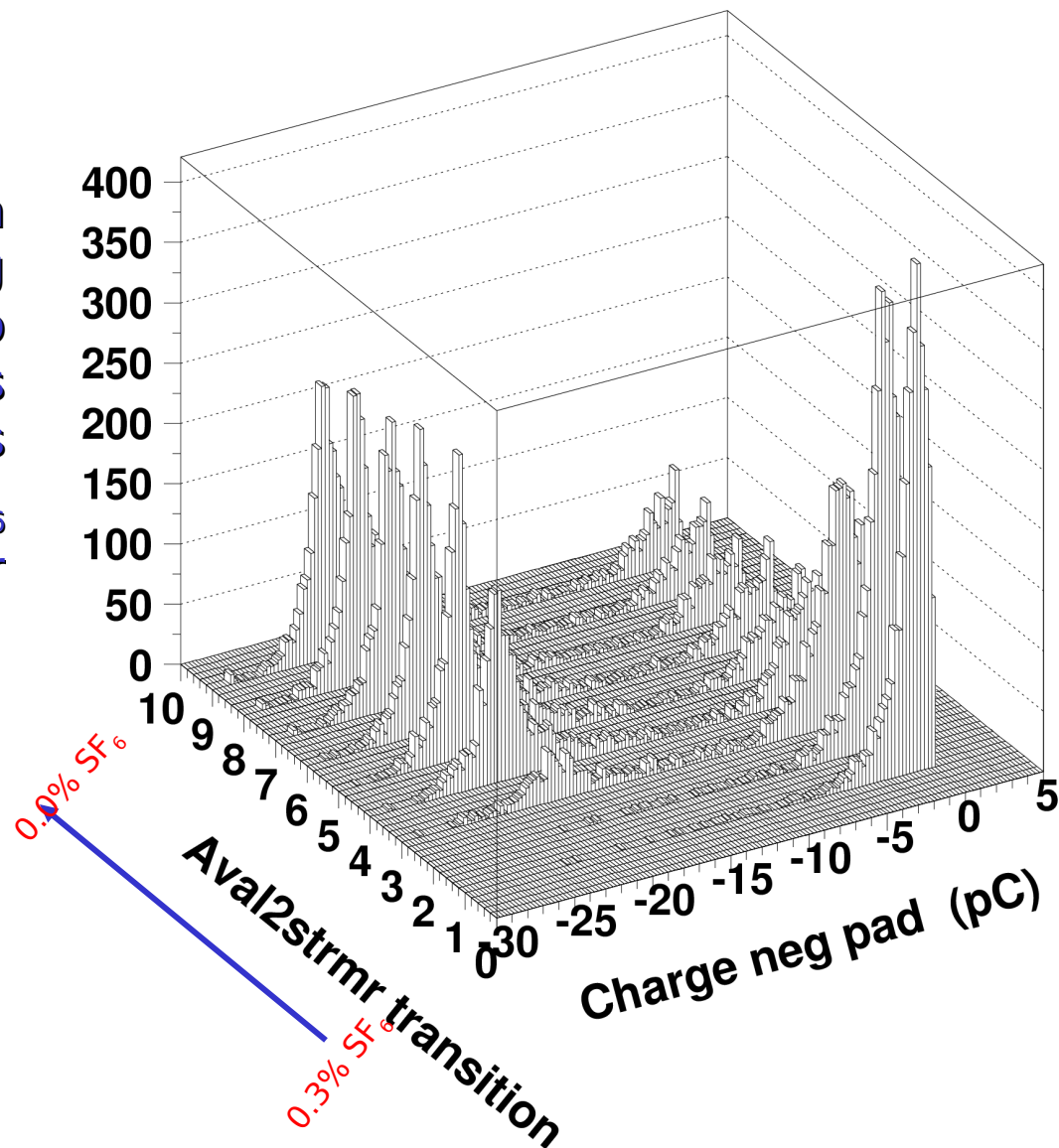
SENSITIVITY OF CHARGE DISTRIBUTIONS TO SF₆ %

