PSD Data Analysis

- $ZnWO_4$ plate
- $ZnWO_4$ grains
- $CaWO_4$ grains

- Acquisition in a short time range (2.5us)
- Acquisition in a long time range (100us)

$$f(x) = A_1 e^{-x/\tau_1} + A_2 e^{-x/\tau_2} + A_3 e^{-x/\tau_3} \text{ for } ZnWO_4$$

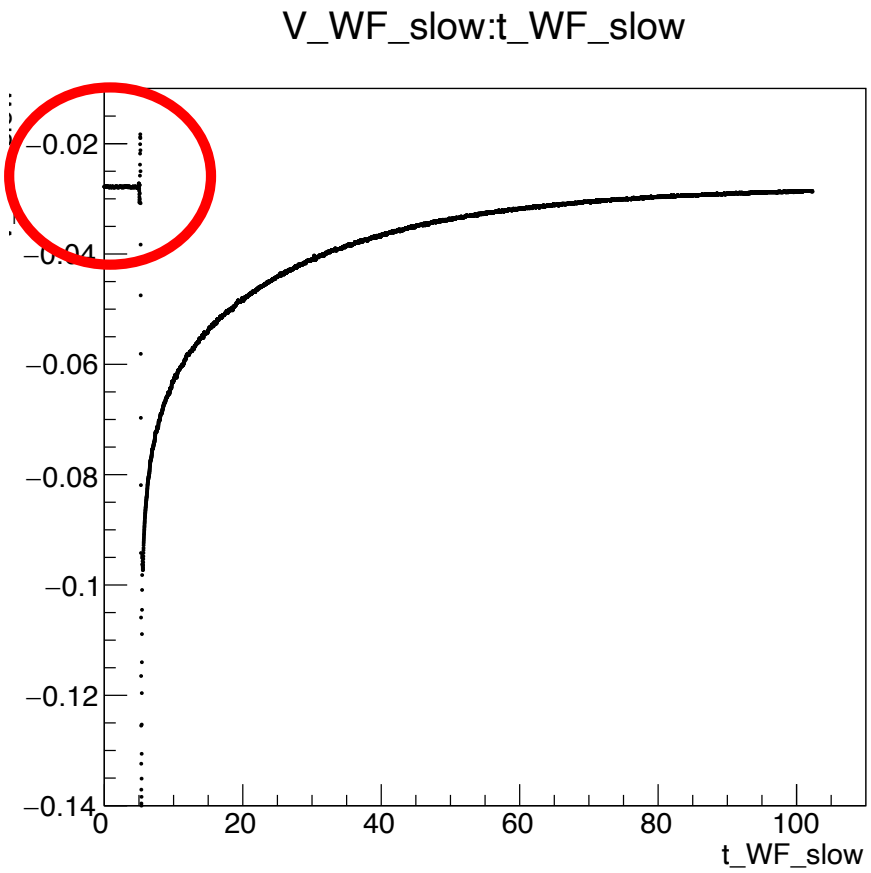
$$f(x) = A_1 e^{-x/\tau_1} + A_2 e^{-x/\tau_2} \text{ for } CaWO_4$$

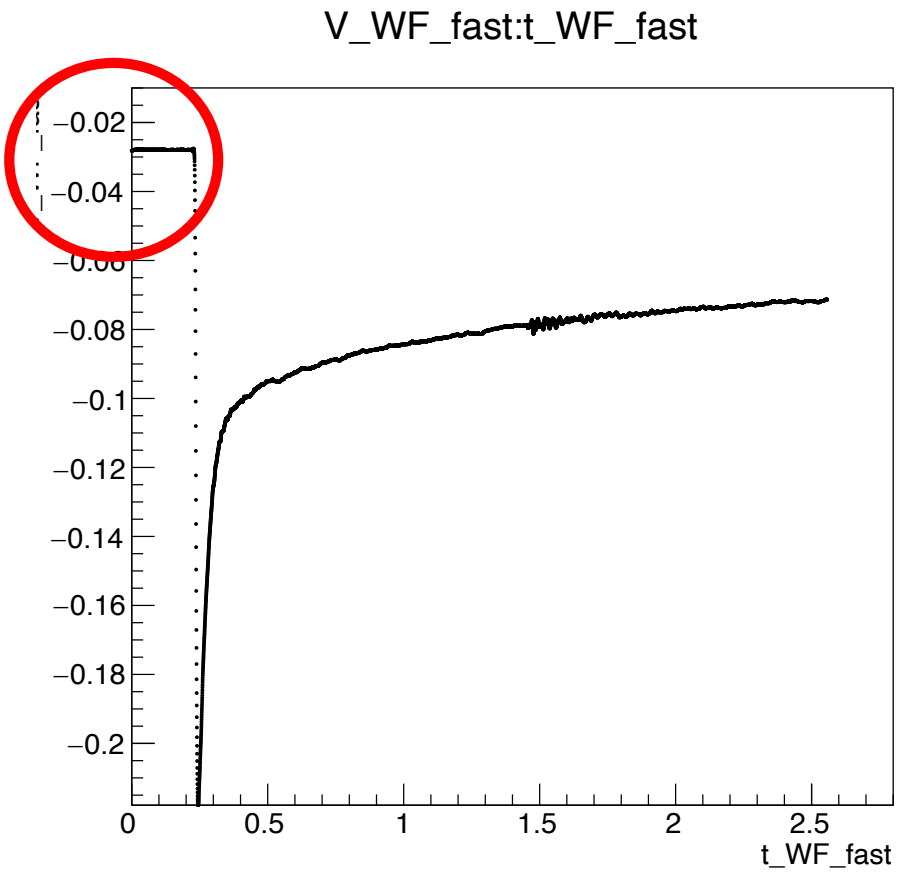
$ZnWO_4$

Type of irradiation	Decay constants, μs		
	τ_1 (A_1)	τ_2 (A_2)	τ_3 (A_3)
γ ray	0.7 (2%)	7.5 (9%)	25.9 (89%)
α particles	0.7 (4%)	5.6 (16%)	24.8 (80%)

