Bremsstrahlung Parametrization

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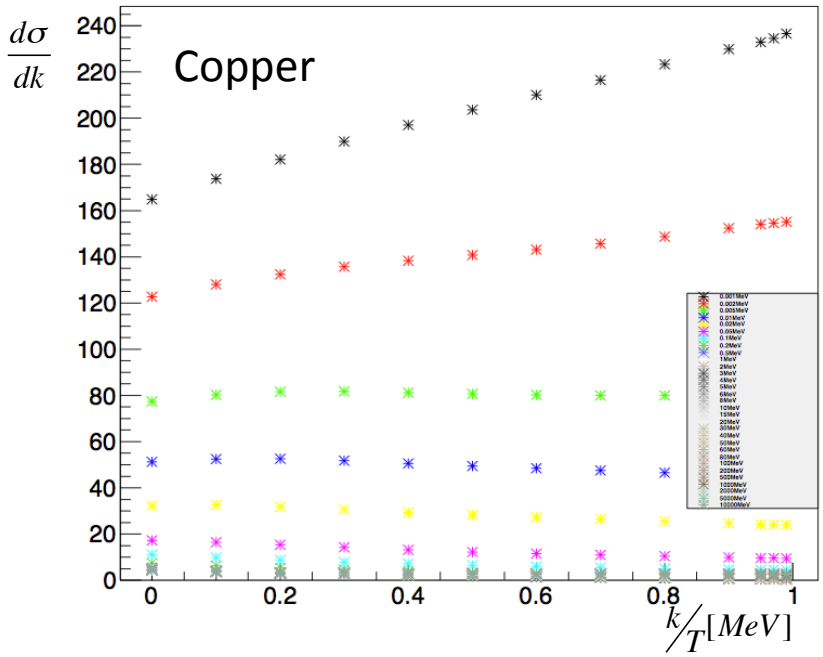
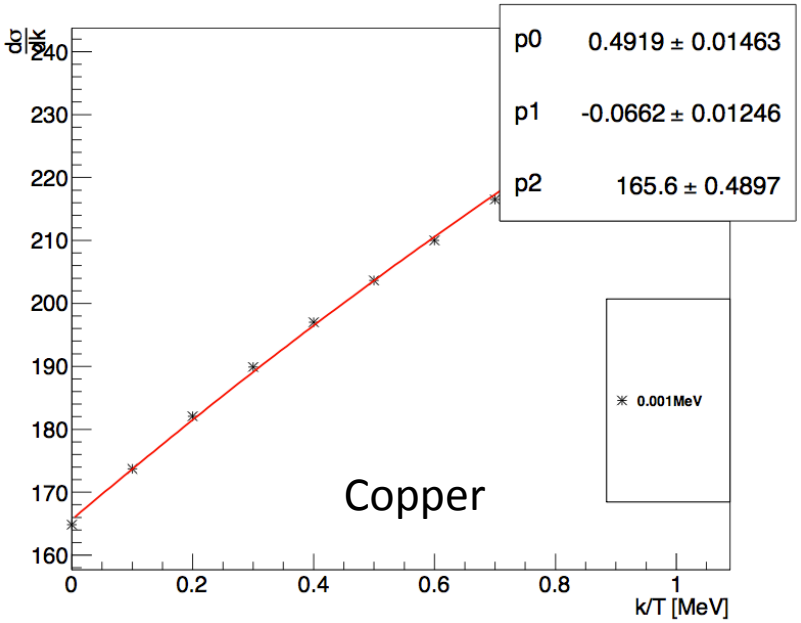
Bremsstrahlung Parametrization

Trying to find a good parametrization for the Seltzer-Berger Model for every energy and for every element. The function used:

