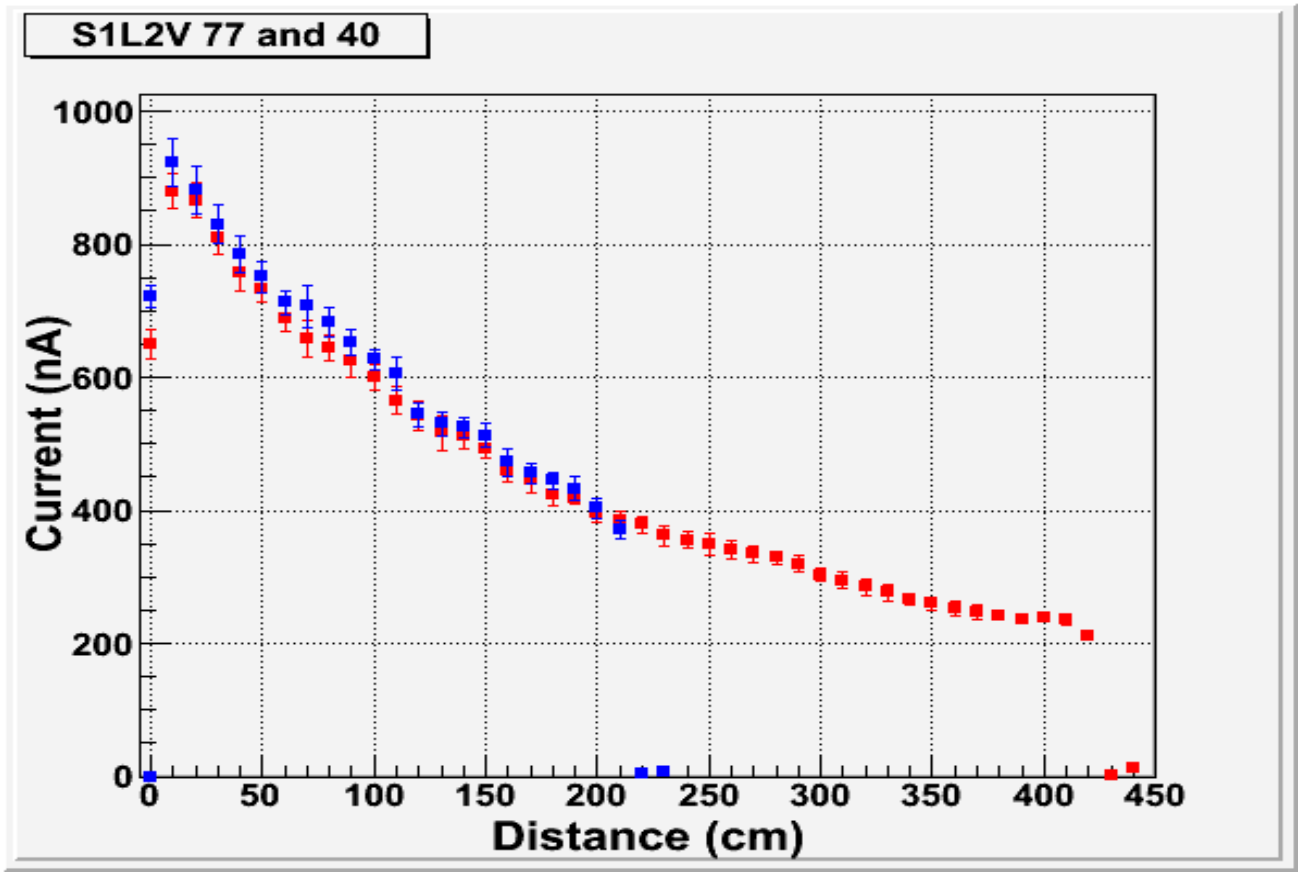
PCAL

Scintillator strips and Fibers Quality Control

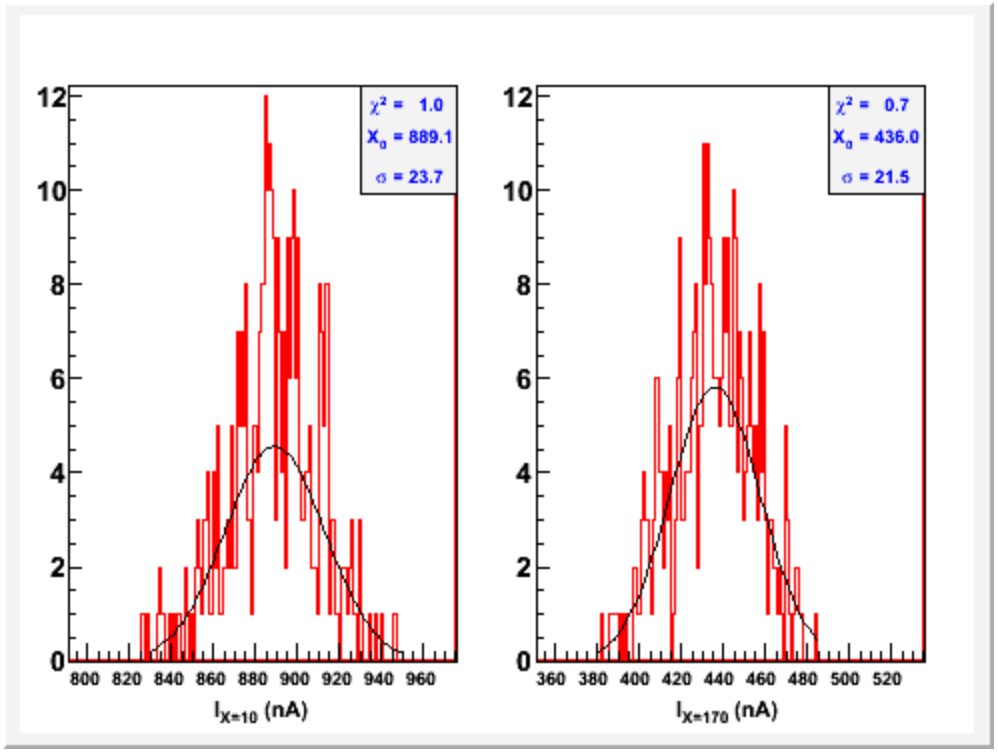
Tuesday, June 21, 2011

Tested strips of U, V - 4 and W - 3 layers.
Total ~440 strips (~73%) during 2.5 months