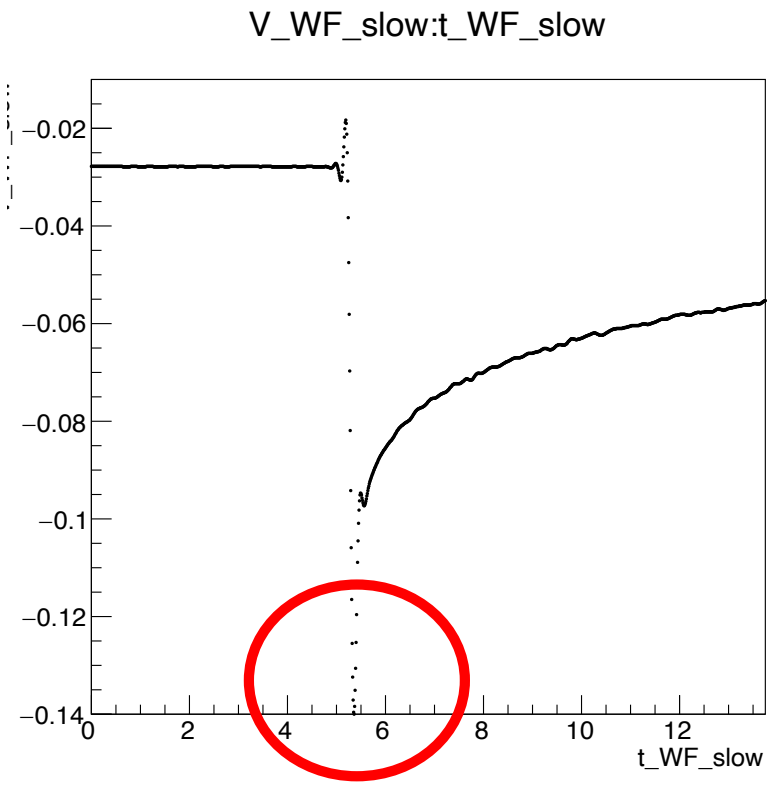
Table 1
Decay time constants of $CaWO_4$ and $ZnWO_4$ crystals at 295 and 9 K obtained using the MPCC technique

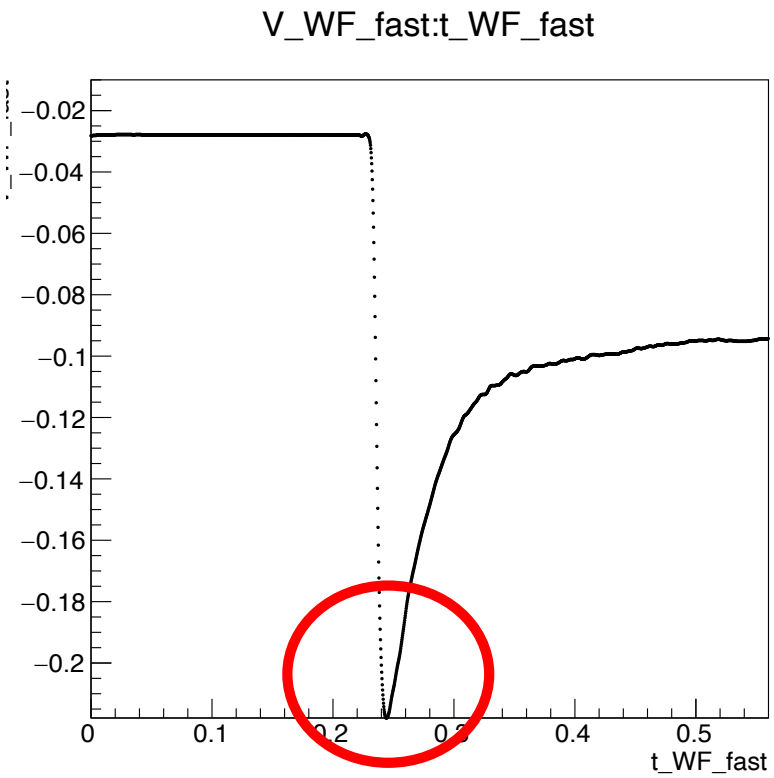
Crystal	T, K	A_1, (%)	τ_1, μs	A_3, (%)	τ_2, μs	A_3, (%)	τ_3, μs
$CaWO_4$	295	50±5 (6[a])	1.4±0.1 (0.3[a])	50±5 (18[a])	8.9±0.2 (3.2[a])	— (76[a])	— (8.8[a])
	9	70±5	3.2±0.4	30±5	390±20	—	—
$ZnWO_4$	295	45±5 (4[b])	1.3±0.1 (0.7[b])	20±5 (16[b])	5.6±0.3 (5.6[b])	35±5 (80[b])	25.7±0.3 (24.8[b])
	9	75±5	1.7±0.2	10±5	17.9±0.8	15±5	110±10