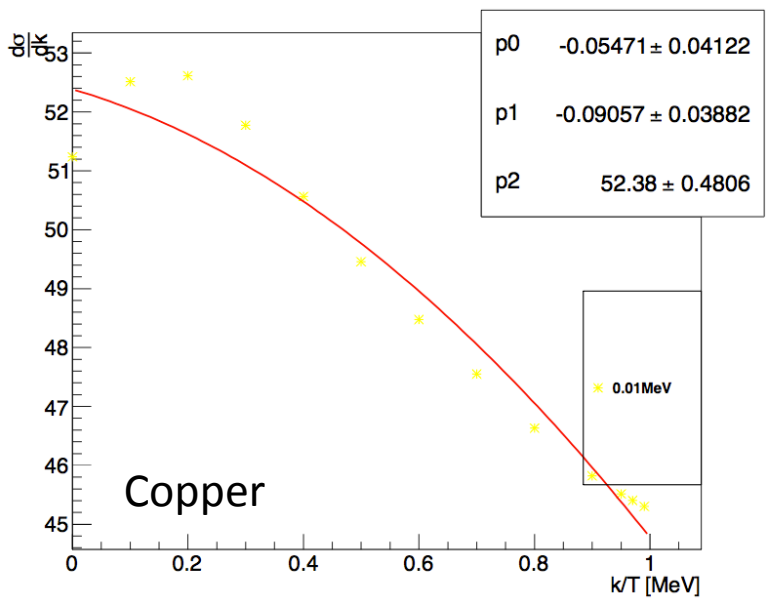
$$F(x) = \begin{cases} c_h[(1-a_h)F_1(\delta) + b_h\varepsilon^2 F_2(\delta)] & T \geq 1MeV \\ c_h(1 + a_h x + b_h x^2) & T < 1MeV \end{cases}$$

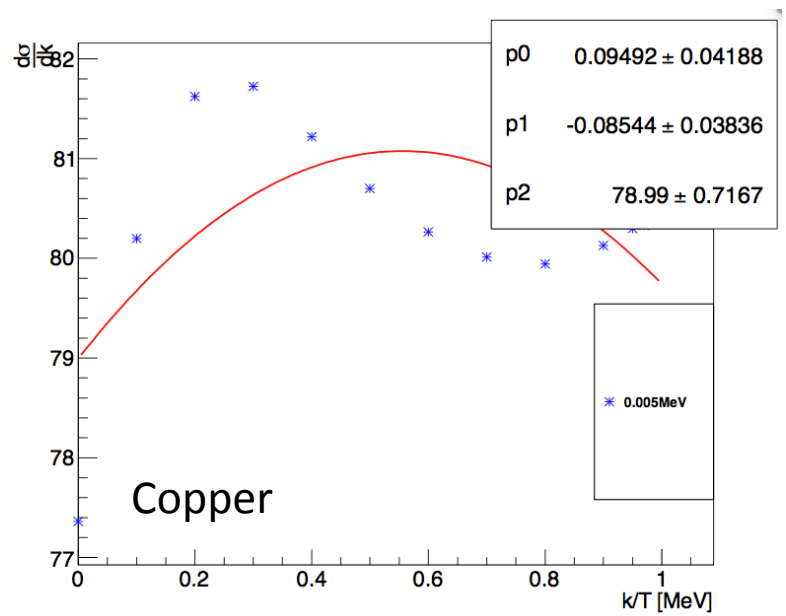
With x=k/T and ah, bh and ch the fiting parameters.

