Calibration of the gain and measurement of the noise for the aPV25 electronics

K. Gnanvo, N. Liyanage, C.Gu, K. Saenboonruang

From INFN Italy: E. Cisbani, P. Musico

Experimental setup put in place at UVa to

- Measure the gain of two apv25 based readout electronics: Scalable Readout System (CERN, RD51) and MPD (INFN Italy for SBS)

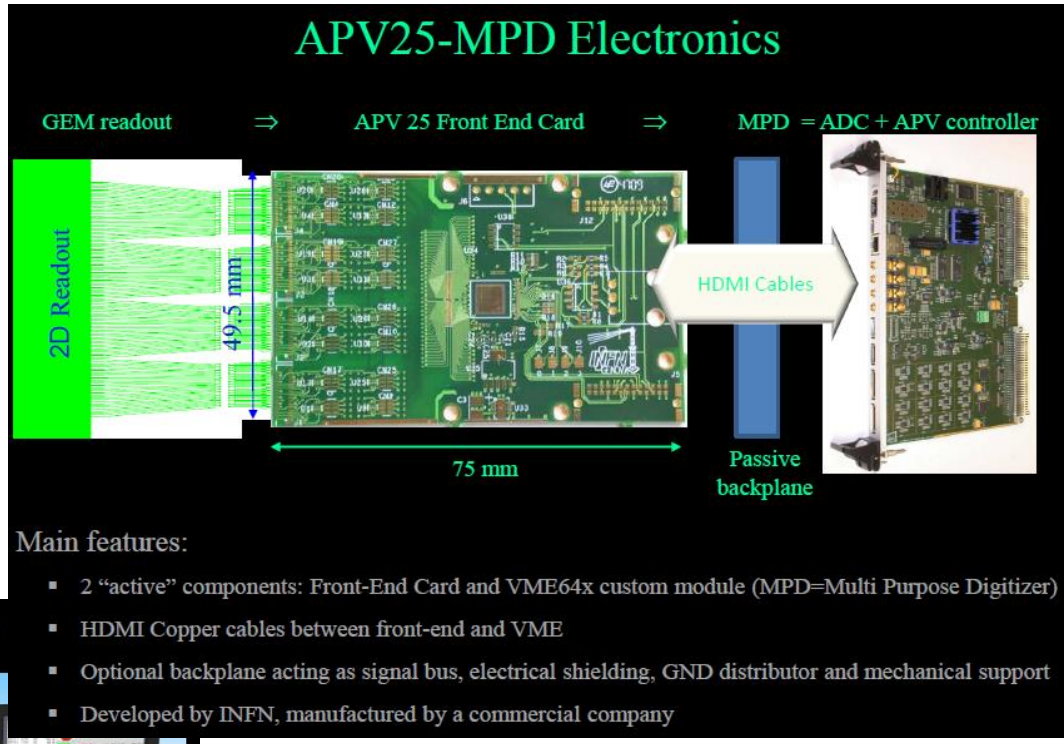
- Measure the apv channels rms noise and estimation of the ENC from the apv gain measurement

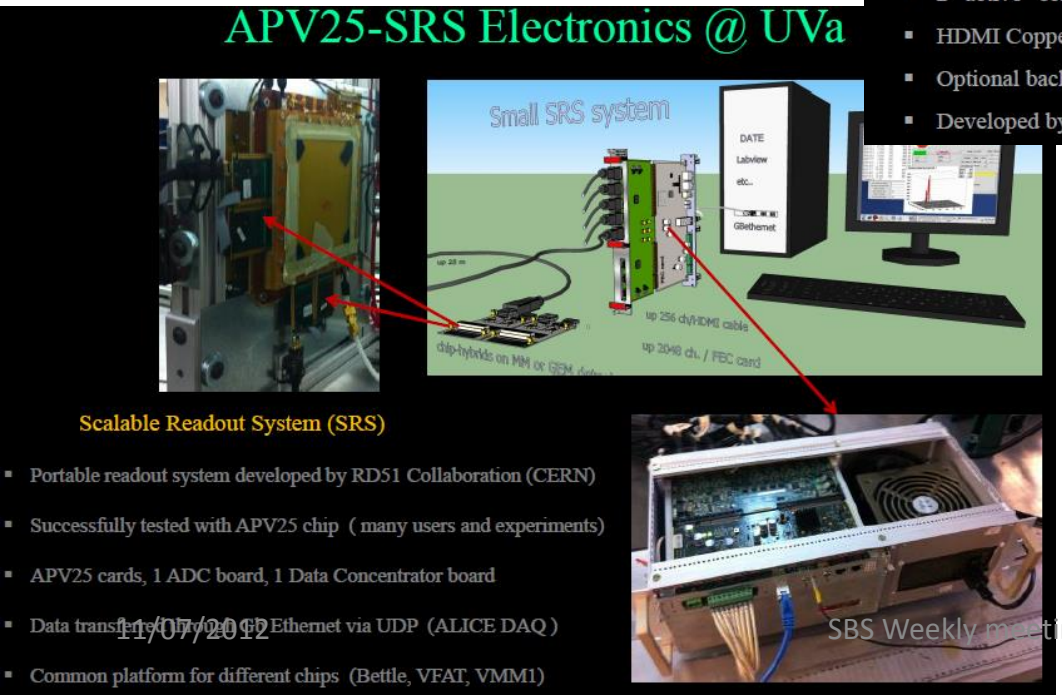
- Comparison of the performances of the two systems

APV25 MPD and SRS system

Multi Purpose Digitizer (MPD)

- P. Musico, INFN Italy
- More than 2.5K Channels at UVa

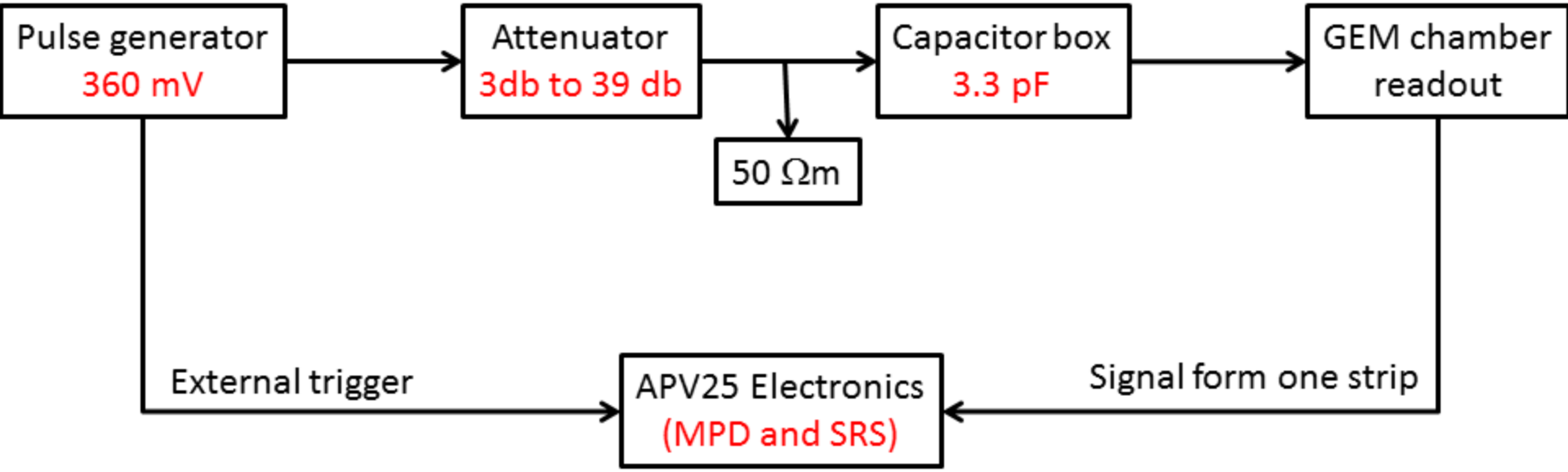




Scalable Readout System (SRS)

