TOF dynode calibration

A. Contin

TOF Group, July 2011

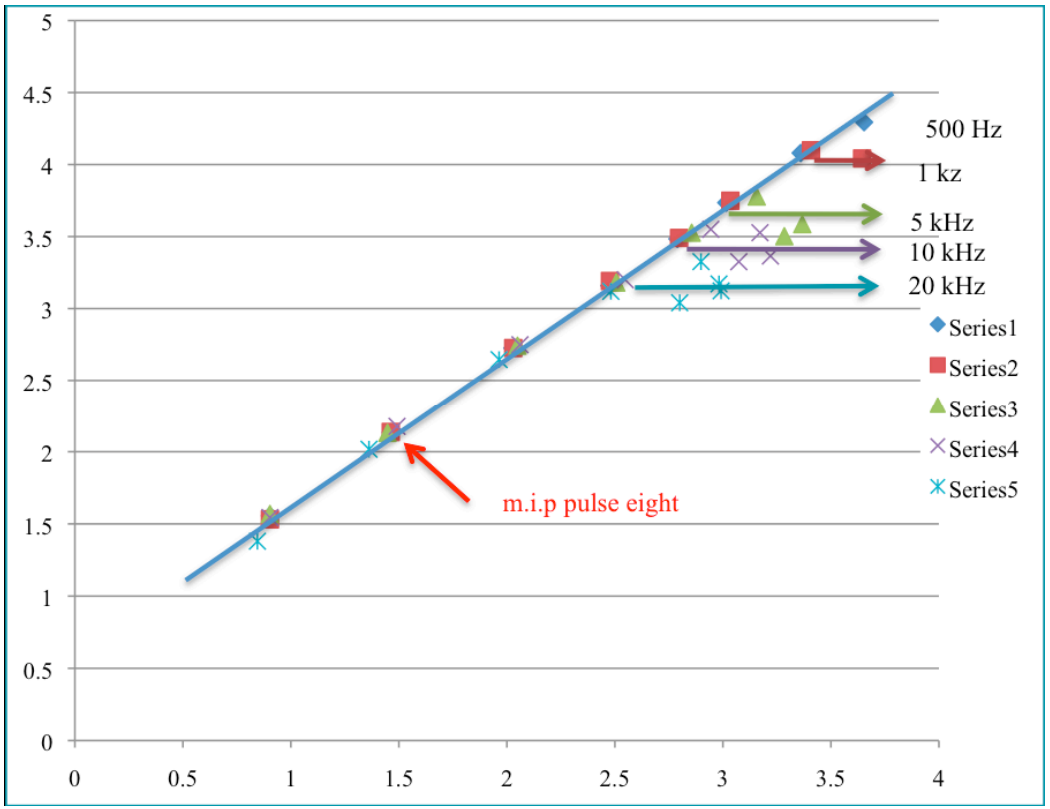
Goal

Calibrate dynodes against anodes.

Principle of the measurement

Third last dynode signal of each PMT is recorded on ADC (see Tutorial - A. Contin talk at KSC, February 2011). Calibration against the anode for low pulse heights allow to define a scale similar to that of the anode (i.e., with equal attenuation and energy calibration constants), but with a larger dynamic range and, possibly, less saturation effects.

Laboratory mesurements (Lolli and Palmonari, 22 July 2011) show that the relation between dynode and anode signals is a power law (linear in bi-logarithmic scale), and that saturation occurs within the anode ADC scale when the rate is higher than about 5kHz.



Log10(A) vs. Log10(D) for the five frequencies 500 Hz, 1, 5, 10, 20 kHz (series 1-5).
PMT HV = 1800 Volt

Event selection and analysis

1. Trigger: all triggers

2. One and only one good track (Chi2<10, at most one central plane missing)
3. Dynode sum greater than 70 ADC channels

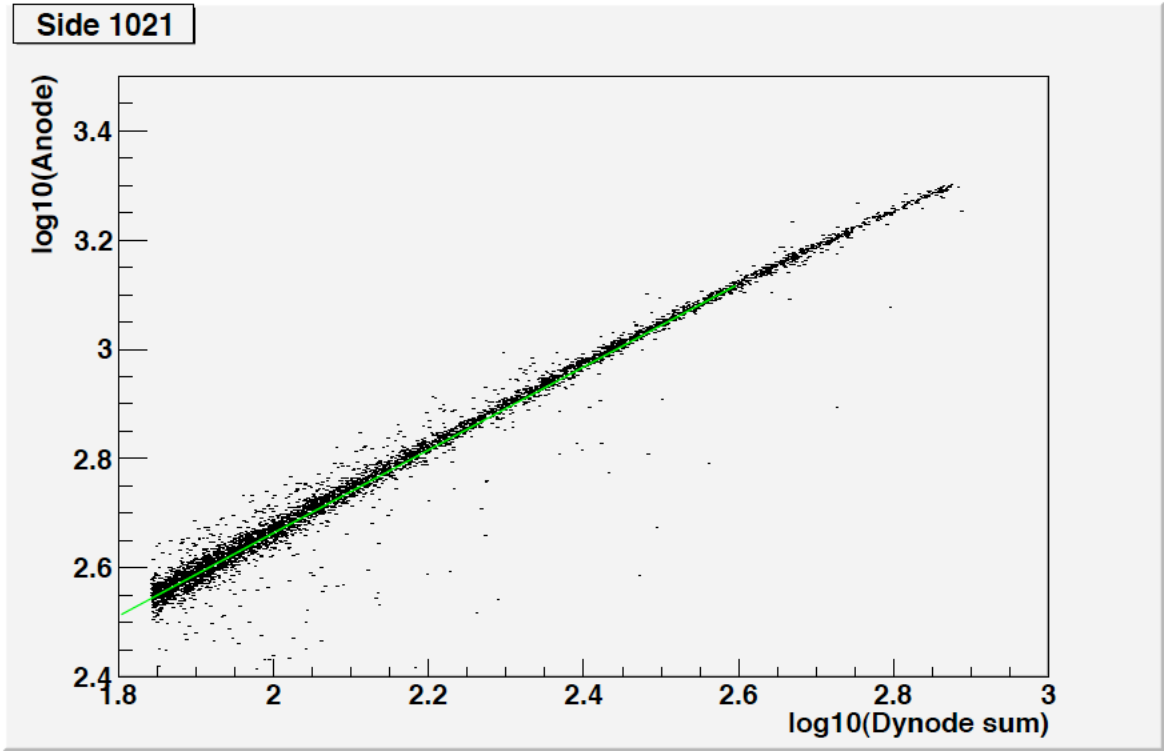
For each run and each side the anode vs. dynode sum plot has been fitted and the resulting parameters were stored on file for further analysis.

All runs up to July 7, 2011 have been analyzed.

Results - Anode vs. dynode fit

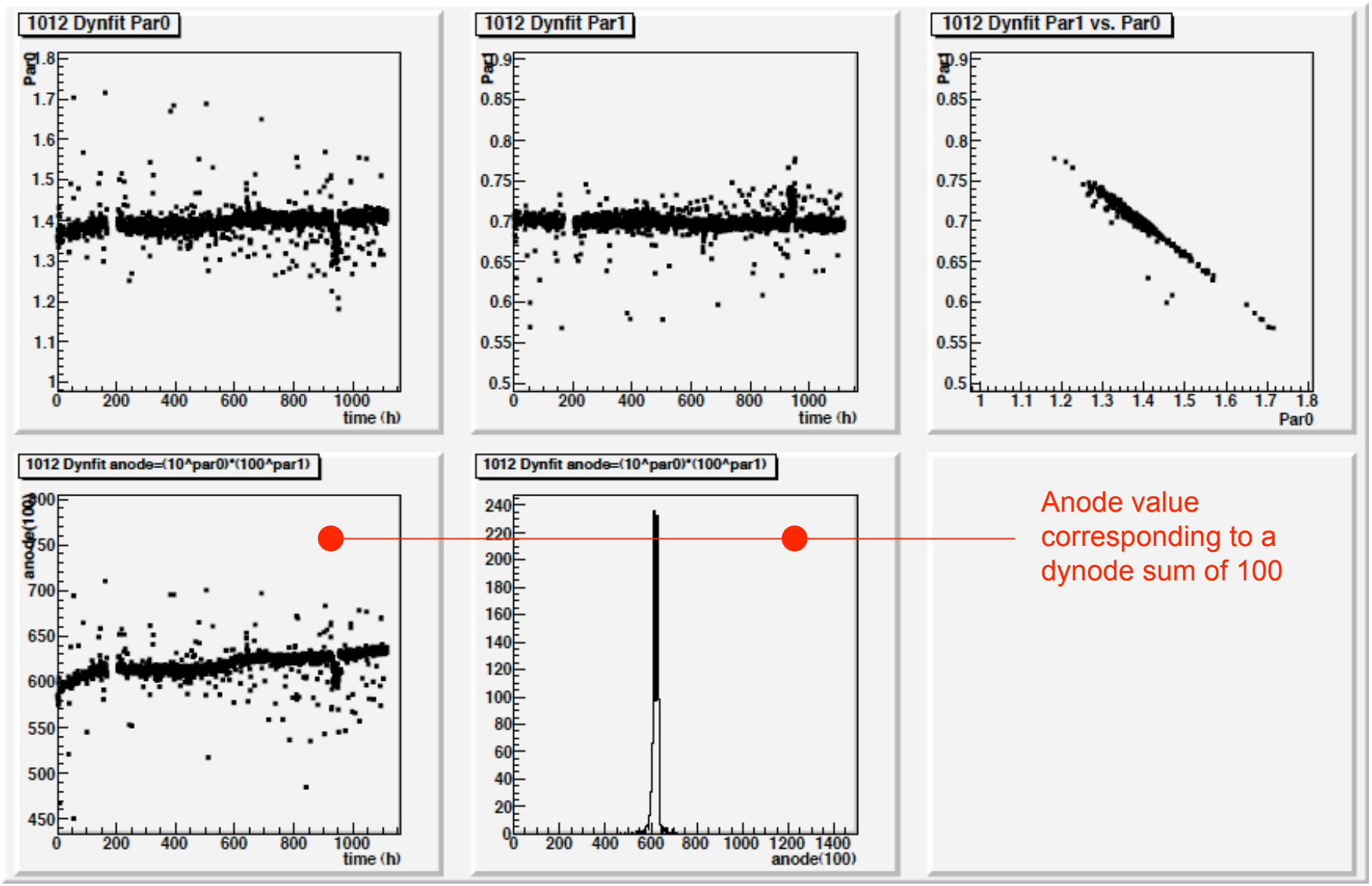
Example plot.