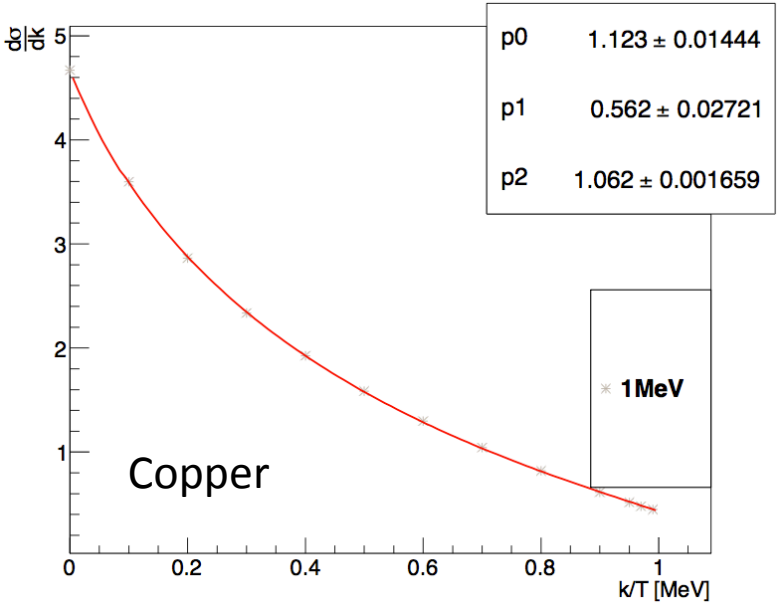




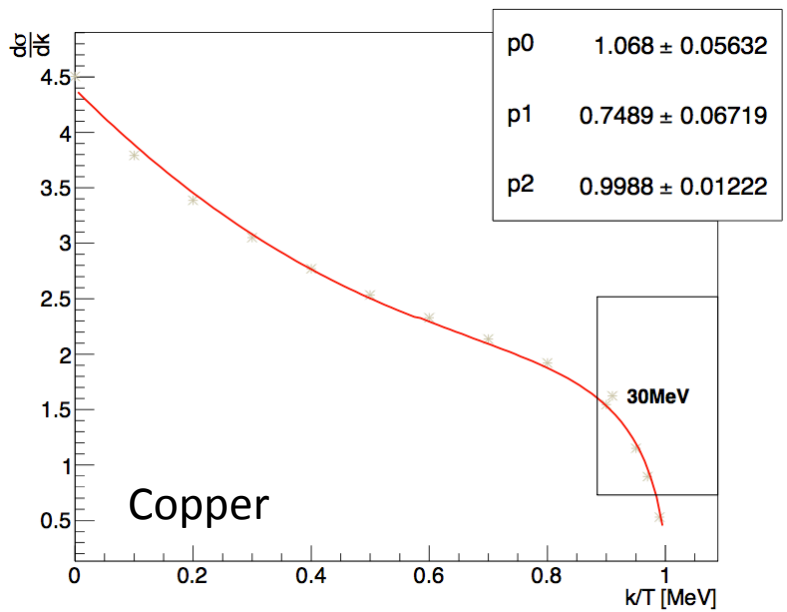
For E<1MeV the parametrization is not very good as it is shown in the figures.