- A first look to the monitoring of work point by changing gas mixture
- Data taken in Frascati with prototype gaps and scope readout
- Streamer appearance due to stop of SF₆ flux

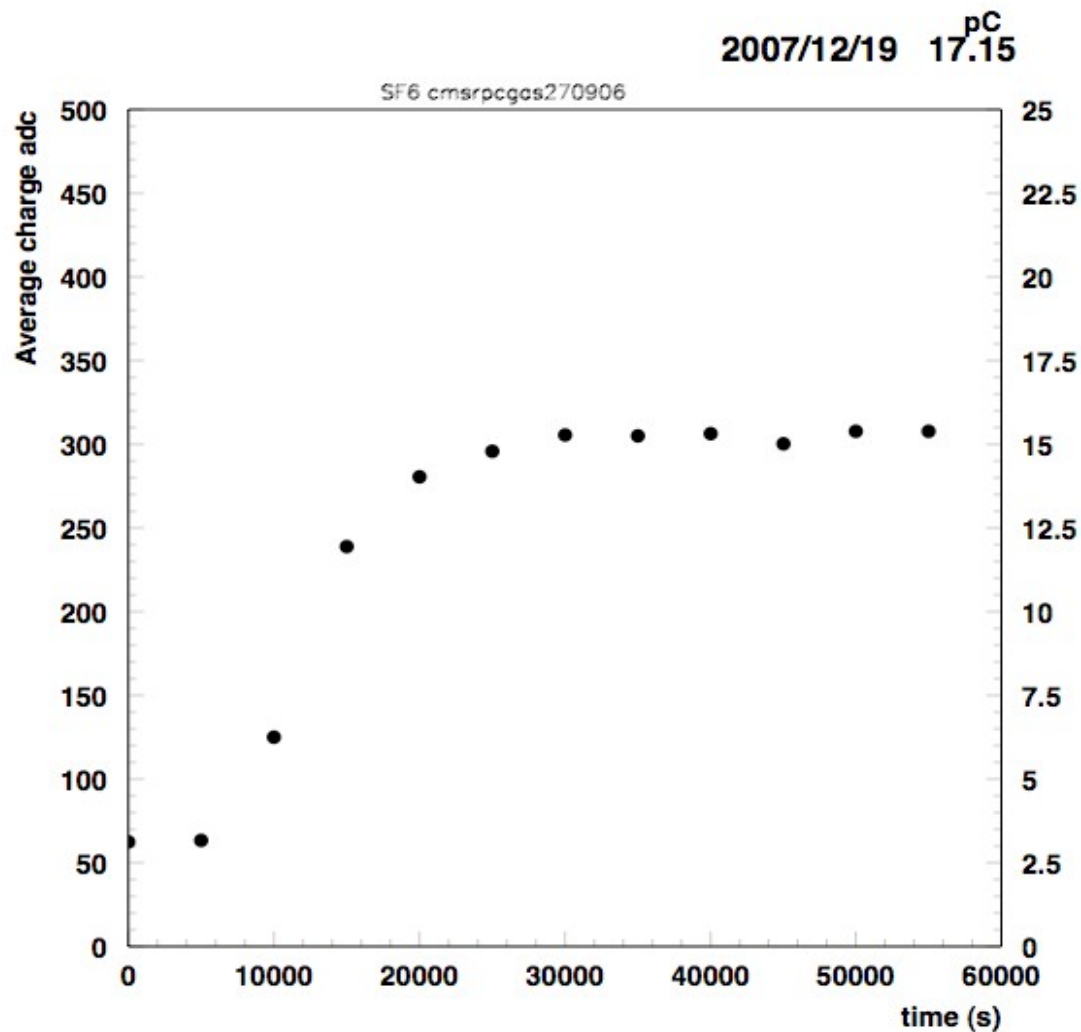
AVALANCHE to STREAMER TRANSITION 0.3%SF₆ TO 0%SF₆

Charge distribution on 45x45cm² pad showing transition from avalanche to streamer. At t=0 standard gas mix contains 0.3% SF₆, which is progressively removed. As SF₆ is decreased, the streamer peak appears.