Anode current dependence of ^{90}Sr source position

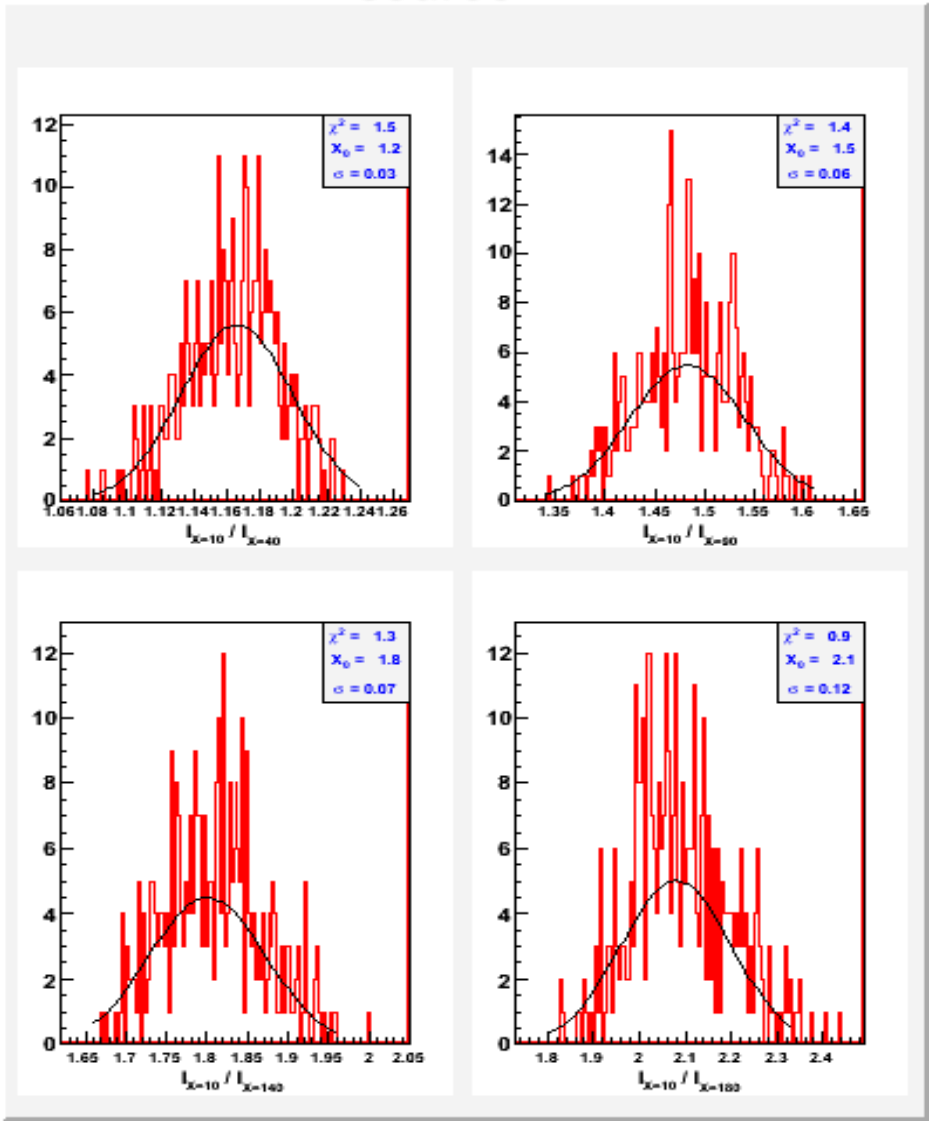


Current at 10cm and 170cm source distance for 360 strips (3 layers of each view of module 1)