- H. Muller, CERN, RD51
- 2048 channels at Uva

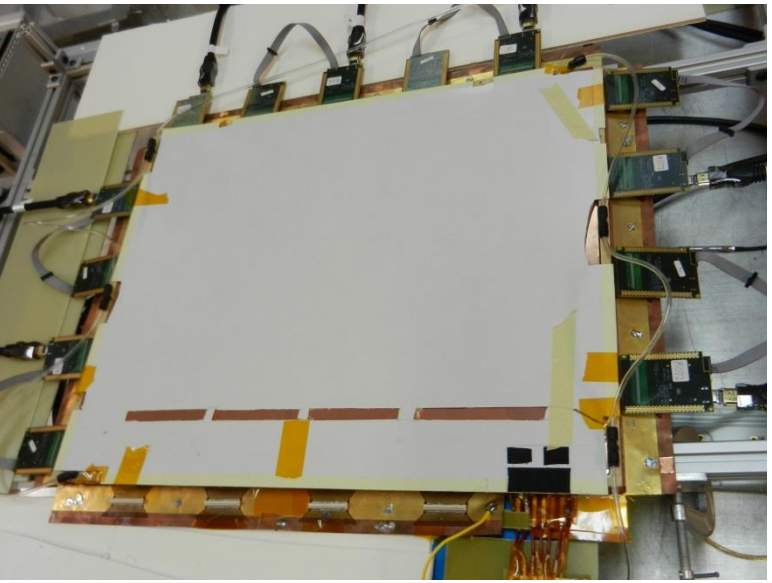
APV25 Gain calibration setup



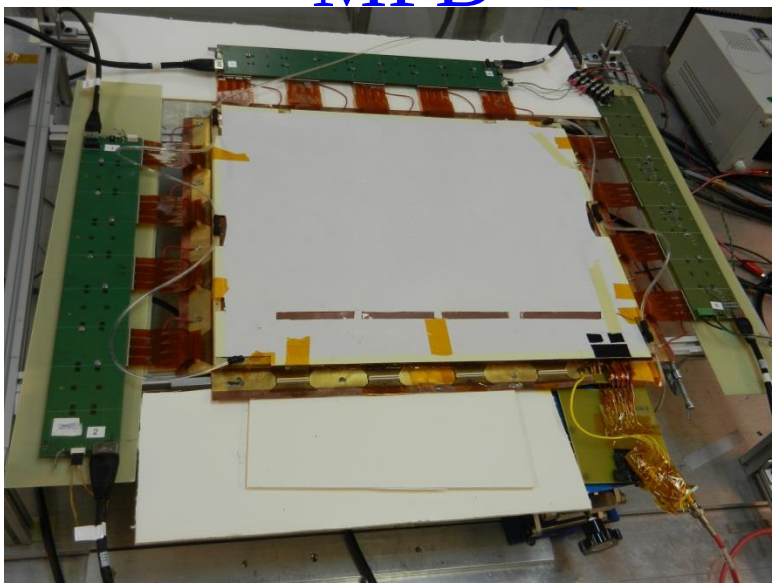
- Test pulse = 360 mV, Capacitor = 3.3 pF ➔ Equivalent charges = 7.2 Million e-
- Injected charges = Equivalent charges / Attenuator ➔ attenuation 3dB to 39 db

