

GEANT4 as a simulation framework in μ SRT. Shiroka^{1,2}, T. Prokscha¹, E. Morenzoni¹, K. Sedlak¹¹*Lab. for Muon-Spin Spectroscopy, Paul Scherrer Institut, CH-5232 Villigen PSI, Switzerland*²*Dip.to di Fisica, Università di Parma & CNISM, Viale G.P. Usberti 7/a, 43100 Parma, Italy*

The increased use of numerical simulations in recent years has demonstrated the potential of Monte Carlo methods also for the μ SR technique, where it has opened up new application possibilities. Most of the work has relied on the GEANT4 C++ toolkit, nowadays the de-facto standard in particle physics simulations [1]. Through the use of different examples we present an overview of the current status of the field, which ranges from the performance improvement of existing instruments (e.g. low energy muons, ALC, etc.), to the design and optimization of new ones. The versatility offered by this new tool has permitted the modelling of the incoming muon beam, the investigation of the outgoing positrons' behaviour [2], the detailed study of geometrical effects [3], etc. The new, high magnetic field instruments being built at PSI and RAL, whose design is entirely based on realistic Monte Carlo simulations, represent still another example of the usefulness of the method for the μ SR technique.

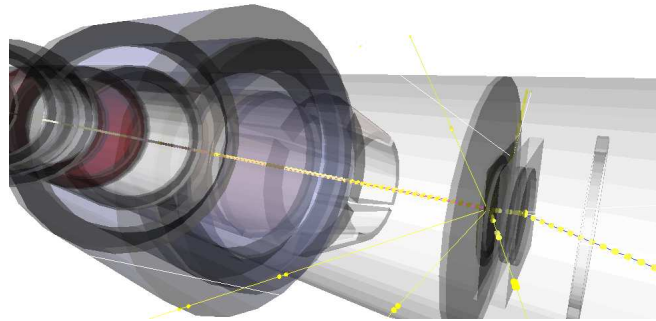


Fig. 1: Simulation of a muon decay event at the LE-MuSR spectrometer.

- [1] J. Allison, *et al.*, IEEE Trans. