Neutrino Group Meeting

Progress of the projects

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Kapustinsky

Time Response

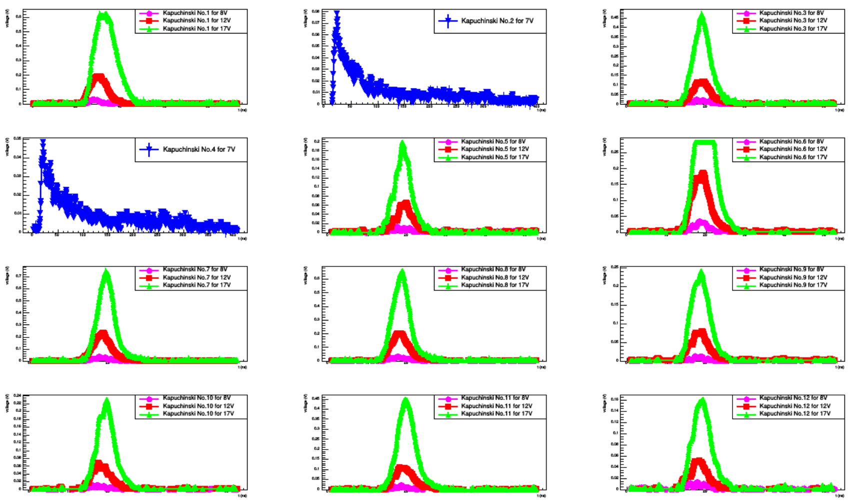
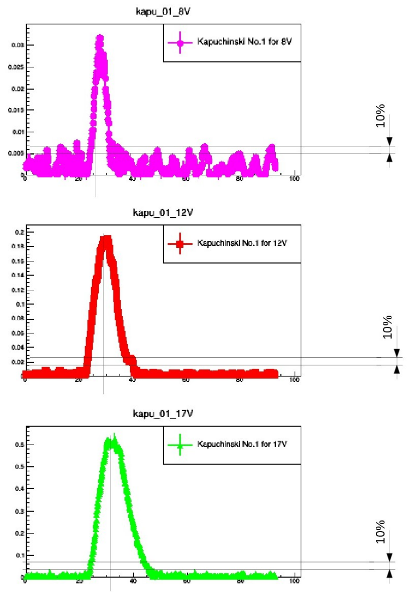


Figure 1: Signals for different voltages for each Kapustinsky.

TIME RESPONSE



Founding for each of the 5000 pulses for an specific voltage:

$t_{1_i} = \frac{\Sigma x_{1_i}}{k}$ and $t_{2_i} = \frac{\Sigma x_{2_i}}{j}$

we have:

$$t_{rise} = t_{max} - t_1$$

$$t_{fall} = t_2 - t_{max}$$

$$t_{total} = t_2 - t_1$$

where

$t_1 = \frac{\Sigma t_{1_i}}{5000}$, $t_2 = \frac{\Sigma t_{2_i}}{5000}$ and $t_{max} = \frac{\Sigma t_{max_i}}{5000}$

Time Response

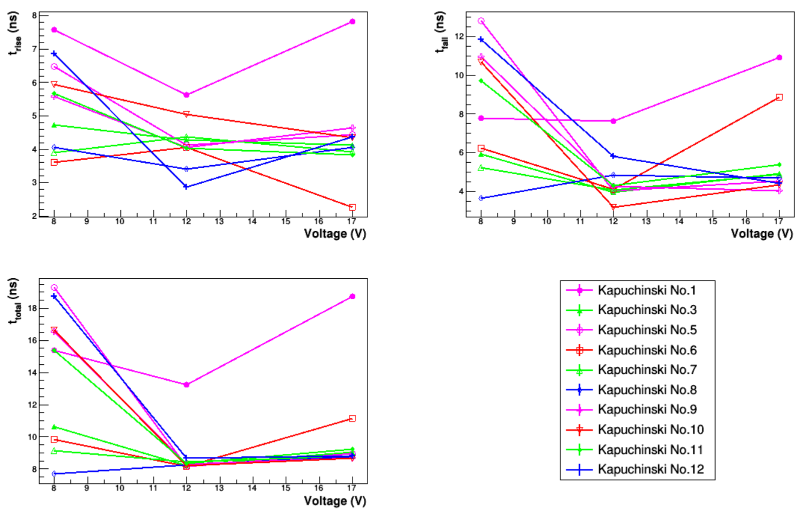


Figure 2: Time response for different voltages for each of the 10 Kapustinsky working fine.

TPC Calibration

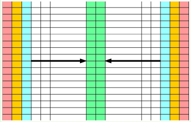
Runs used

Run No.	Beam (GeV/c)	Trigger	No. Events	Root
434	-0.8	p	17687	proton_-0.8GeVc
396+403+404	0.5	e	149020	electron_0.5GeVc
397+405+406+407+408	0.5	p	154935	proton_0.5GeVc
341+343+381+384+388	0.8	e	271285	electron_0.8GeVc
344+345+386	0.8	p	203226	proton_0.8GeVc
409	1	e	100561	electron_1GeVc
414	1	p	72114	proton_1GeVc
448	2	e	87136	electron_2GeVc

Table 1: Runs used for the study

dE/dx Calibration

To distinguish between e and μ a good dE/dx resolution is required, that way you can determine the ν_e contamination of the beam.