SENSITIVITY TO GAS CHANGES



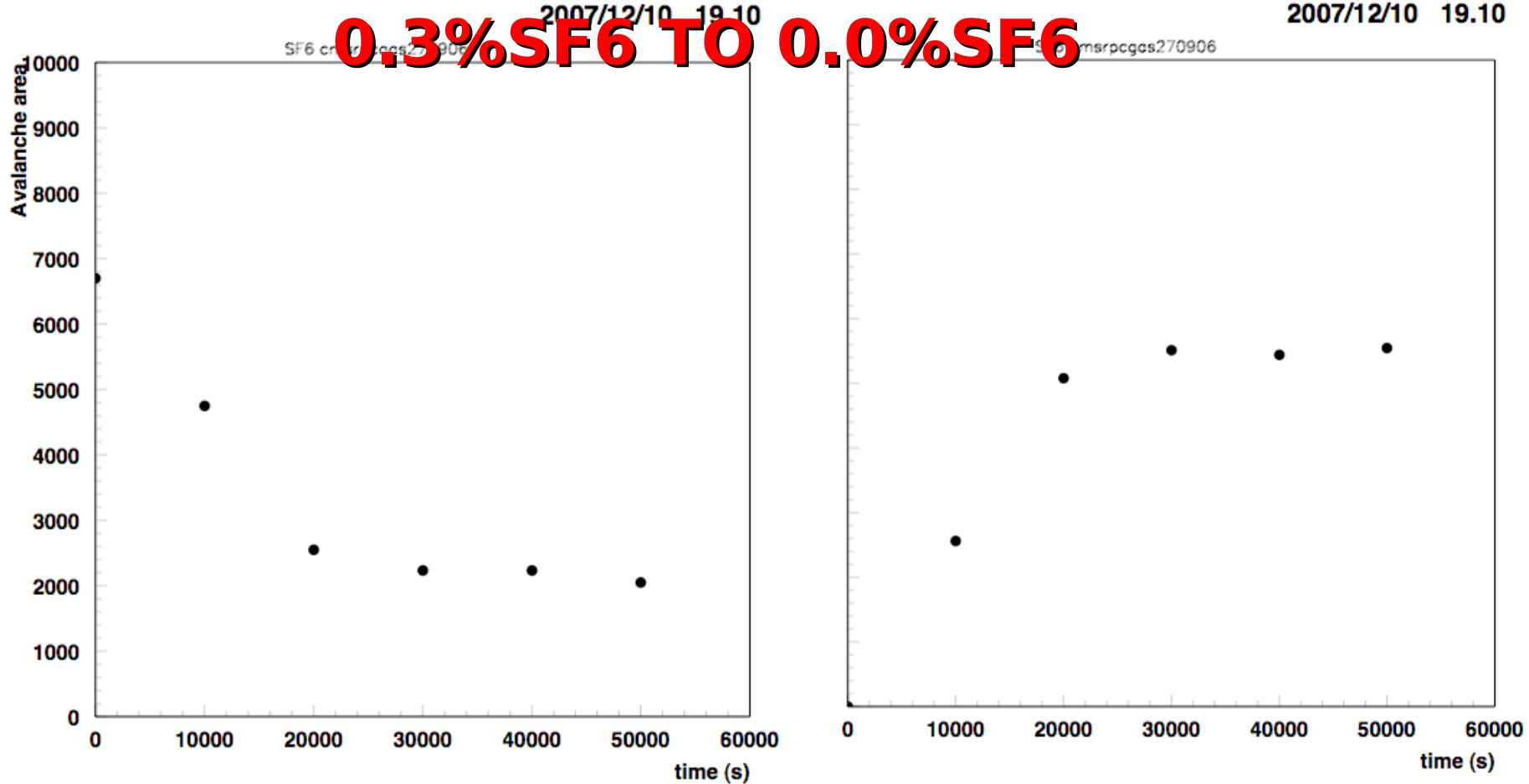
AVALANCHE to STREAMER TRANSITION 0.3%SF6 TO 0.0%SF6