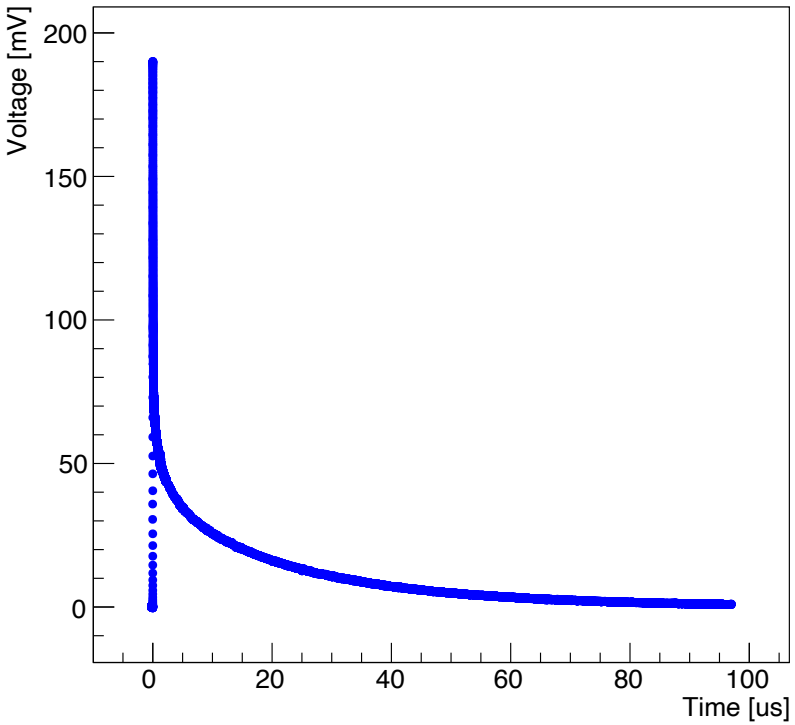


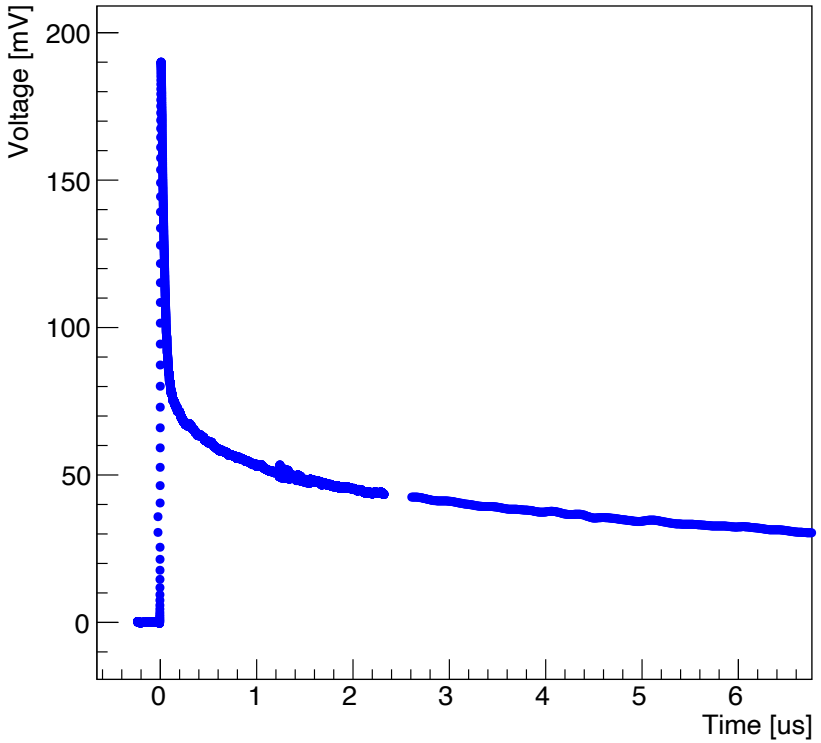
1. Offset correction (Voffset ~ 25-27 mV)





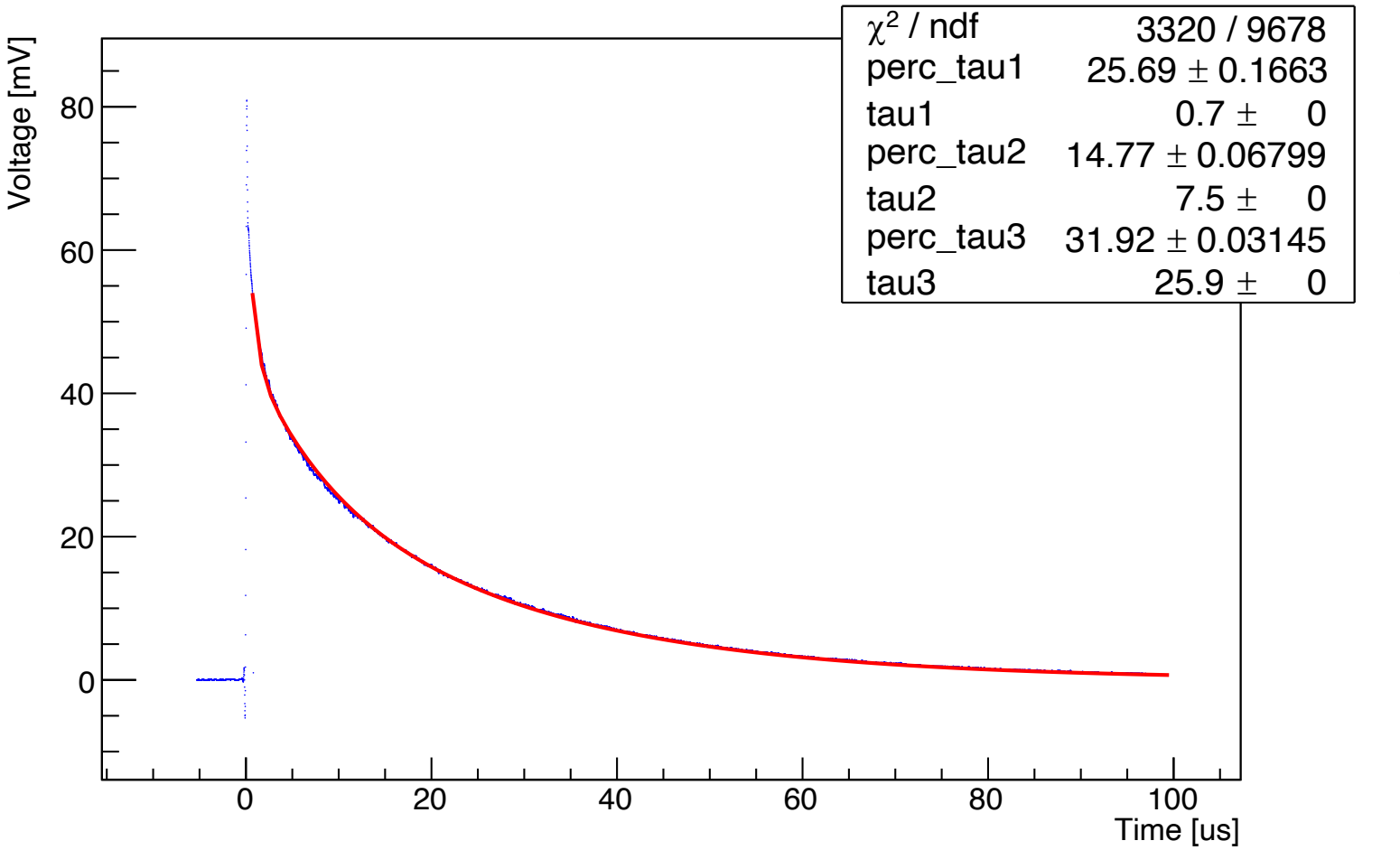
2. Shift correction (toffset ~ 5.3us for the long range WF acquisition and 0.23us for the short range WF)
3. Exponential fit