σ ≤ 5%

The ratio of current at X=10cm over 4 different positions of source

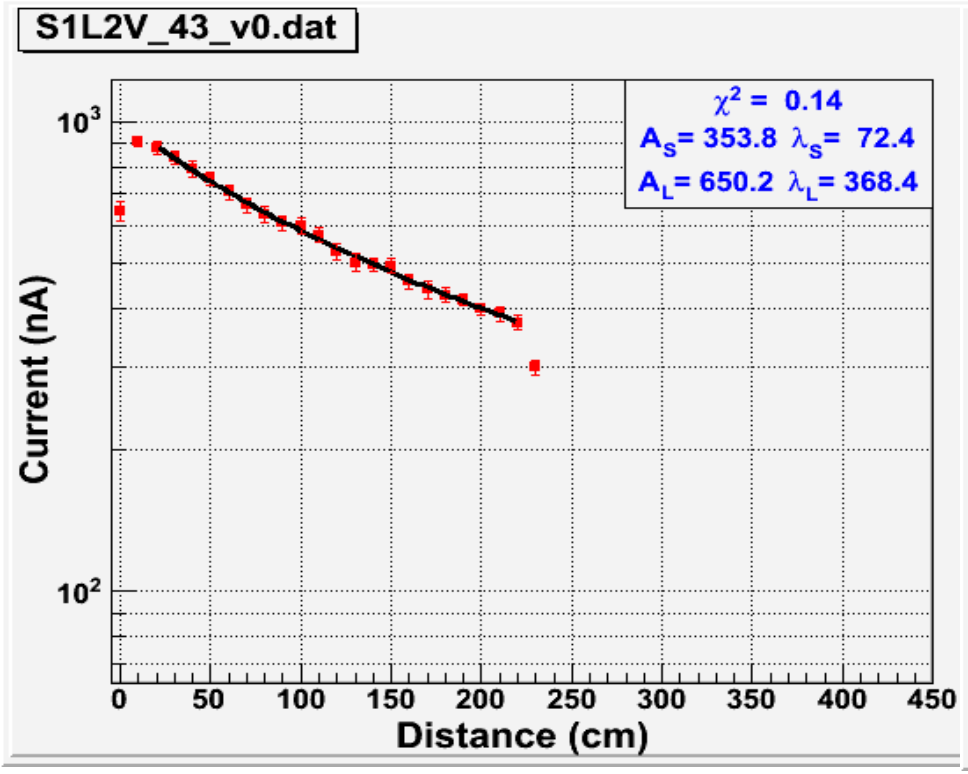


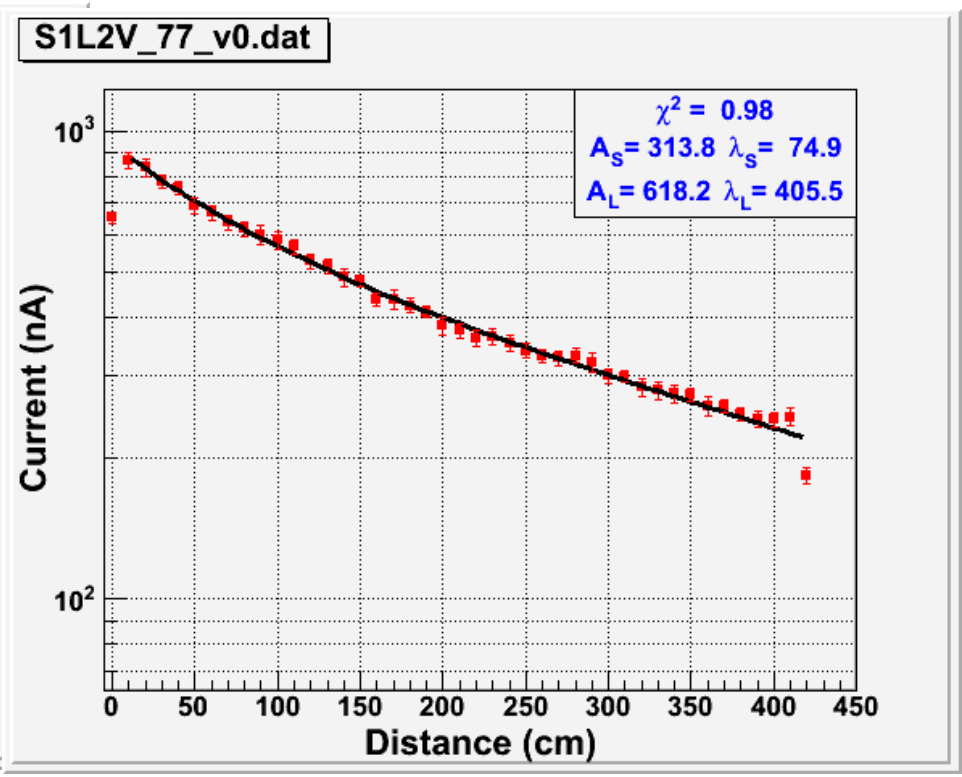
σ ≤ 5%

Property of scintillators defined using fitting procedure

$$F(x) = A_S \, e^{-\frac{x}{\lambda_S}} + A_L \, e^{-\frac{x}{\lambda_L}}$$

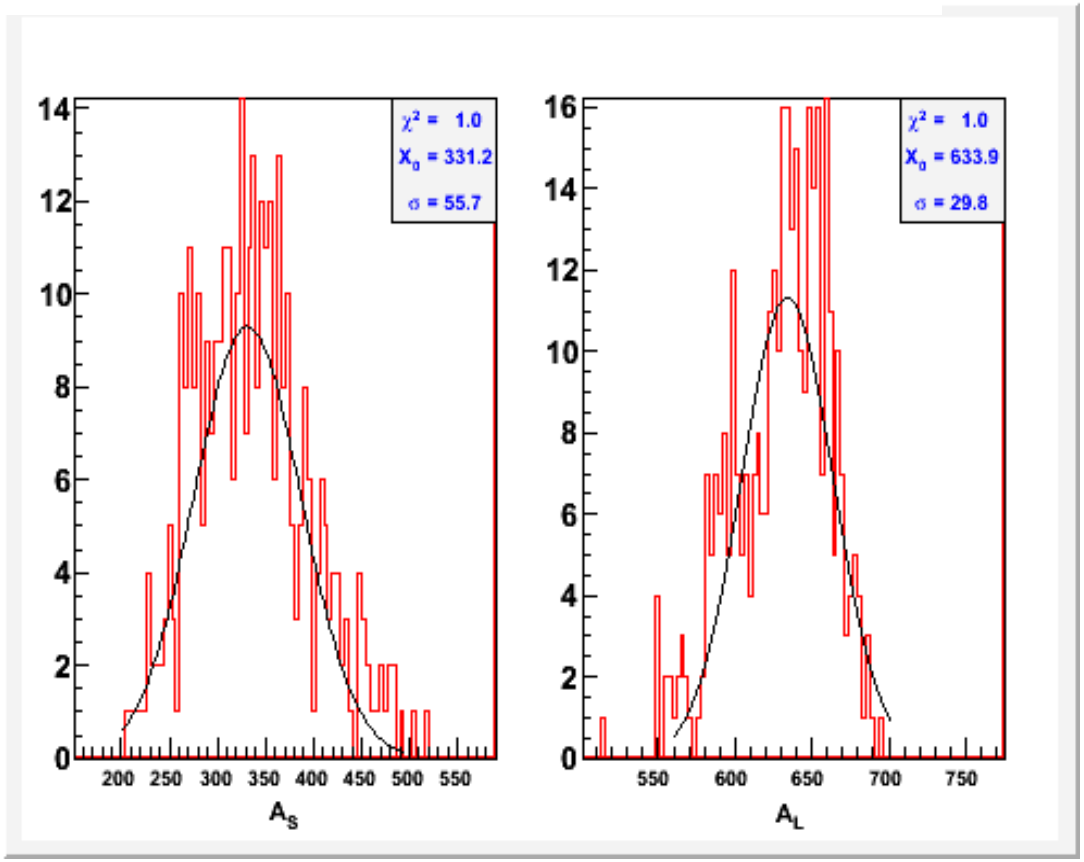
Samples of fitting procedure with four free parameters