• MEAN VALUE OF CHARGE ABOVE PEDESTAL

AVALANCHE to STREAMER TRANSITION

0.3%SF6 TO 0.0%SF6



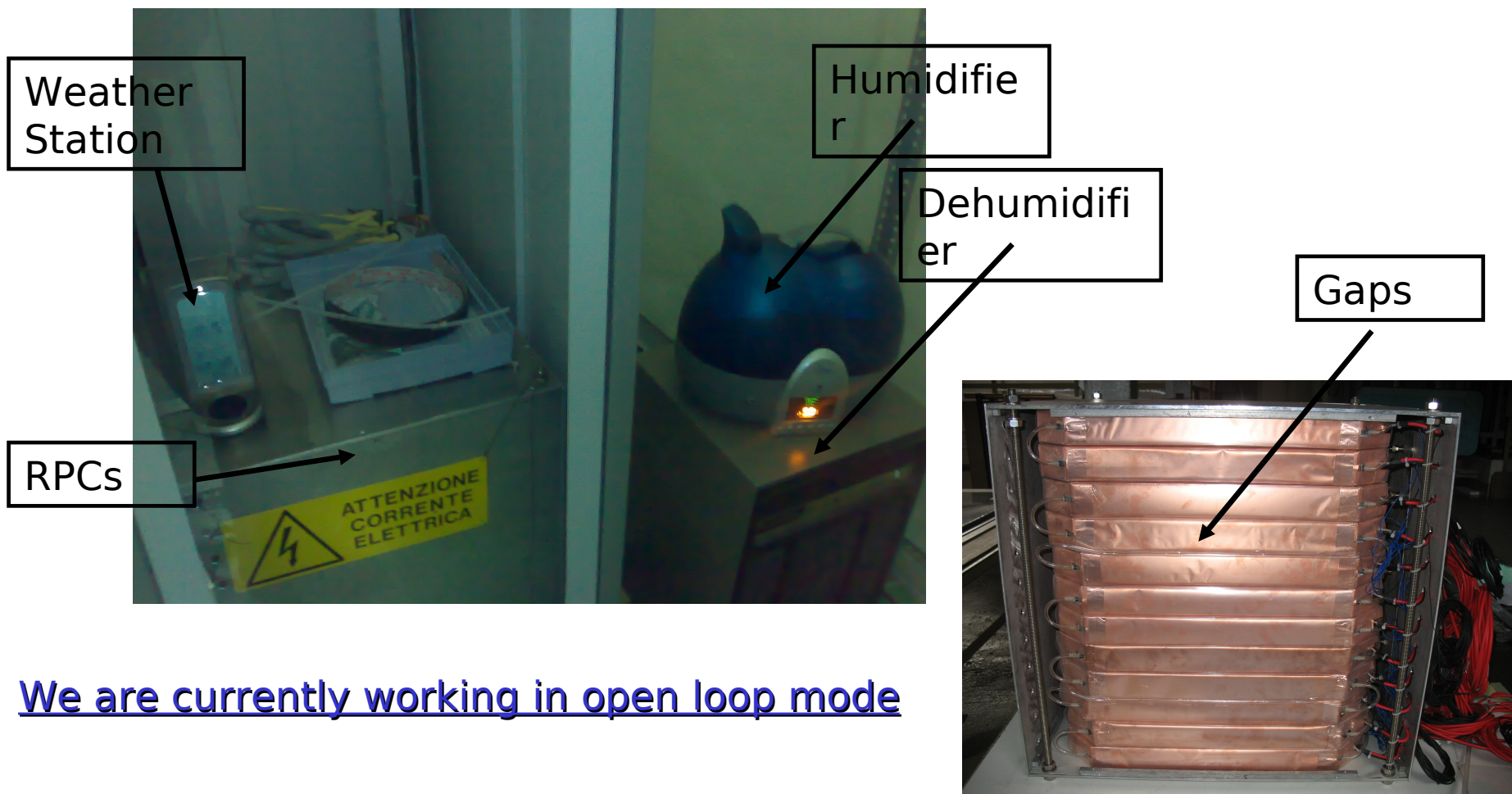
- YIELDS OF AVALANCHE AND STREAMER PEAKS