4. Mix the two waveforms
5. Exponential fit

$ZnWO_4$ plate

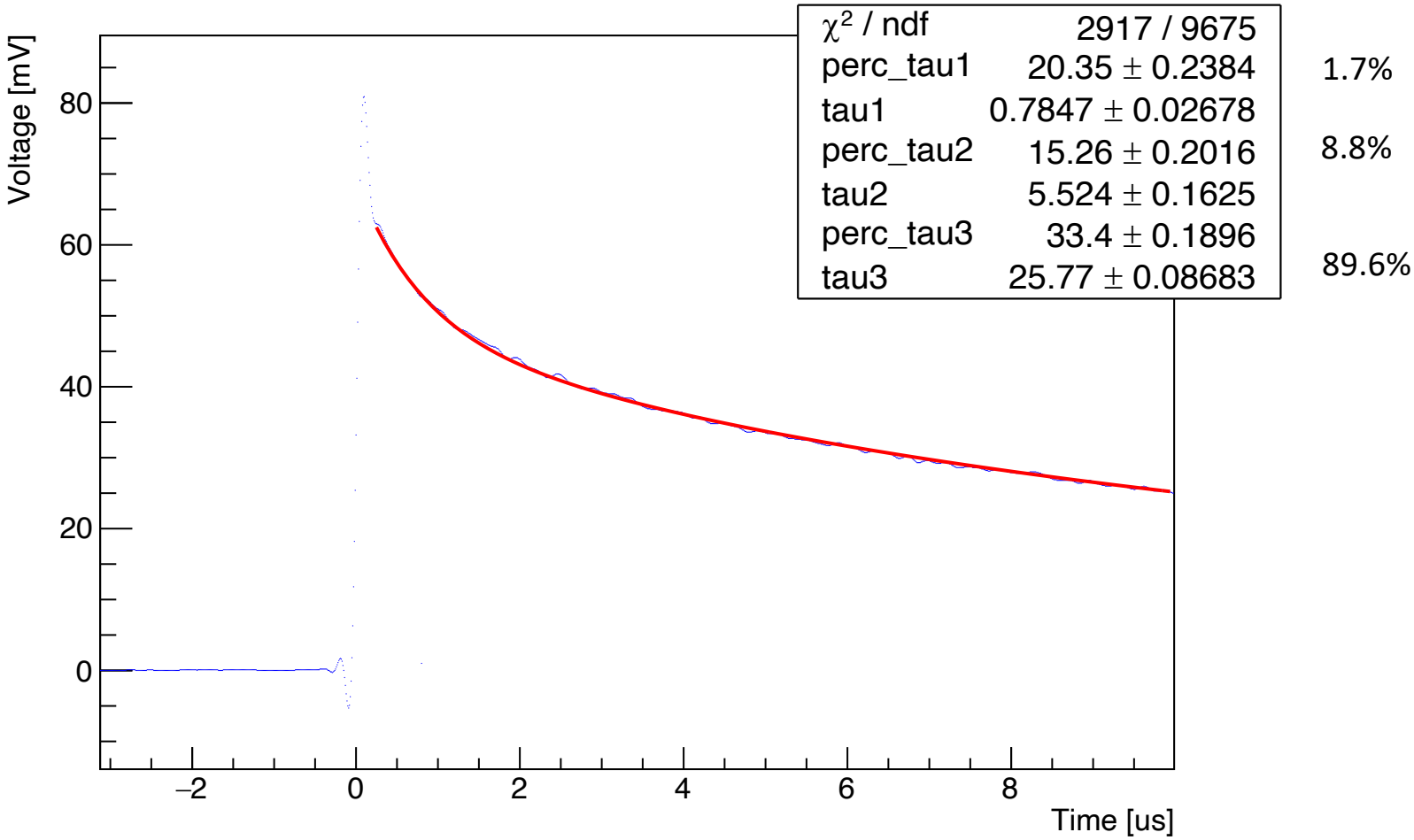


1.9% (instead of 2%)

11.6% (instead of 9%)

86.5% (instead of 89%)