Fit (green line) is done with $\log_{10}$(dynode sum) between 1.85 and 2.6 (dynode sum between 70 and 400).



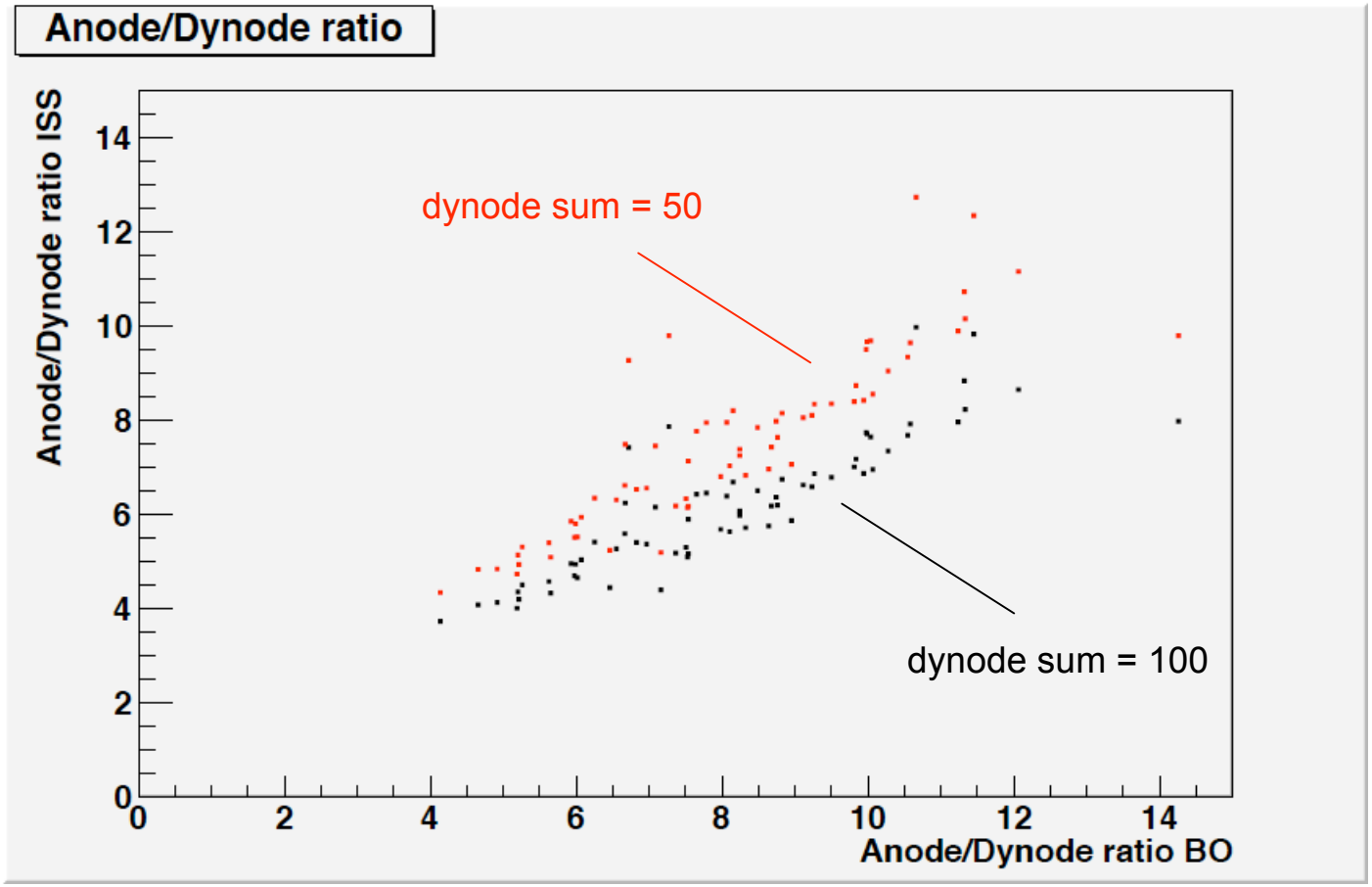
Results - Fit parameters vs. time

Example plots.



Results - Comparison with Bologna measurements

Bologna measurements were done at low pulse height, using a linear fit. Therefore the comparison with the present results changes at different dynode values.



Conclusions

A new (2-parameters) relation between anode and dynode sum have to be implemented (Choumilov) in the calibration and in the reconstruction program.

The fit parameters are quite stable in almost two months.
The anode/dynode behaviour of the various sides compare well with the Bologna measurements.