SPARE SLIDES

GAS GAIN MONITORING SYSTEM

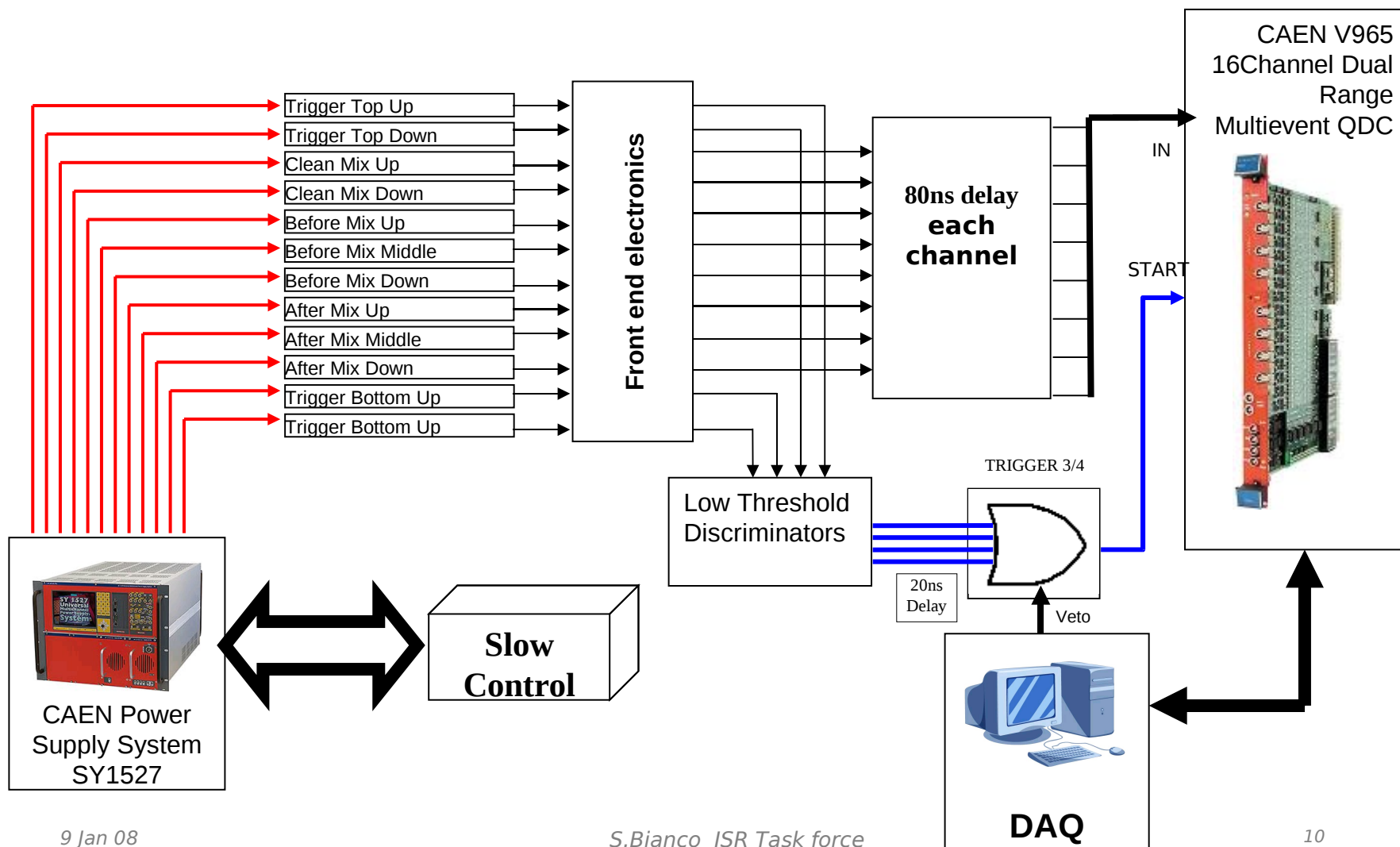
- A monitoring system of the RPC working point for changes due to gas composition
 - provides much faster and sensitive response than the CMS RPC system
 - Monitor efficiency and charge continuously with cosmic rays (20Hz rate)
 - Three sub-systems of 50x50cm² gaps in the same telescope
 - Reference with fresh open loop gas mix
 - ü Monitor before gas purifiers
 - ü Monitor after gas purifiers
- ✓ System shipped to CERN in August ahead of schedule
- ✓ Gas building SG5 not ready yet, system installed at ISR in Closed Loop scaled-down gas system
- ✓ Commissioning in progress, 11 out of 12 gaps working
- ✓ Spare gaps fabrication in progress, delivery Dec 1st
- Faulty gap replaced this week
- MILESTONE: system operational on Dec 31st