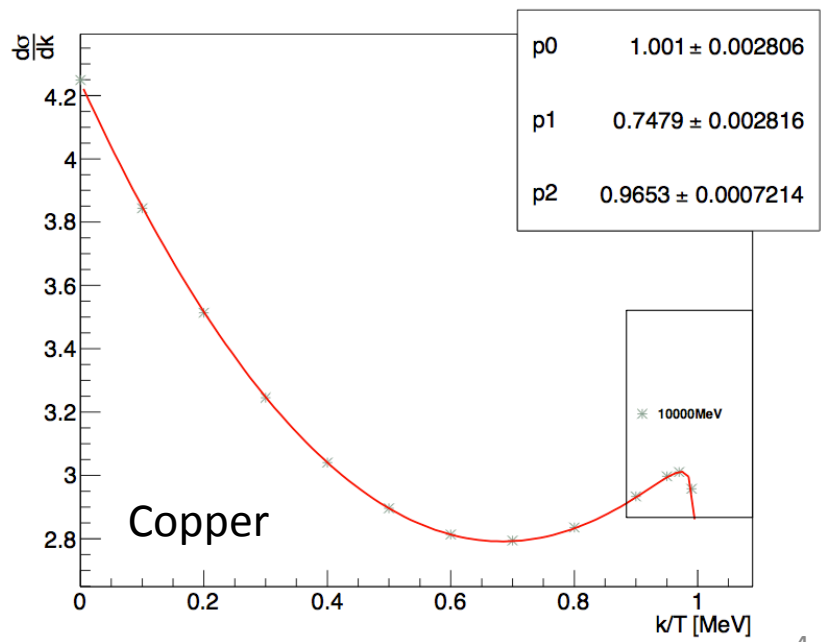




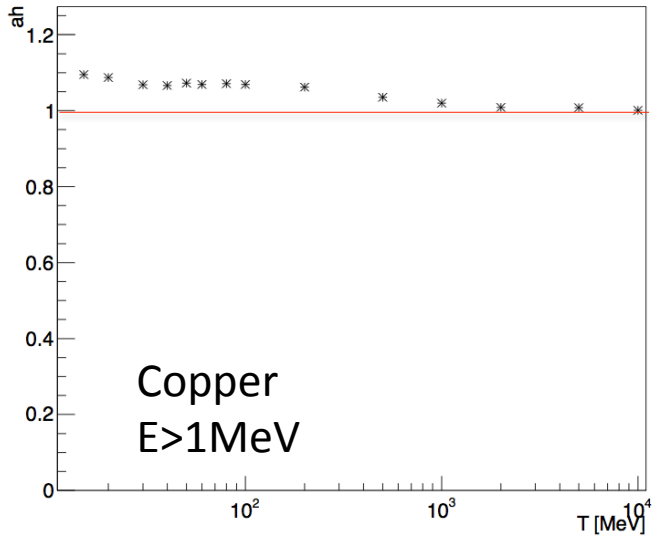


For E>1MeV the parametrization is very good as it is shown in the figures.