longest and shortest strips





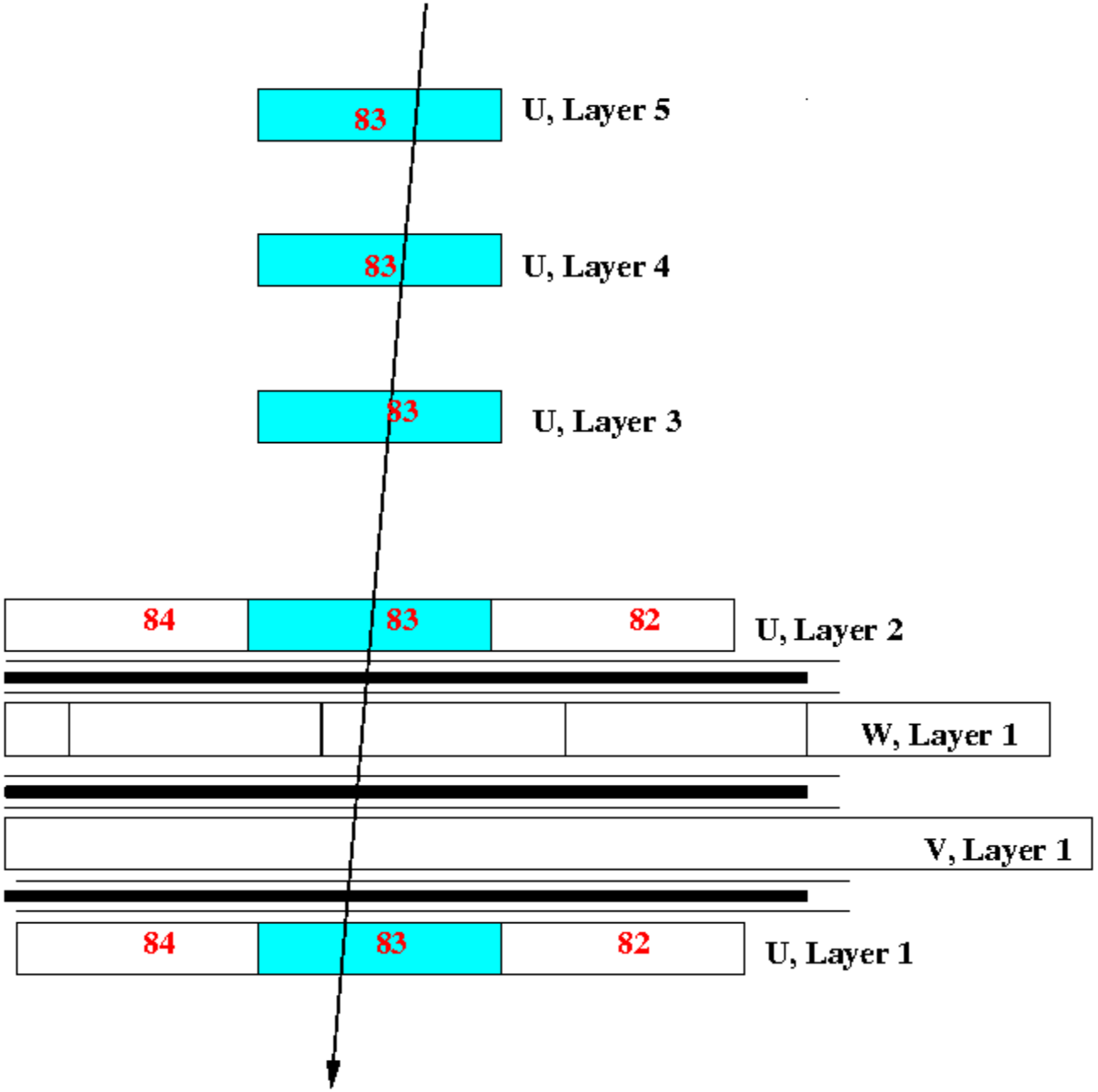
Defined amplitudes - A_S, AL using fitting procedure with fixed attenuations (3 layers of each view of module 1)