Setup at ISR

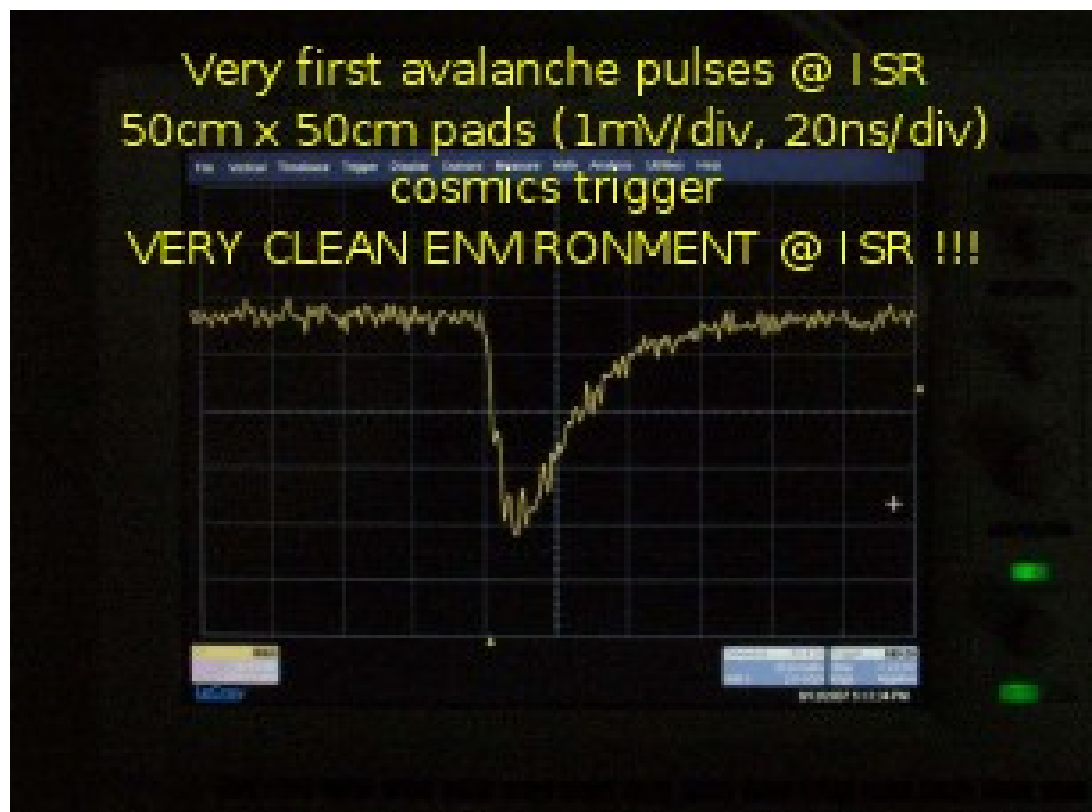


We are currently working in open loop mode

Configuration at CERN ISR



Very Clean Cosmic ray pulses from gaps at CERN ISR



Gap Dimension 50x50 cm²

Readout pad about 48x48cm²

Gas Gain Monitor (conceptual design)

