**Extending Spektr To Higher Energies:**

While TASMICS models energies up to 640 keV, spektr v3.0 is limited to the 150 keV energy range used in previous spektr versions. To extend spektr to higher energies, a list of anticipated changes is outlined below. Further changes may be required to achieve full functionality at higher energies.

*Extension of Attenuation Coefficients and spektrFluencePerExposure*

To filter spectra, spektr relies on the energy dependent mass attenuation coefficients from 1-150 keV stored incolumn 9 in *spektrMuRhoCompounds.mat* and *spektrMuRhoElements.mat*. To extend the mass attenuation coefficients beyond 150 keV, higher energy attenuation coefficients for the elements and compounds supported by spektr must be downloaded from the NIST XCom database (linked below) at 1 keV resolution and appended to column 9 of their respective .mat files.

To extend *spektrFluencePerExposure.mat* to higher energies, the mass attenuation coefficients from the NIST XCom database for air must be downloaded for the desired energy range and inputted into the following equation:

where is the mass attenuation coefficient outputted from NIST and is energy associated with the coefficient. The resulting values should be appended to column 3 in *spektrFluencePerExposure.mat*.

*Extension of Normalization Factors*

In spektr 3.0, the tube output of TASMICS is normalized to the tube output of TASMIP to account for differences in model generation parameters. As TASMIP is not defined for tube potentials above 150 kV, normalization cannot be done beyond this range. Thus, all calls to the function *spektrSpectrum* must be with the normalize flag set to 0 for potentials above 150 kV.

*Change Energy Range Limits of Plot in Spektr GUI*

To display higher energies in the spektr GUI, the x limits of the axis must be changed to the tube potential of the spectrum. This can be done with the following function call:

where and are the minimum and maximum values of the energy range. This call should be placed following all calls to *plot* in *spektr.m*.

*Change* EnergyVector *variable in spektrBeers, spektrMuRhoElements, and spektrMuRhoCompounds*

The EnergyVector variable in *spektrBeers.m, spektrMuRhoElements.m, and spektrMuRhoCompounds.m* controls the range of values indexed from each functions respective .mat file. This vector must be modified to the desired energy range.

NIST XCom:

https://physics.nist.gov/PhysRefData/Xcom/html/xcom1.html