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TrimSP Simulations for Pressure Cell Stopping Fraction

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For quantum systems/materials, a standard procedure for probing this behaviour is to try to tune these properties using external parameters to put the different phases of the material onto a phase diagram. Pressure application is a widely used tool to tune these properties, using a given pressure cell device. This can be a problem when using Muon Spin Rotation/Relaxation (μ+SR) as a large proportion of the muons will be implanted in the pressure cell rather than in the sample. This is a problem as in most cases the pressure cells give their own temperature responses. This issue gets amplified when the temperature dependant response from the sample is much smaller than that of the pressure cell, where the sample response can be lost in the background and cause alignment issues. As pressure dependant μ+SR studies increase in popularity, the need to tackle this issue becomes greater. We have used pySRIM **[1]** to make a tool that helps alleviate some of these problems, specifically for the pressure cell setup at the GPD beamline at the Paul Scherrer Institute, with the use of TRIMSP simulations. The goal is to make it easy to estimate how many muons will be stopping in the sample and how many in the pressure cell at a given muon momentum. This will allow the user to know before their experiment what they expect in terms of alignment and also what kind of fractions to be inputting into their fit procedures to extract the background accurately. The aim is to make this tool into an available GUI so users can easily use this before their experiment or append the simulation results to their proposals for the GPD beamline (and maybe also other beamlines in the future).

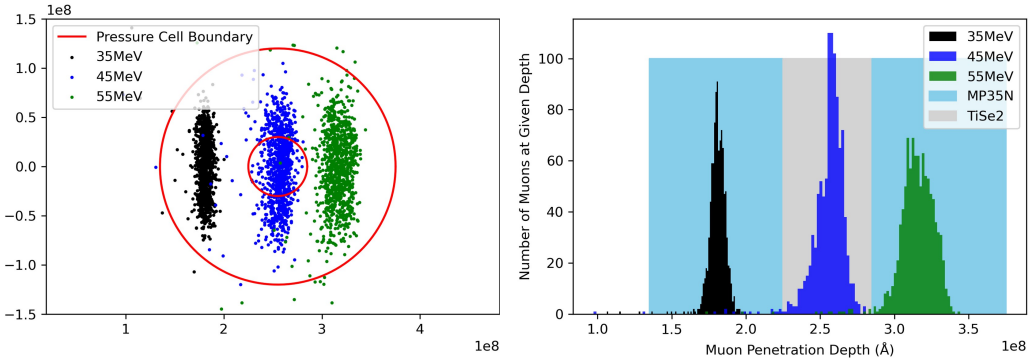

Figure 1: Example of simulation results

[1] pySRIM : https://pysrim.readthedocs.io/en/latest/

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