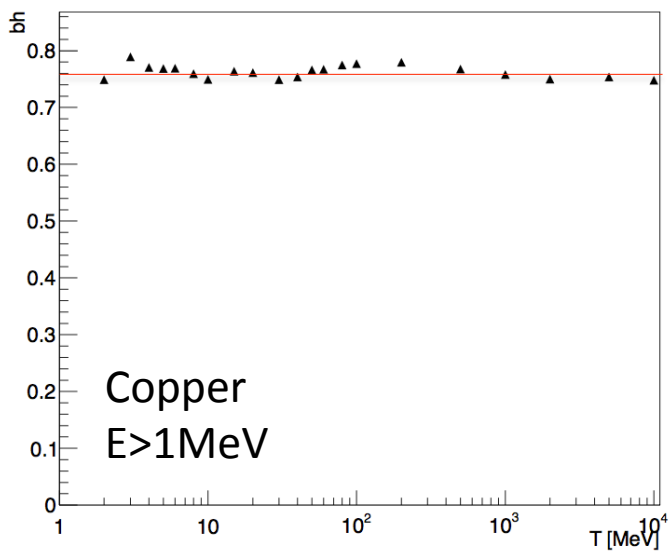


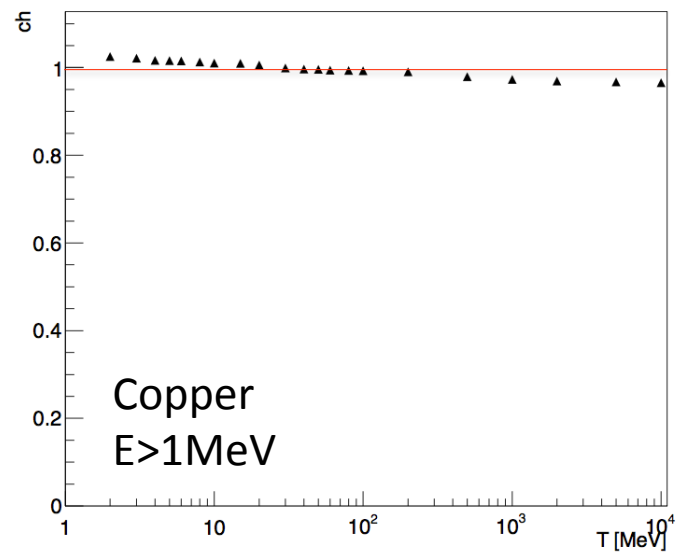


Parameters Plots

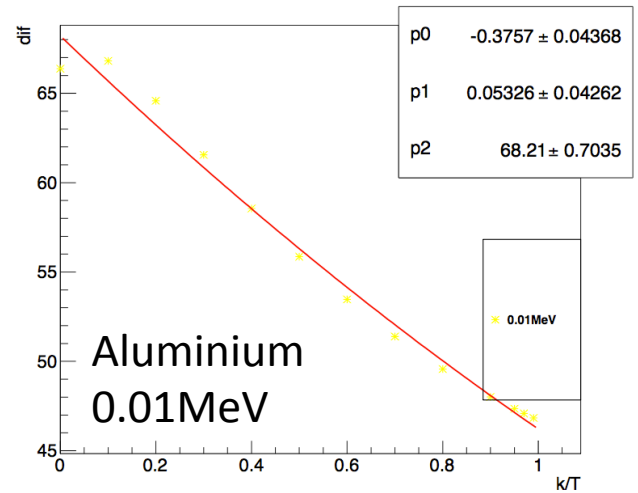


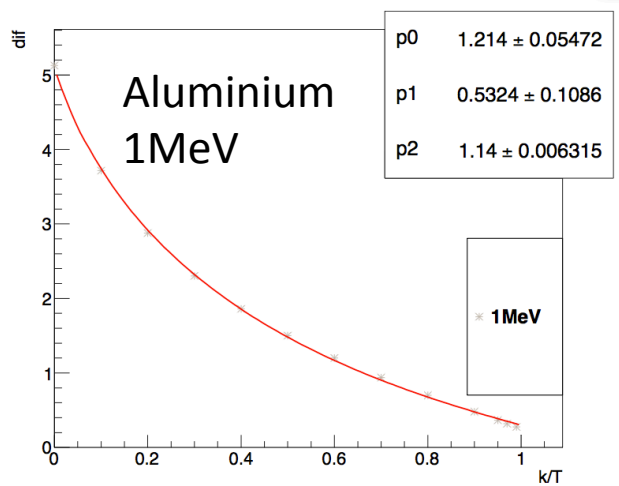
Not very smooth curves.