APV2 on SBS GEM prototype

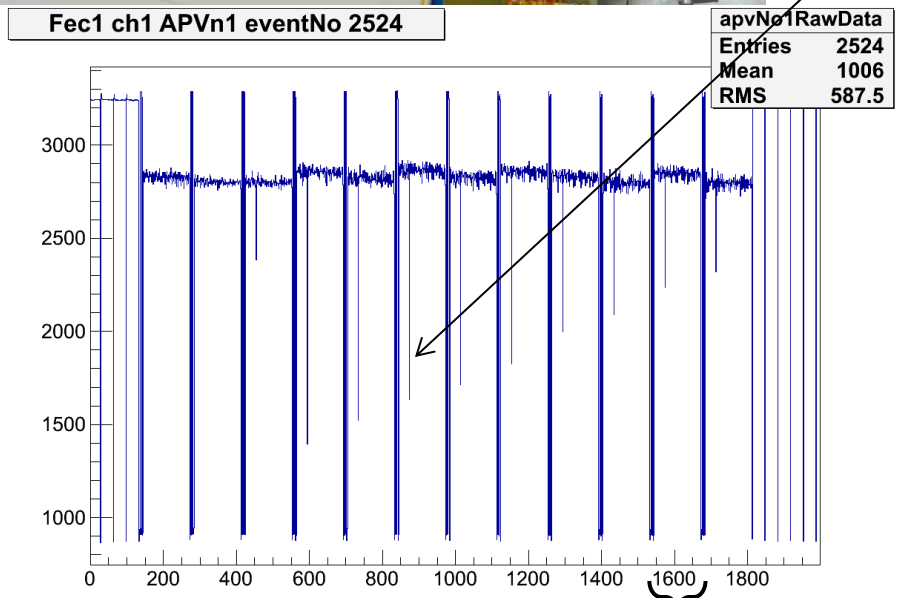
SRS

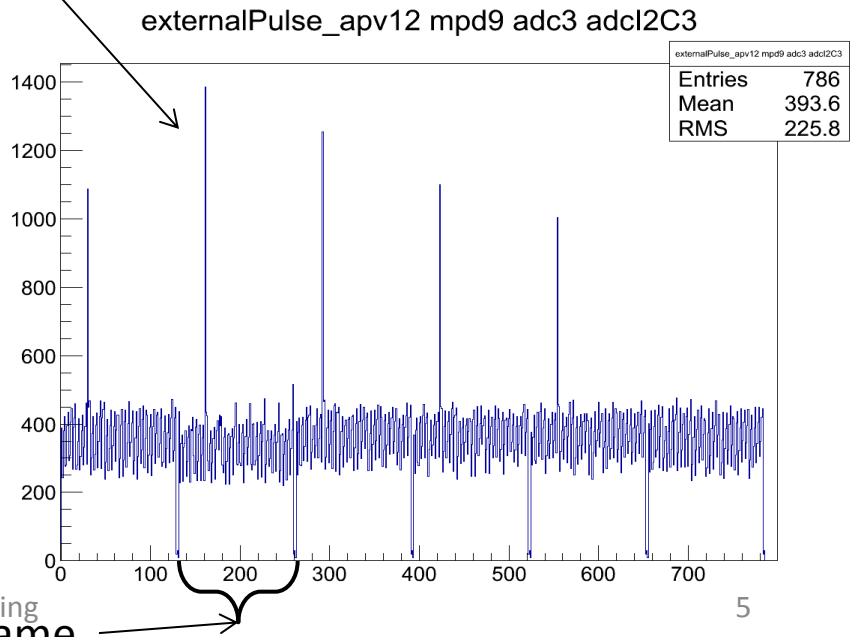


MPD



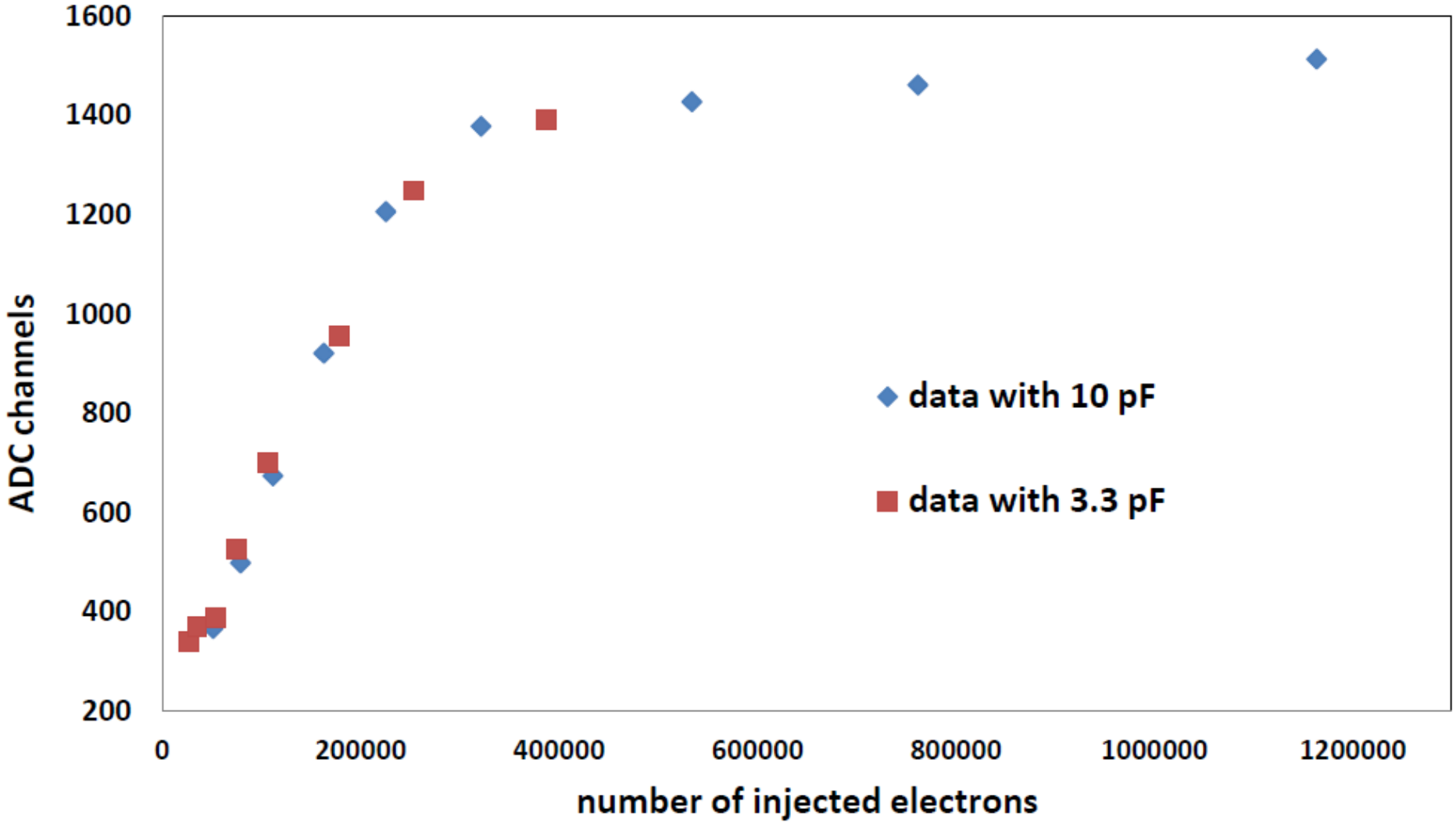
Analog signal



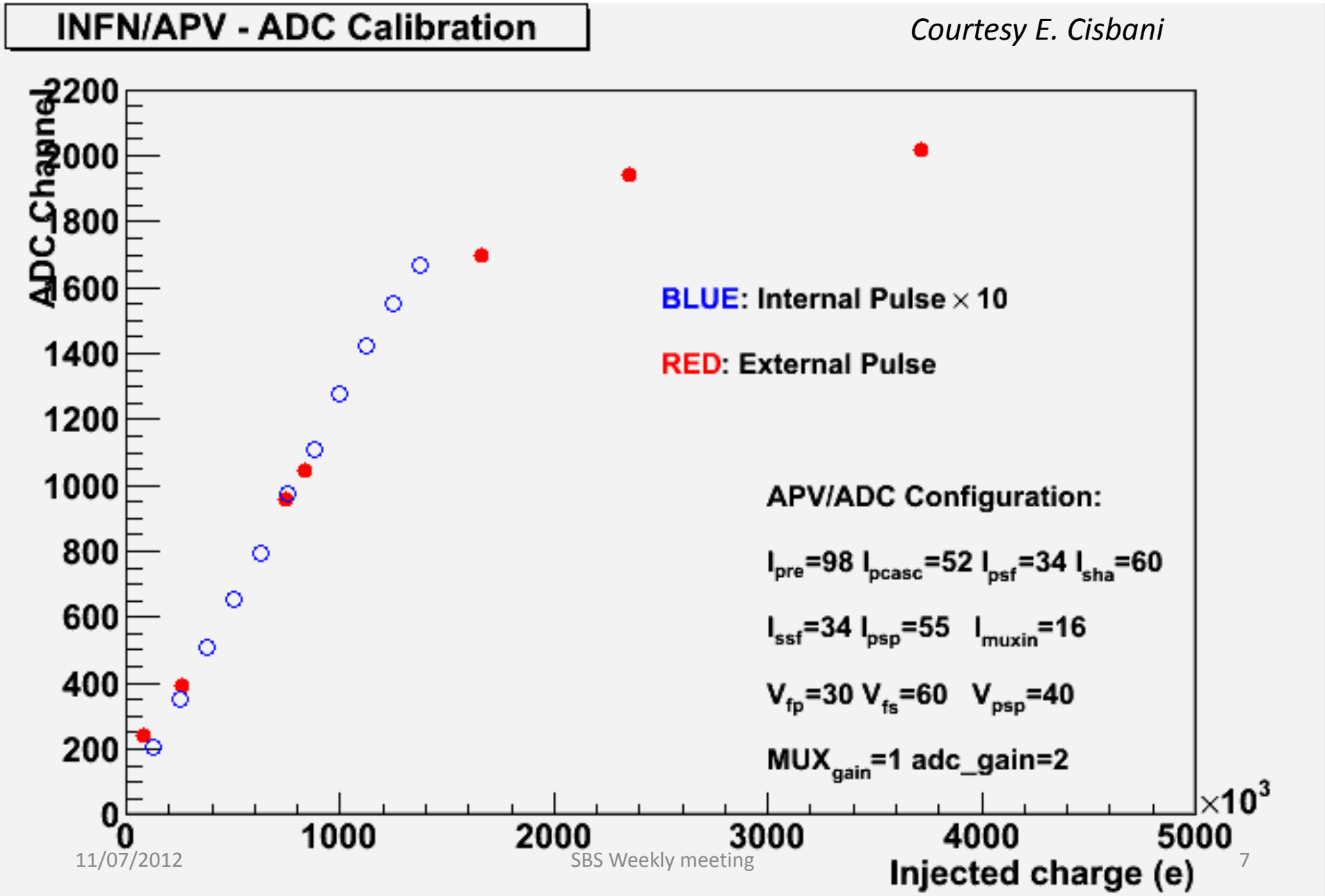


25 ns time frame

APV25-SRS with external pulse