$ZnWO_4$ plate

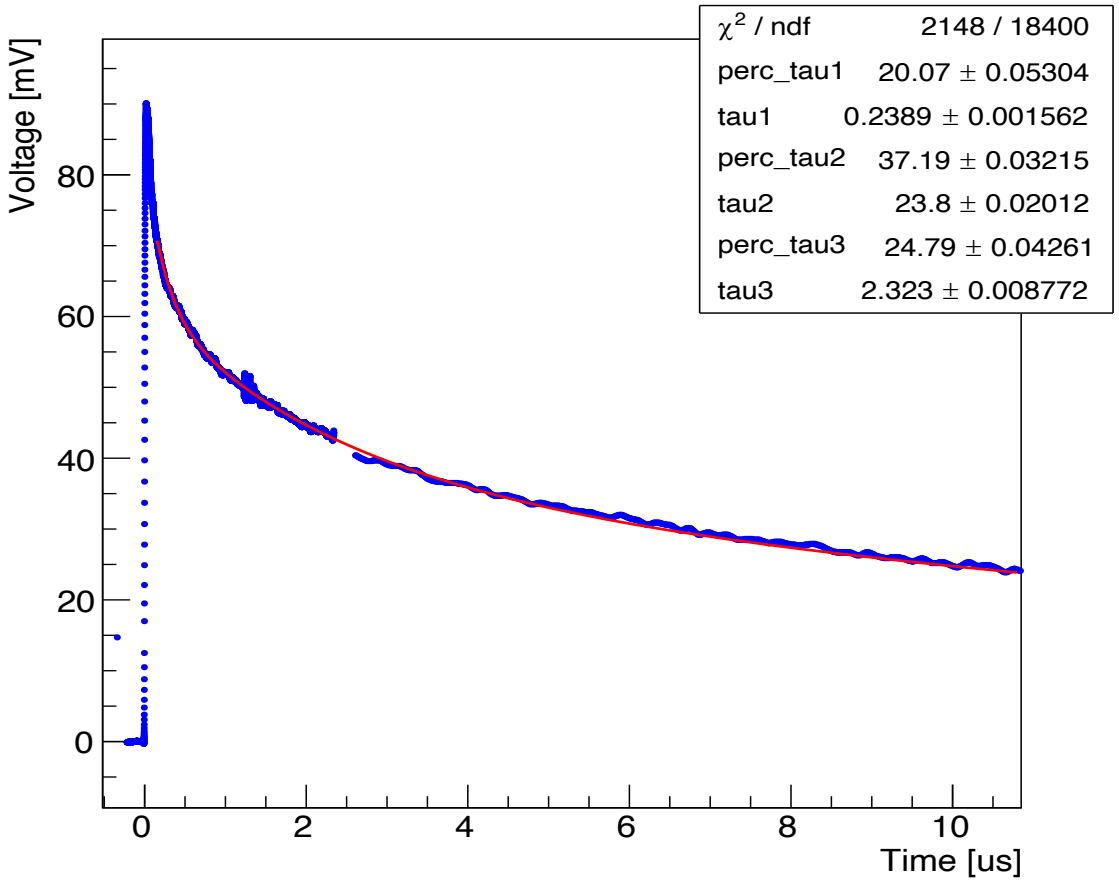


1.7%

8.8%

89.6%

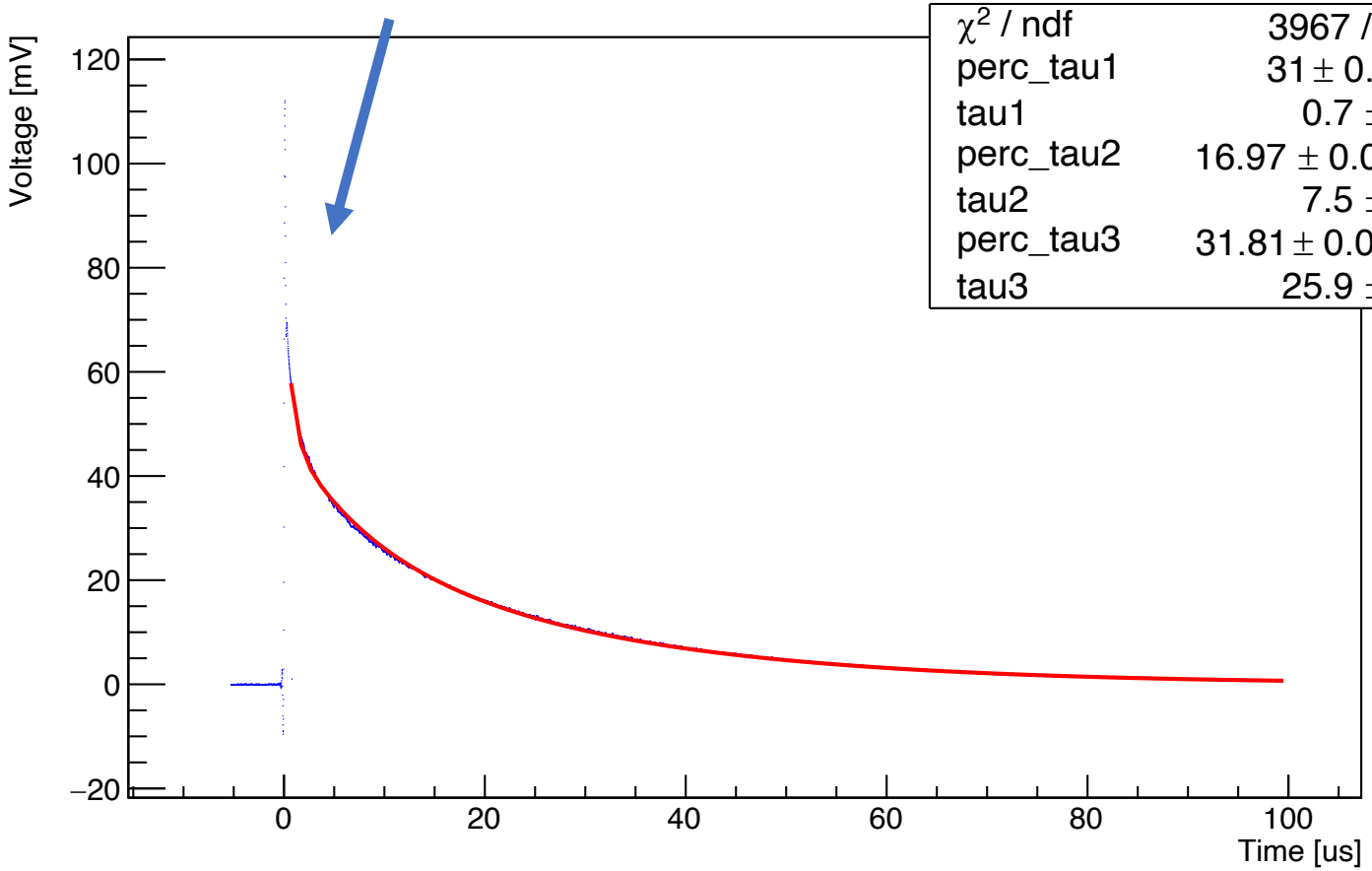
$ZnWO_4$ plate



Tau	%
0.239	0.5
2.323	6.1
23.8	93.4

$ZnWO_4$ grains

Cherenkov peak.



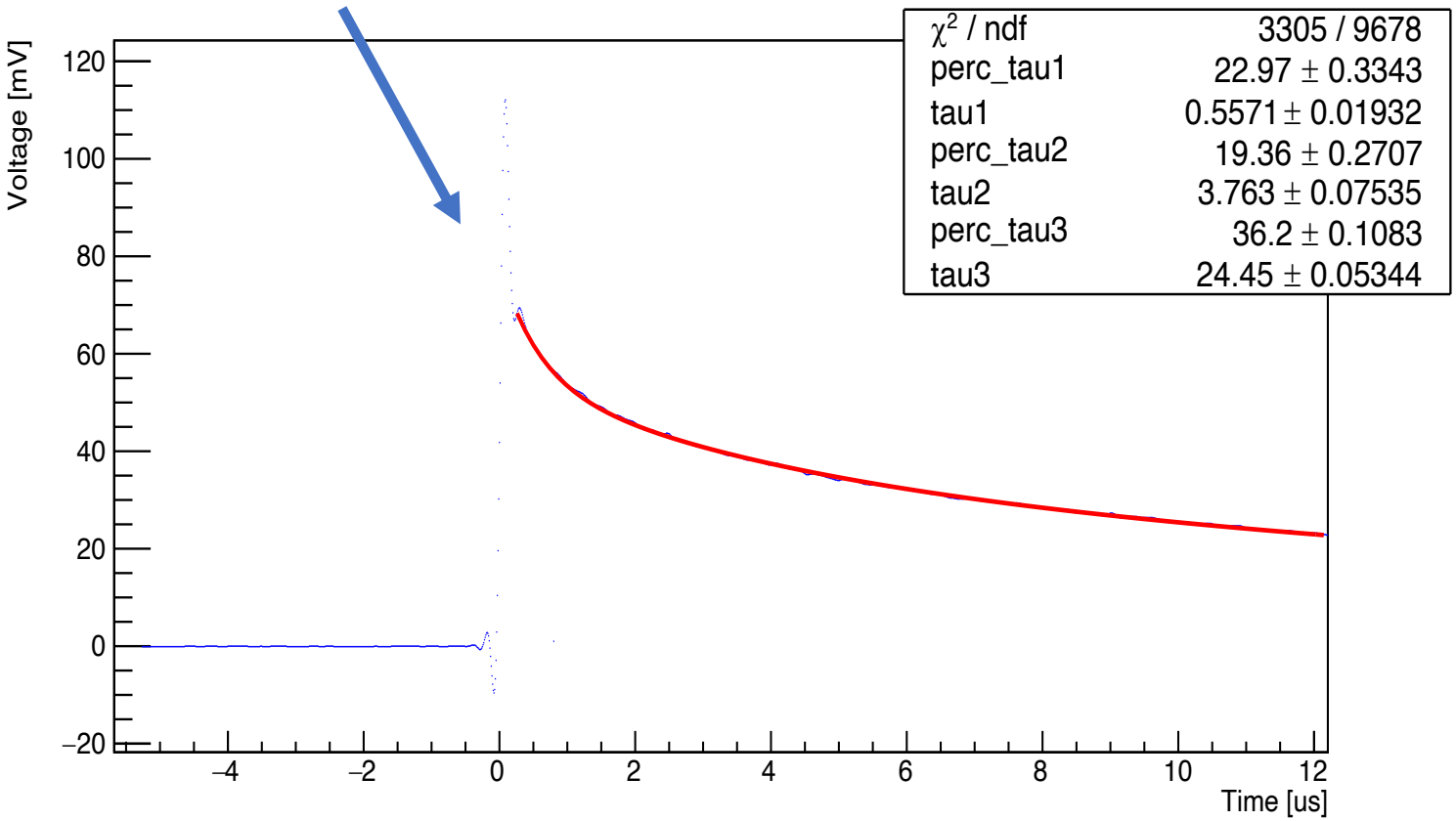
2.2% (instead of 2%)

13.1 % (instead of 9%)

84.7% (instead of 89%)

$ZnWO_4$ grains

Cherenkov peak.