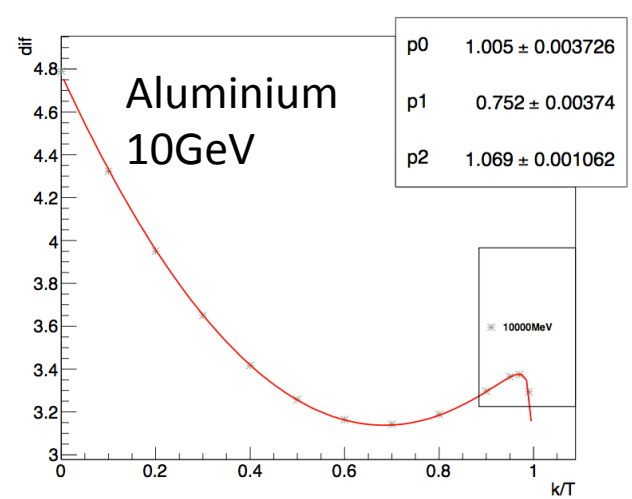


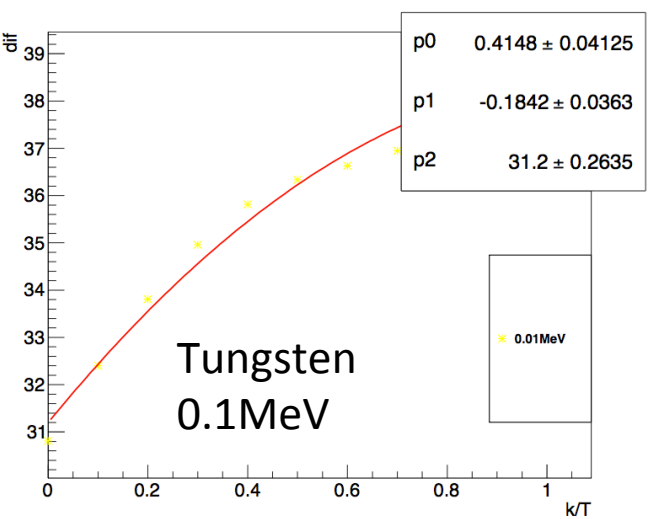


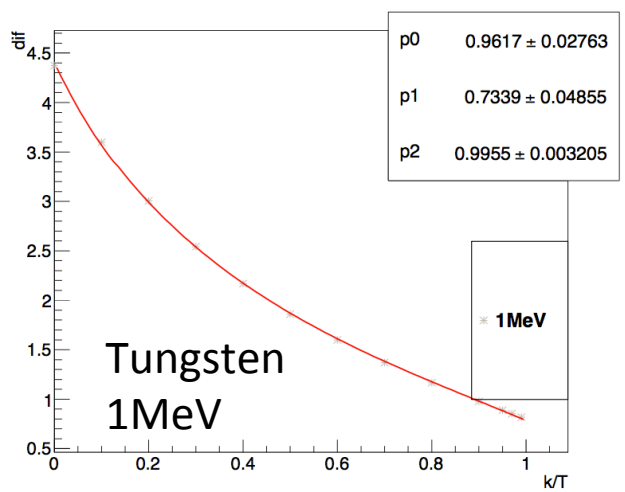
Other elements…

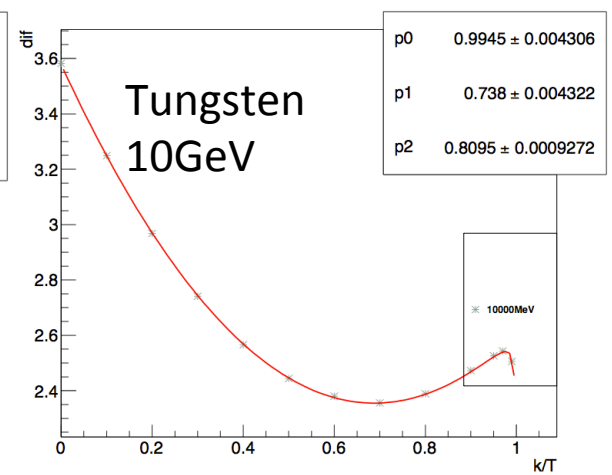




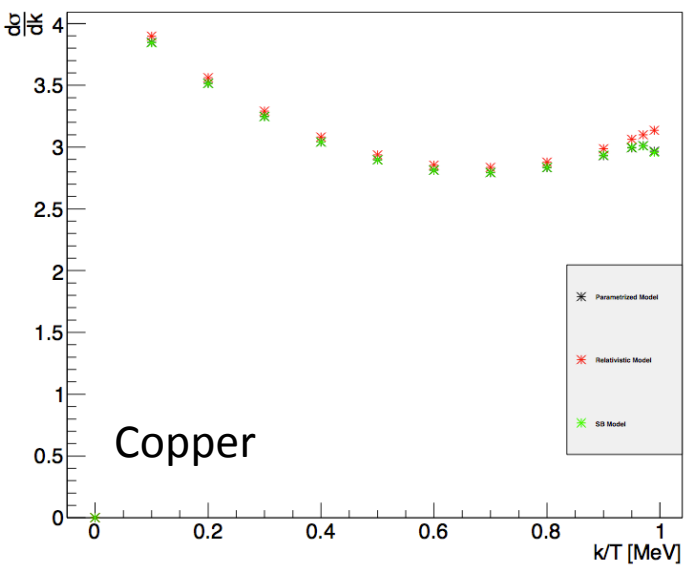








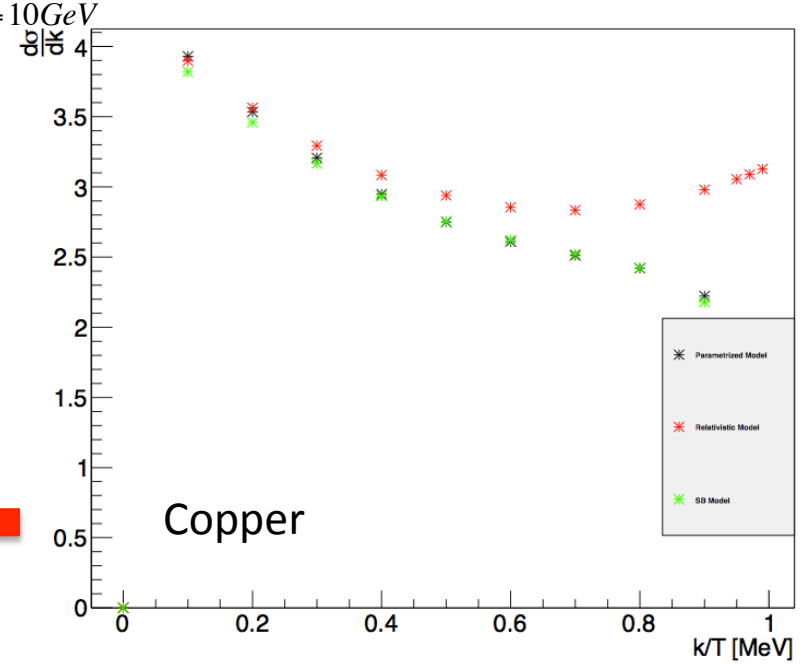
Relativistic Model vs. Selzter-Berger Model