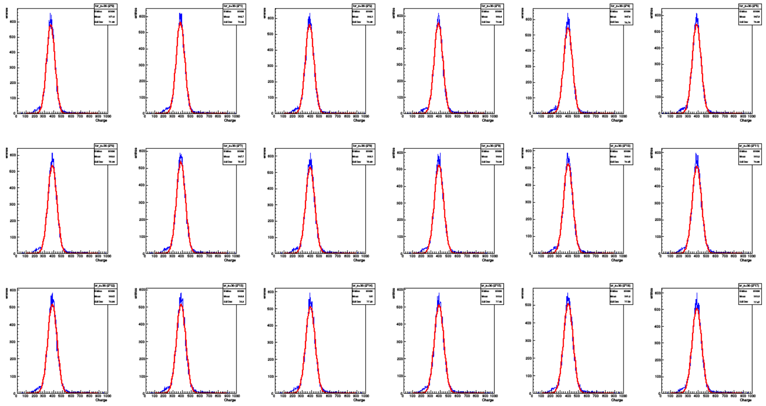


Figure 3: *dedx* fit for electron $0.8 GeV/c$.

dE/dx Calibration

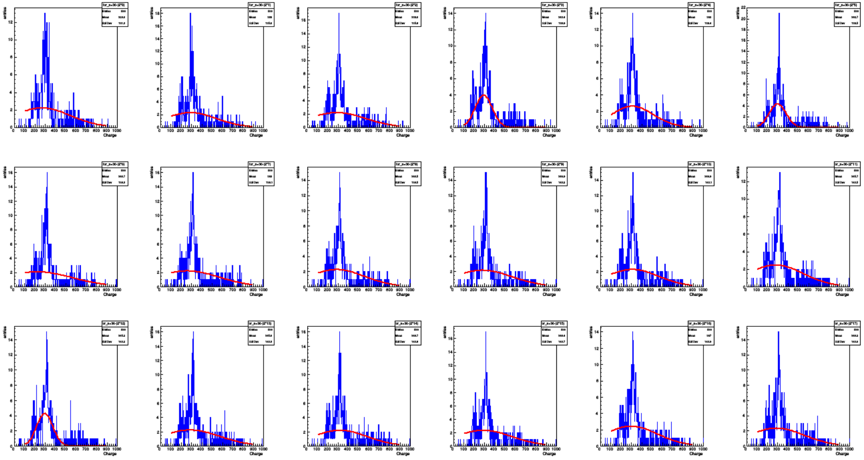


Figure 4: *dedx* fit for proton $-0.8GeV/c$.

dE/*dx* CALIBRATION

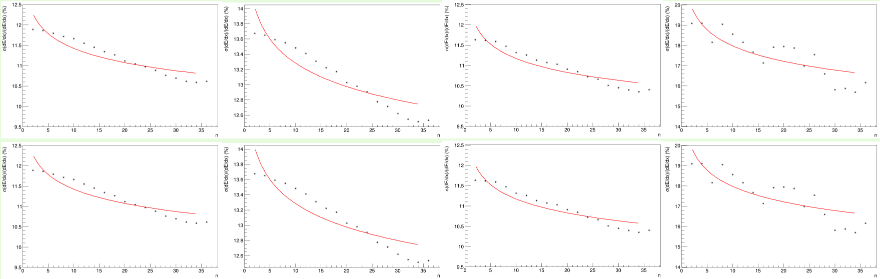


Figure 5: *dedx* resolution for electron $0.5GeV/c$, $0.8GeV/c$, $1GeV/c$ and $2GeV/c$ (top) and for proton $-0.8GeV/c$, $0.5GeV/c$, $0.8GeV/c$ and $1GeV/c$ (bottom).

dE/dx Calibration

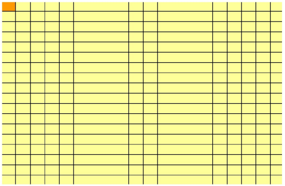
If n is the number of columns used each time we can fit the dE/dx resolution to:

$$\frac{\sigma(dE/dx)}{(dE/dx)} = a\, n^b$$

Root	a	σ_a	b	σ_b
proton_-0.8GeVc	95.8196	32.0744	-0.0421626	0.122499
electron_0.5GeVc	12.6706	0.176498	-0.0449464	0.00508825
proton_0.5GeVc	20.893	10.2773	-0.244829	0.195386
electron_0.8GeVc	14.3614	0.162924	-0.033886	0.00412741
proton_0.8GeVc	18.032	0.166074	-0.0259404	0.00334314
electron_1GeVc	12.3911	0.16461	-0.0449964	0.00485225
proton_1GeVc	13.2747	0.186926	-0.0436221	0.00514208
electron_2GeVc	20.7673	0.623325	-0.0625893	0.0110567

Table 2: Values of a and b for deferents runs

Inter Calibration



The inter-calibration factor is because of the gain variations between the different electronics channels.

$$r = \frac{Q^{av}_{hit,pad}}{Q^{av}_{hit,all}}$$

with r is the inter-calibration factor, $Q^{av}_{hit,pad}$ is the average charge per hit per pad divided and $Q^{av}_{hit,all}$ the average charge per hit over all pads.