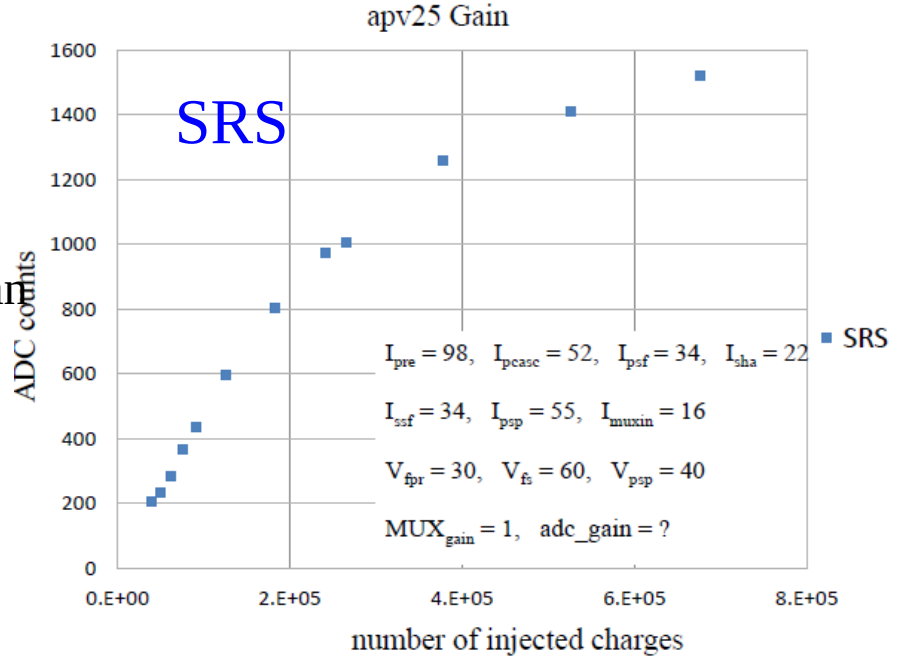


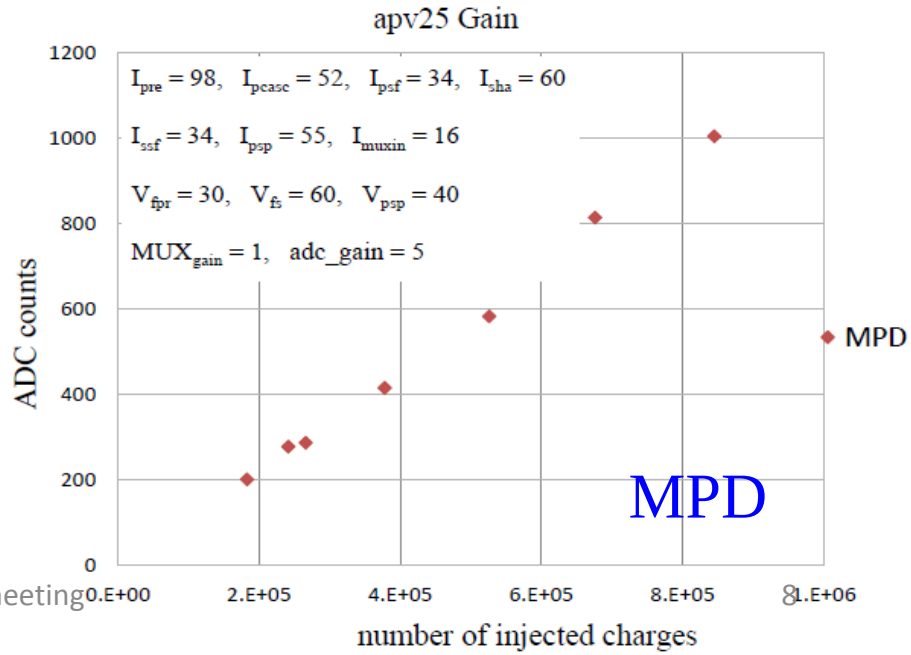
APV25-MPD with Internal & external pulse



APV25 and ADC configuration for MPD and SRS systems

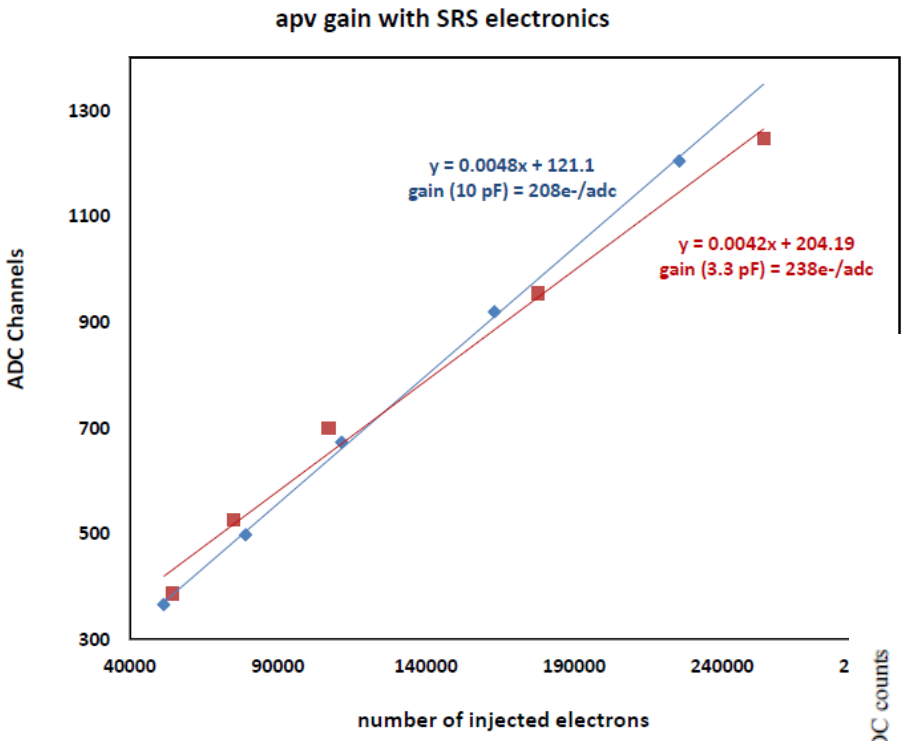
- We have almost the same configuration parameters for the two systems
- Different performances of the two electronics can be related to some differences in hardware that Paolo has identified:
  - protecting diode in the VCC line of the INFN card
  - input capacitance 47 pF vs. 1 pF in SRS
  - 1 MΩ resistor to ground in the SRS input lines
  - external biasing in INFN card vs. internal biasing in SRS (this affect the values of the APV parameters for the optimal working point)





Apv25 Gain: MPD vs SRS

Gain calibration with 3.3pF and 10pF



Gain calibration for SRS and MPD