$E_e = 100 MeV$ (LPM Model)

Difference of approx. 5%

$E_e = 10 GeV$



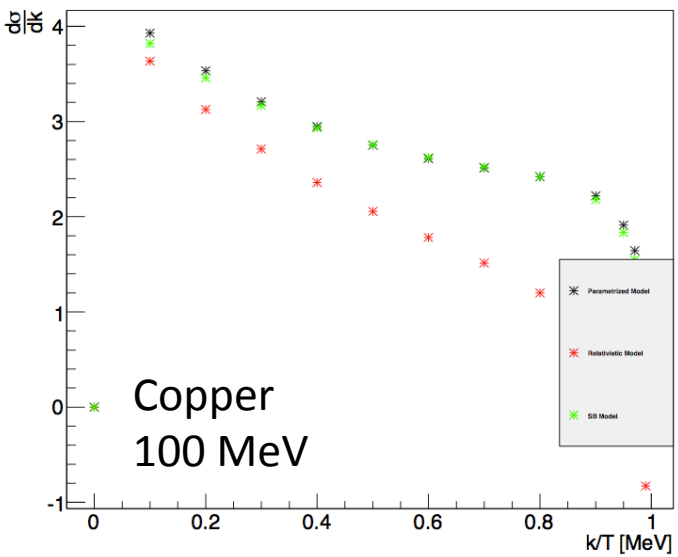
$E_e = 100 MeV$

(Using complete screening)

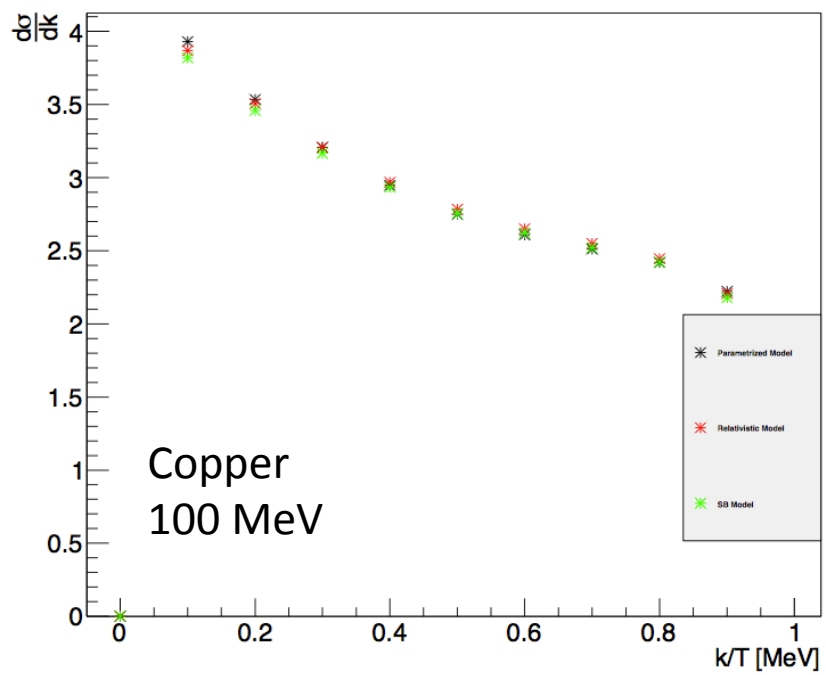
Difference is very large.

Solution at Low energies

Using Thomas-Fermi Model (intermediate screening and only valid for Z>5).

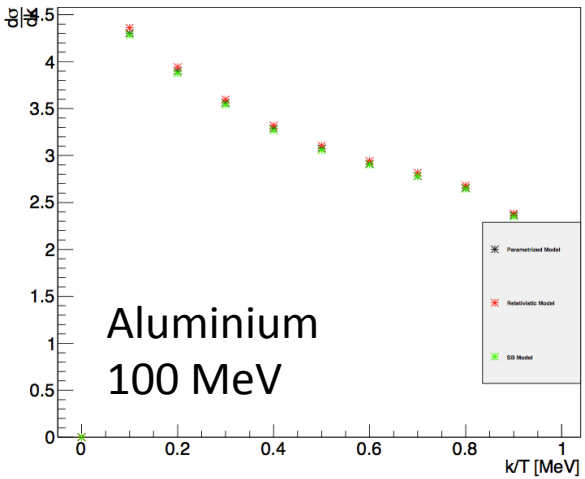


Big difference! … There was a bug.