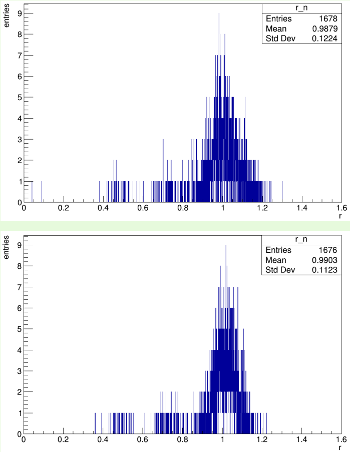


Figure 6: *dedx* fit for electron $1 GeV/c$ (top) and for proton $0.5 GeV/c$ (bottom).

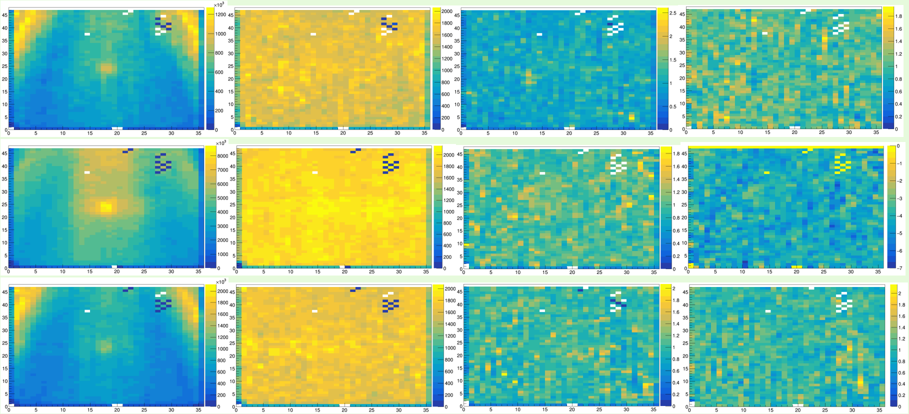


Figure 7: Sum of the charge, Average charge, the inter-calibration factor (r) and after applied r for electron $1 GeV/c$ (top), $0.8 GeV/c$ (middle) and $0.5 GeV/c$ (bottom).

Inter Calibration

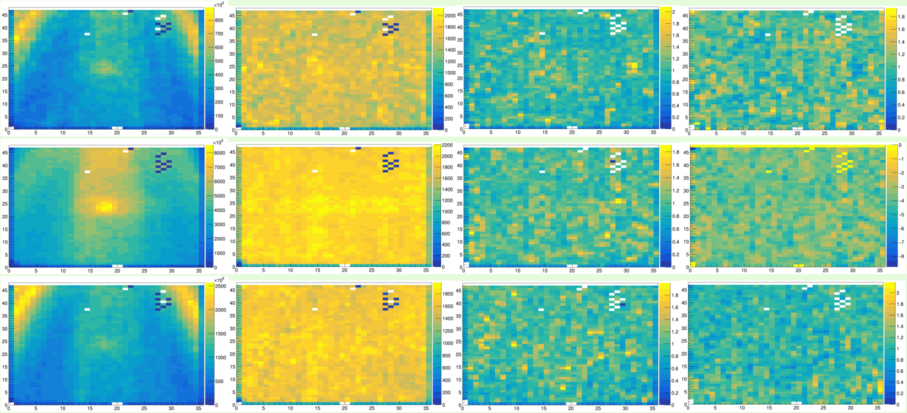
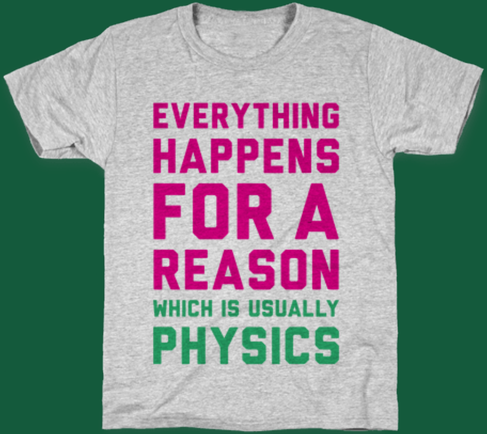


Figure 8: Sum of the charge, Average charge, the inter-calibration factor (r) and after applied r for proton $1 GeV/c$ (top), $0.8 GeV/c$ (middle) and $0.5 GeV/c$ (bottom).

Thank you!



TO BE CONTINUE ...