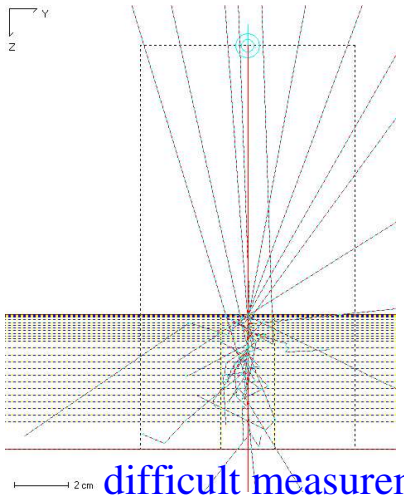
Results assignment 06: X-Ray Properties



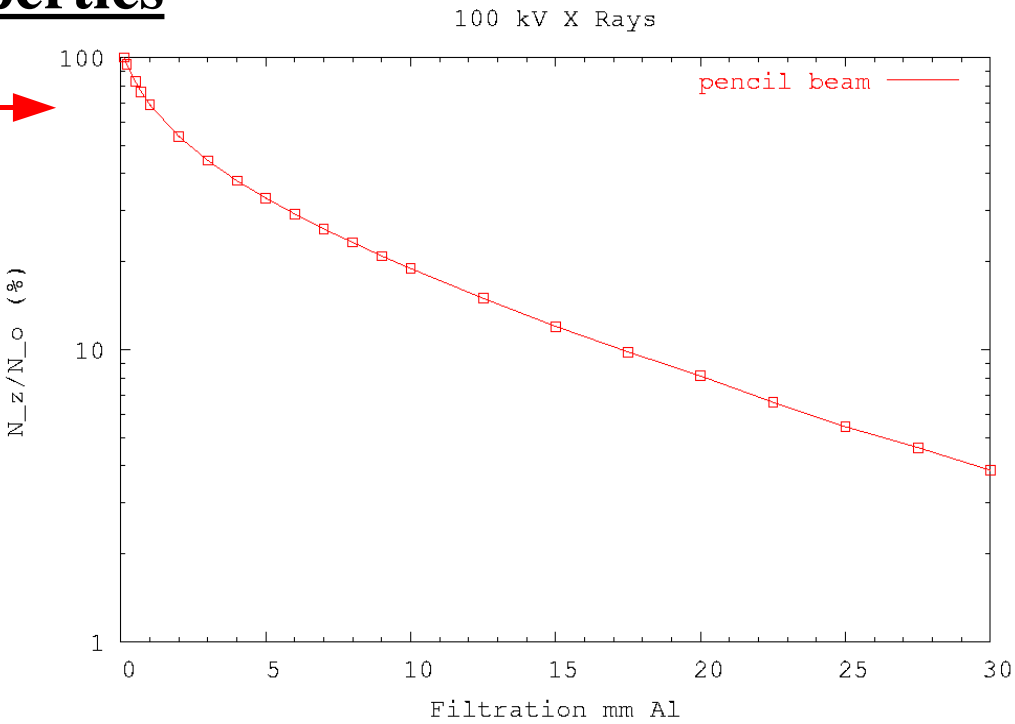
100 kV pencil beam with Generation 1

$$d_{1/2}^{(1)} = 2.4 \text{ mm}$$

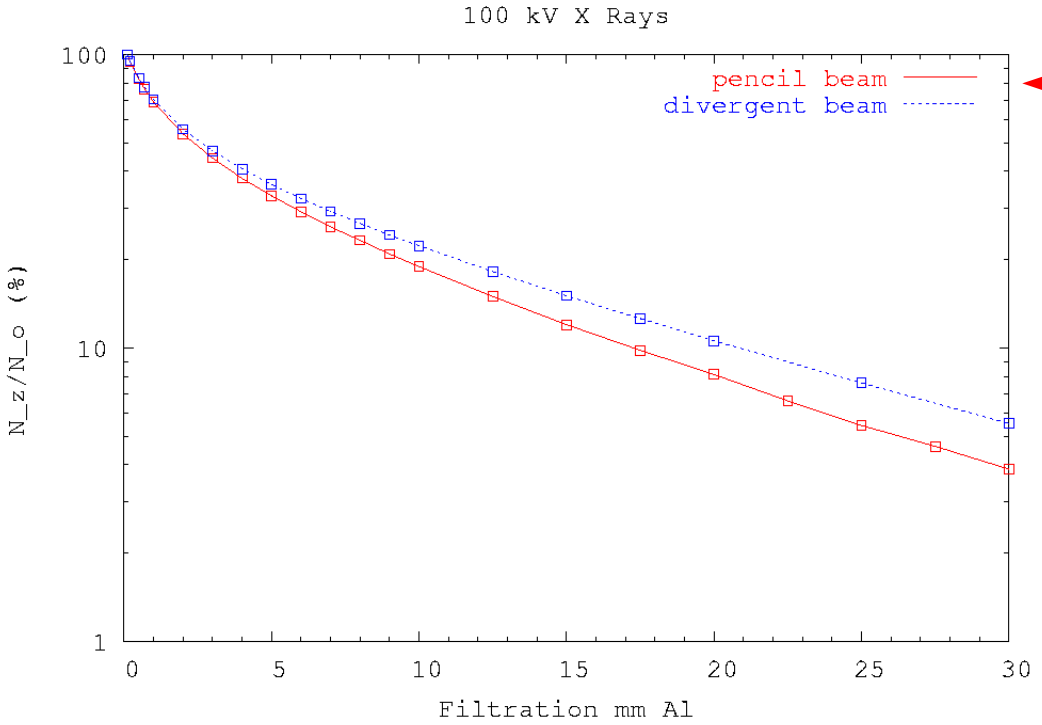
$$d_{1/2}^{(2)} = 4.9 \text{ mm}$$

$$H = \frac{d_{1/2}^{(1)}}{d_{1/2}^{(2)}} = 0.49$$

difficult measurement in real life because scatter is not considered in the simulation.



100 kV pencil beam + divergent beam

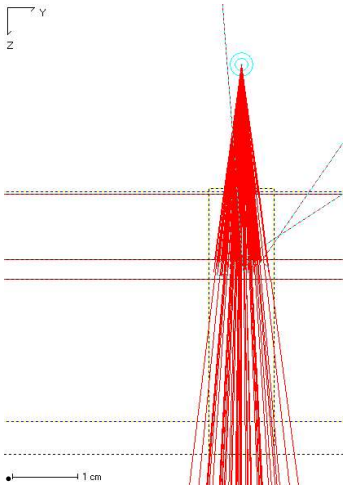


For the divergent beam:

$$d_{1/2}^{(1)} = 2.6 \text{ mm}$$

$$d_{1/2}^{(2)} = 6.1 \text{ mm}$$

$$H = \frac{d_{1/2}^{(1)}}{d_{1/2}^{(2)}} = 0.43$$



divergent beam harder!

Using $\mu = \frac{\log 2}{d_{1/2}}$ and table values:

$E_{eff} \approx 30$ keV

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125 kV divergent beam →

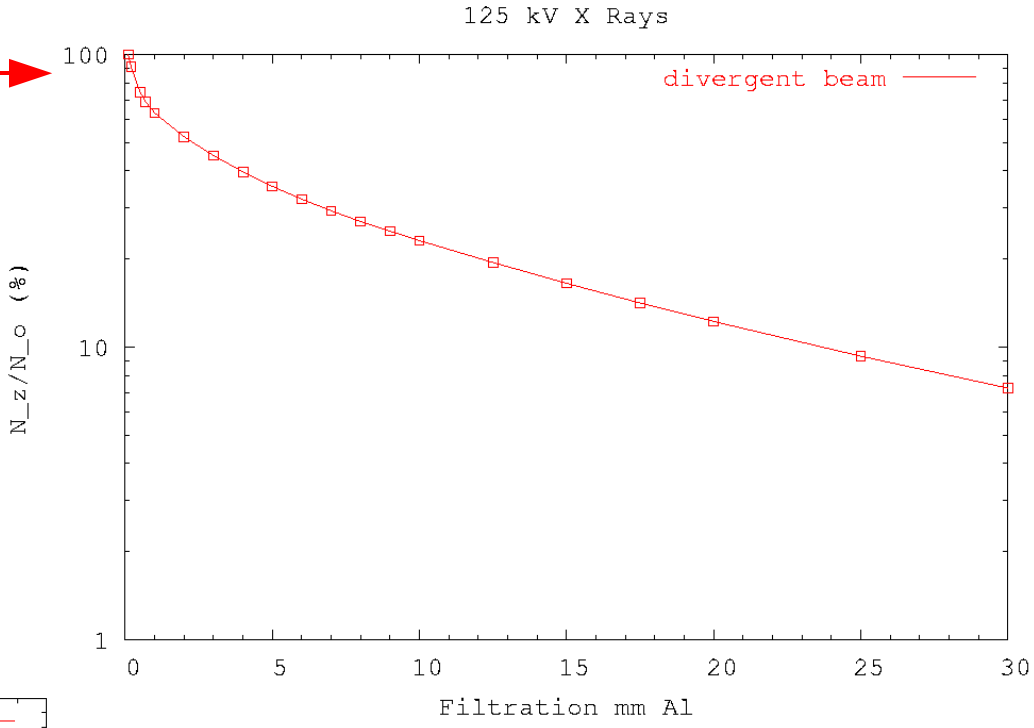
$$d_{1/2}^{(1)} = 2.3 \text{ mm}$$

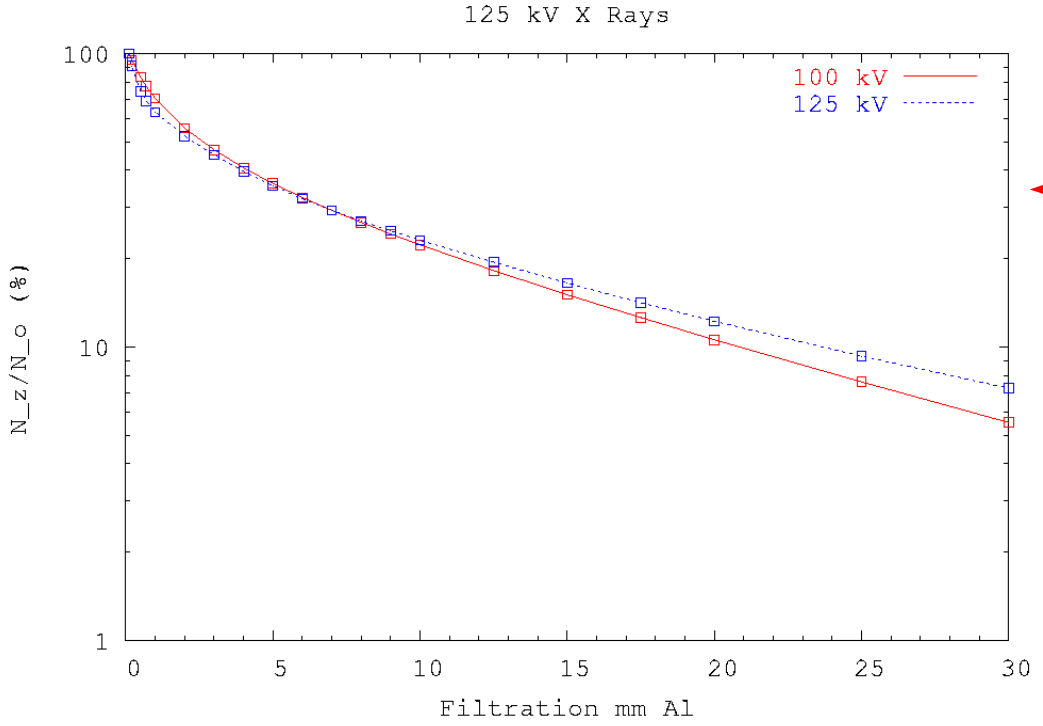
$$d_{1/2}^{(2)} = 6.6 \text{ mm}$$

$$H = \frac{d_{1/2}^{(1)}}{d_{1/2}^{(2)}} = 0.35$$

Using $\mu = \frac{\log 2}{d_{1/2}}$ and table values:

$E_{eff} \approx 30$ keV (not very sensitive technique)





← 125 kV harder than 100 kV.

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100 kV after 3 mm aluminum filter
measured in a “virtual” ionization chamber

$$d_{1/2}^{(1)} = 7.1 \text{ mm}$$

$$d_{1/2}^{(2)} = 9.2 \text{ mm}$$

$$H = \frac{d_{1/2}^{(1)}}{d_{1/2}^{(2)}} = 0.77$$