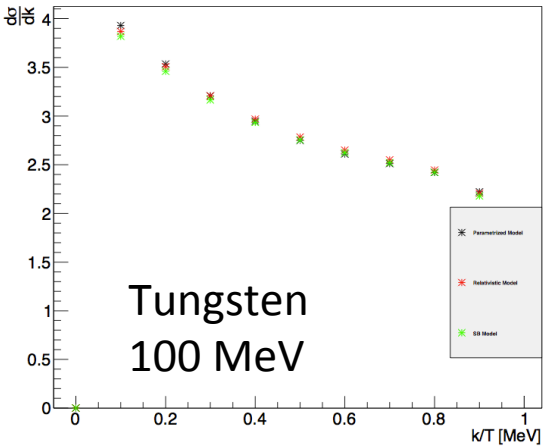


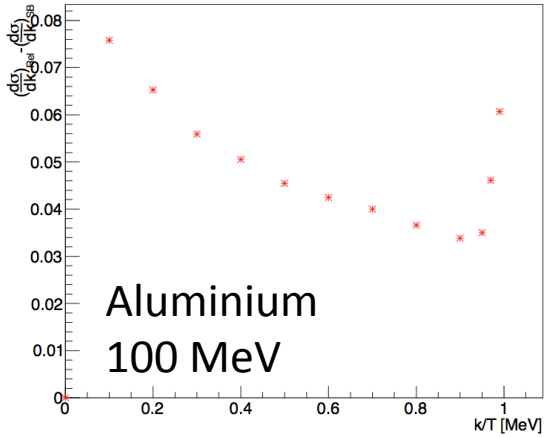
FIXED!

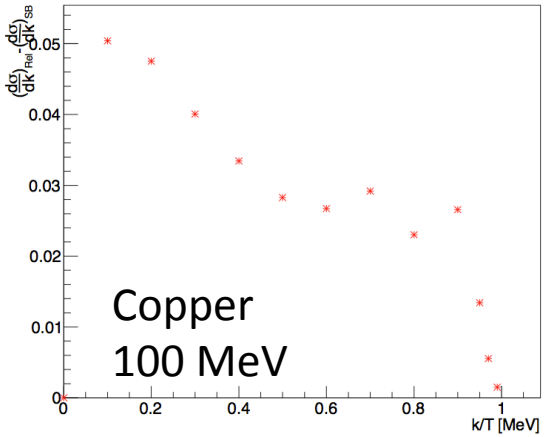
Difference of approx. 5%

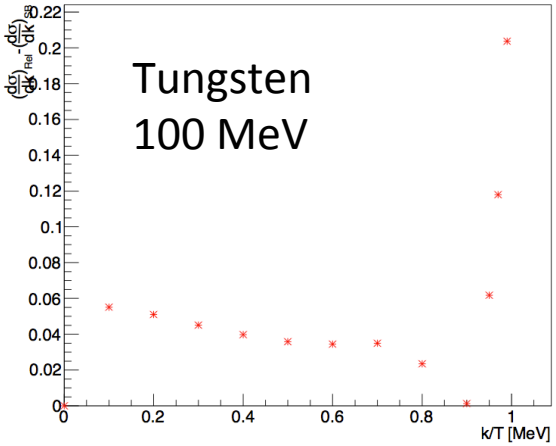


Also works for other elements.









- Difference of approximately 5% is seen in every plot and in different elements.
- We need to understand were is coming from.

Summary

- The parameterization works well, in particular for E> 1 MeV.

  ↳ Investigate a possible overall parameterization (all energies) for each Material.

- Relativistic Model vs. Seltzer-Berger:
  - The bug in screening functions was fixed (can now be turned on).
  - Now there is a better agreement for lower energies (about 100MeV).
  - Open questions:

    ↳ Why do we see this 5% difference between the Relativistic Model and the Seltzer-Berger Model?