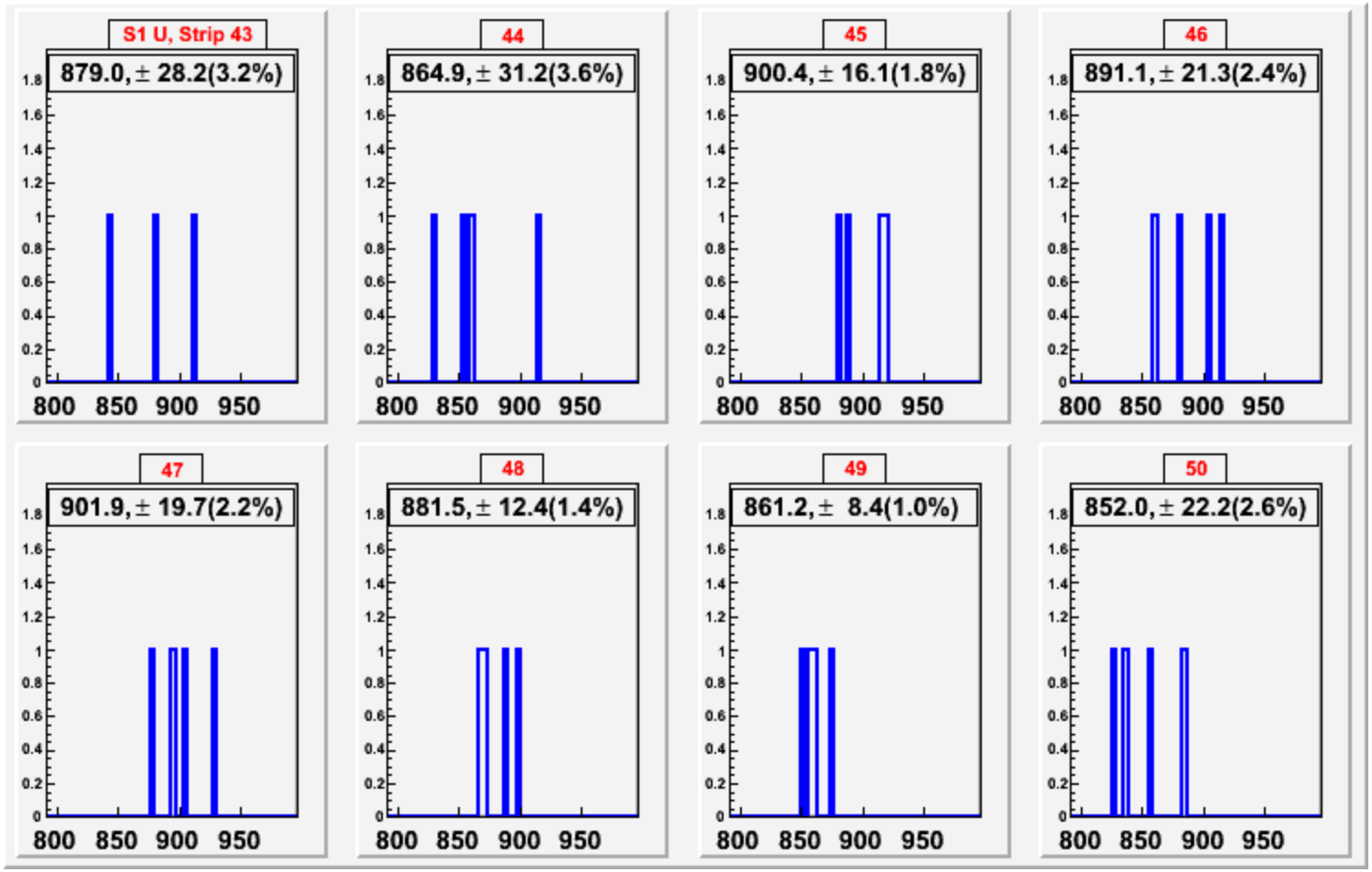
$$F(x) = A_S\, e^{-\frac{x}{70}} + A_L\, e^{-\frac{x}{400}}$$