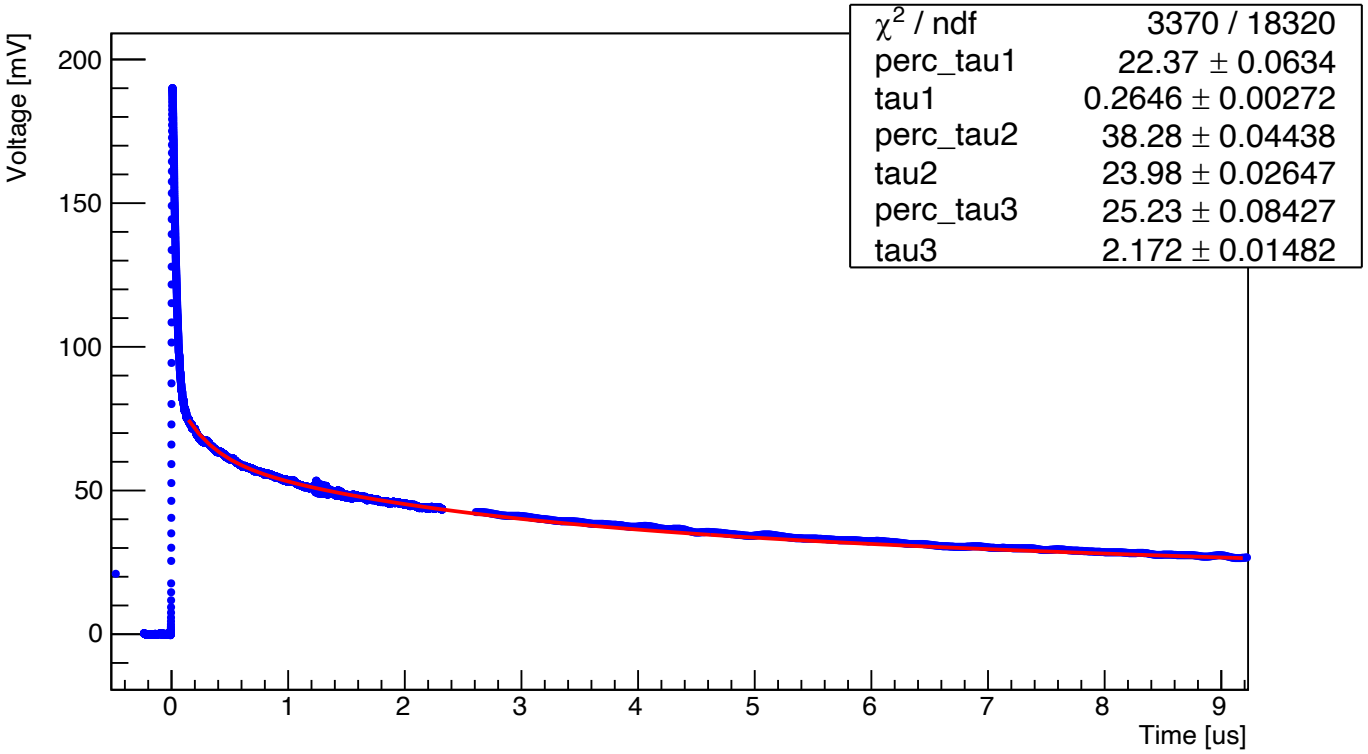


1.3% (instead of 2%)

7.5% (instead of 9%)

91.2% (instead of 89%)

