Useful Excel Programs for Particle Accelerators

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This paper will describe nine open-source programs that can be found on the IBA Periodic Table Website: http://www.sandia.gov/pcnsc/departments/iba/ibatable.html .

DEDX6.xls calculates the electronic and nuclear stopping powers of all ions in the periodic table, accelerated to energies up to 1 GeV, in all material compounds containing up to 6 elements. The ZBL theory is used for the electronic stopping, while the LSS theory is used for the nuclear stopping.

IBA.xls calculates the energy of nuclear scattering or reaction.

Q.xls calculates the distribution of ion's charges after passage through either low pressures of gas or thin carbon foils.

Q-optimum.xls builds off of the Q.xls program above by calculating the charge state and terminal voltage to select when accelerating ions with a Tandem Van de Graaff accelerator that uses gas stripping at the terminal.

XSs.xls gives a snapshot of all the IBA cross sections for all the techniques and ion species and energies typically used

Deflection_by_earth_B_field.xlsm calculates the deflection an accelerated particle beam experiences due to passage through the magnetic field of the earth.

Magnetic_deflection_of_ions.xlsx calculates the radius of curvature and deflection angle of accelerated ions through magnetic fields provided by circular pole electromagnets.

Electrostatic_deflection_of_ions.xls calculates the deflection angle for accelerated ions passing through a constant electrostatic field.

Channeling.xlsm calculates the half-angles and Chi-minimums for both axial and planar channeling for indexes up to <555> and [555].