σ ≤ 16.8% **4.7%**

The property (current at 10cm position) of the same strips and the same view in different layers


83
U, Layer 5
83
U, Layer 4
83
U, Layer 3
84
83
82
U, Layer 2
W, Layer 1
V, Layer 1
84
83
82
U, Layer 1


S1 U, Strip 43
879.0, ± 28.2(3.2%)
44
864.9, ± 31.2(3.6%)
45
900.4, ± 16.1(1.8%)
46
891.1, ± 21.3(2.4%)
47
901.9, ± 19.7(2.2%)
48
881.5, ± 12.4(1.4%)
49
861.2, ± 8.4(1.0%)
50
852.0, ± 22.2(2.6%)
800 850 900 950

RMS ≤ 3.6%

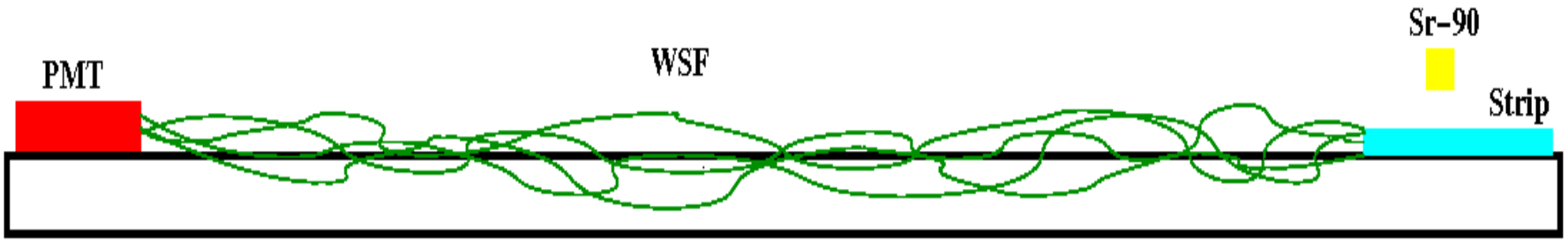
Test of half scintillator strips of module 1showed:

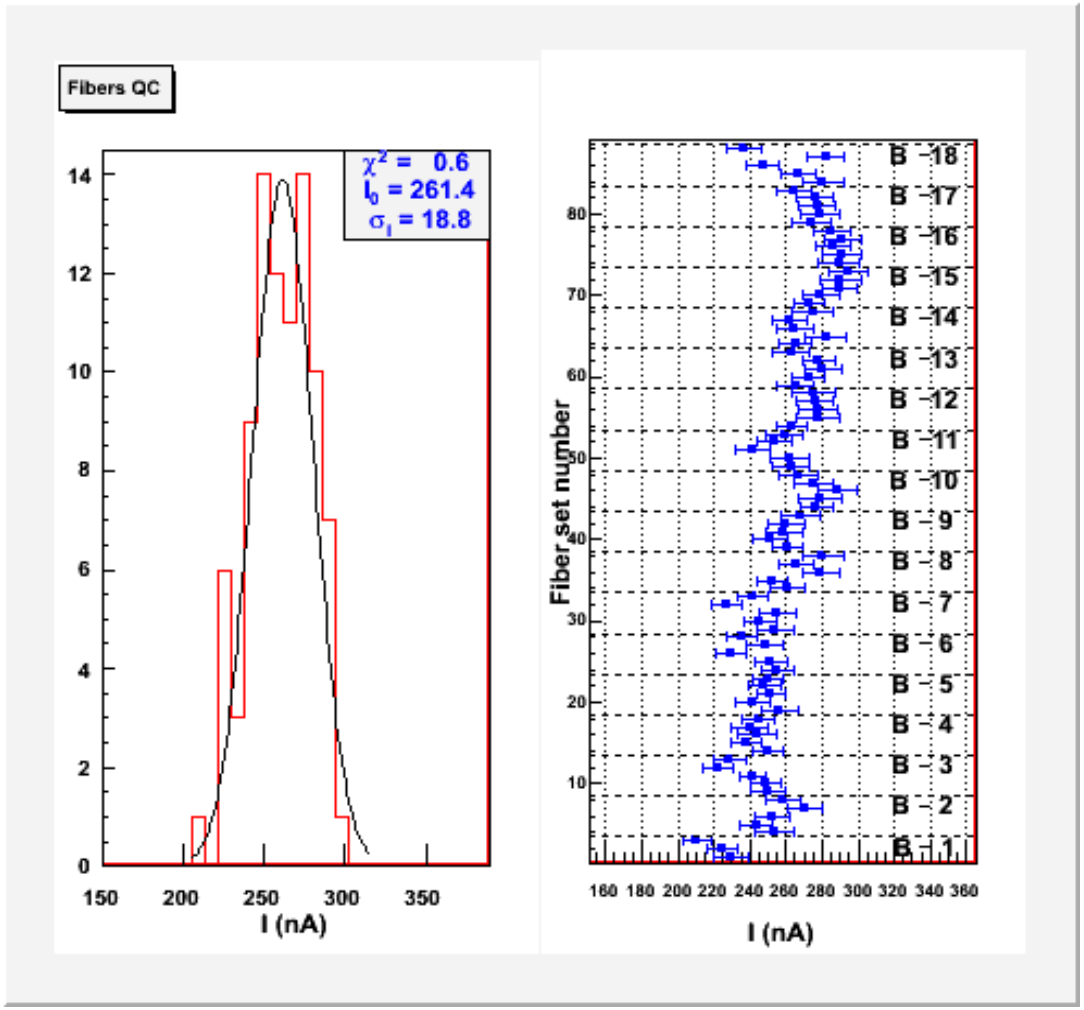
1. *The anode current deviation at* **X=10cm** *and* **170cm** *source positions are* **≤5%** *range,*
2. *Ratio of current at* **X=10cm** *to the current at 4 different source positions are the same range,* **≤5%**,
3. *With fixed attenuations fitting results for* **Short** *and* **Long** *amplitudes are* **16.8%** *and* **4.7%** *respectively,*
4. *The current range (at* **x=10cm**) *of the same strips, the same view in different layers are* **≤3.6%**

Wave-length Shifting Fibers

1. *Bundles included ~100 fibers and measuring from each bundle 5 sets of fibers, each set included 4 fibers (testing random* **20%** *of fibers),*
2. *End of fibers inserted to the small strip and radiated with* ^{90}**Sr** *source,*
3. *Measuring background and subtracting it*

Setup




Fibers QC
χ² = 0.6
I₀ = 261.4
σ_I = 18.8
I (nA)
Fiber set number
B 18
B 17
B 16
B 15
B 14
B 13
B 12
B 11
B 10
B 9
B 8
B 7
B 6
B 5
B 4
B 3
B 2
B 1
I (nA)

σ ≤ 7.5%

1. Tested 18 bundles, 90 sets of fibers,
2. Current distribution showed that the property of fibers are in narrow range, **≤7.5%**