$ZnWO_4$ grains

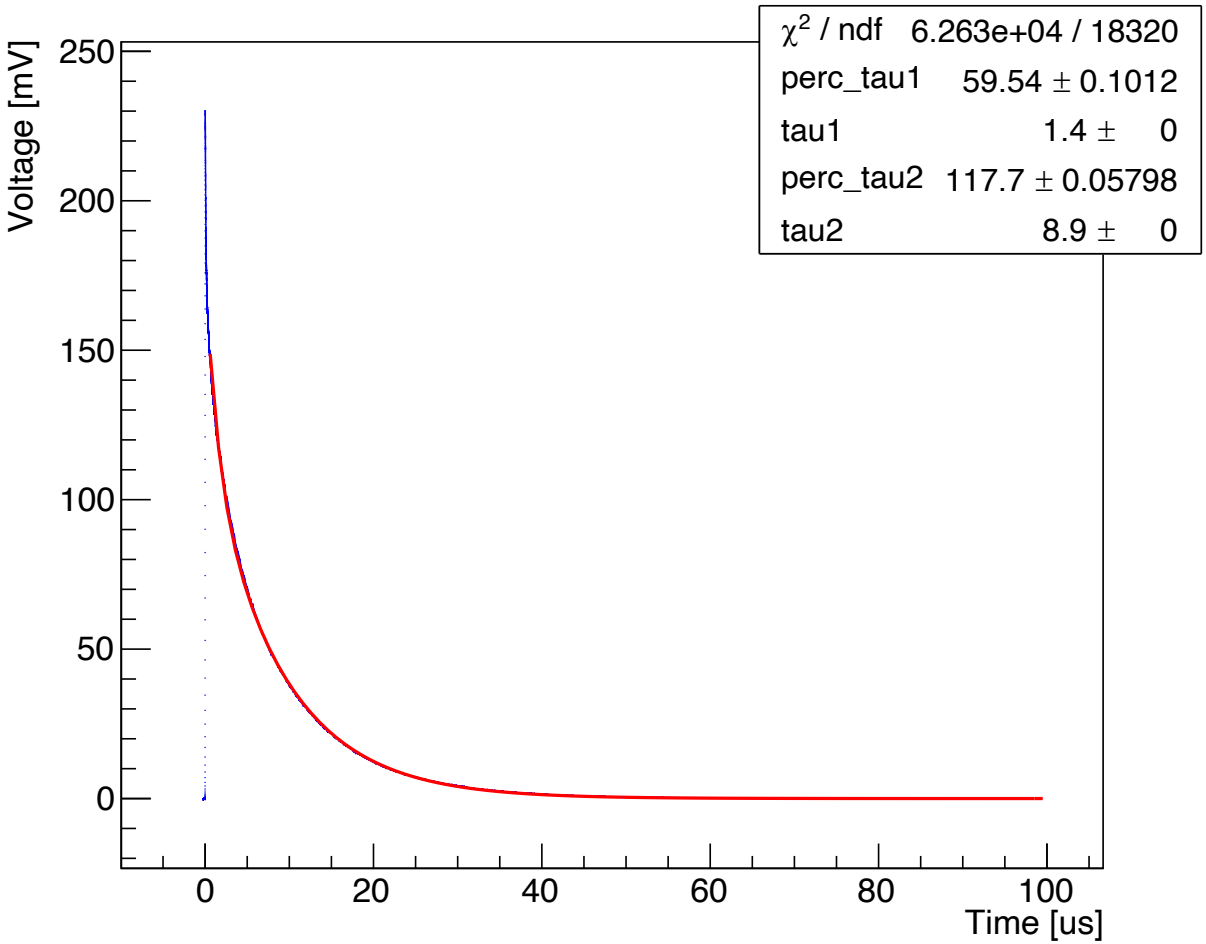


Tau	%
0.264	0.6
2.17	5.6
23.98	93.8

$ZnWO_4$ plates vs grains

	ZnWO4 plate (Voff -27.7, t off -5.3)	
PLATE	tau	%
1	0,7	1,88
2	7,5	11,59
3	25,9	86,52
	ZnWO4 plate (Voff -27.7, t off -5.3)	
PLATE	tau	%
1	0,785	1,66
2	5,524	8,77
3	25,77	89,57
	ZnWO4 grain (Voff -27.9, t off -5.3)	
GRAIN	tau	%
1	0,7	2,23
2	7,5	13,08
3	25,9	84,69
	ZnWO4 grain (Voff -27.9, t off -5.3)	
GRAIN	tau	%
1	0,56	1,33
2	3,76	7,50
3	24,45	91,18

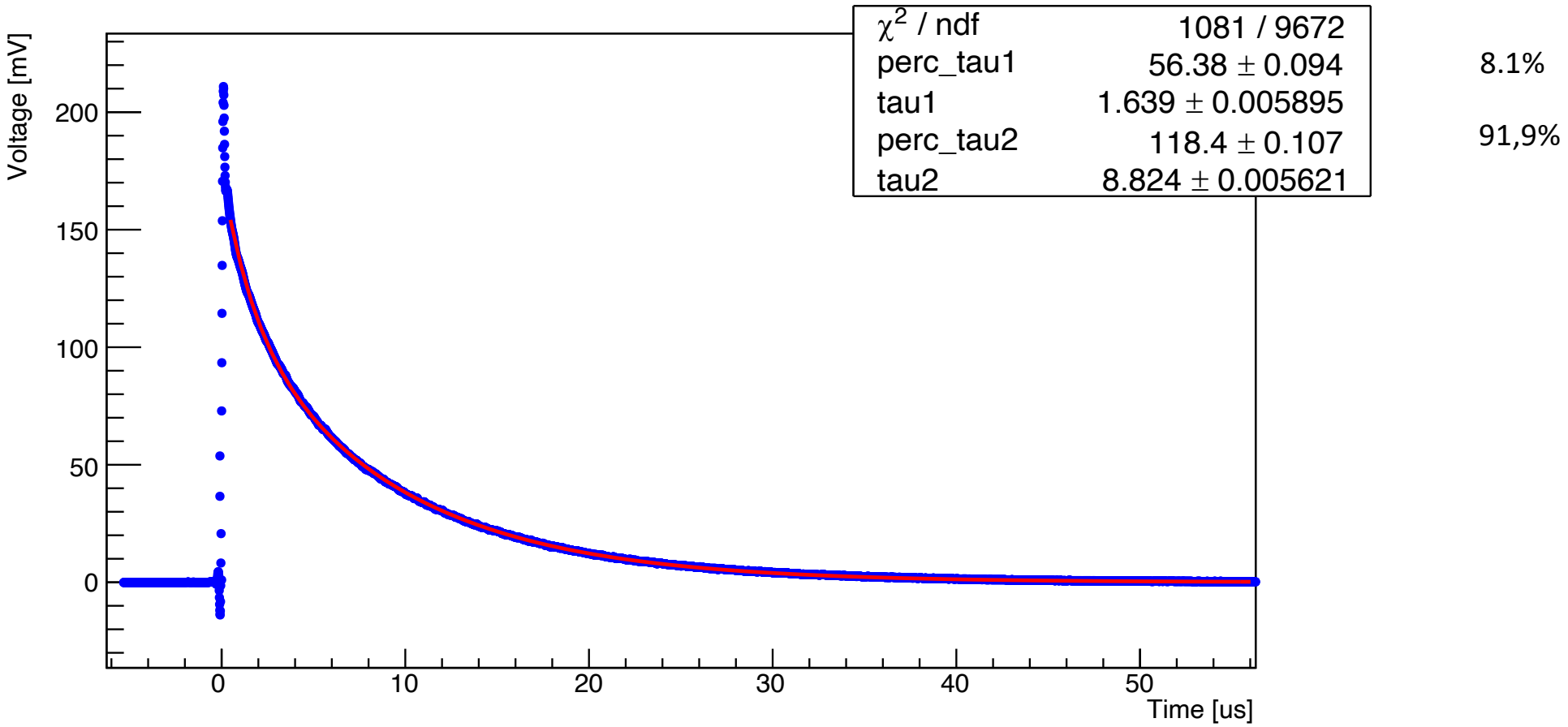
$CaWO_4$ grains



7.3%

92,7%

$CaWO_4$ grains



8.1%

91,9%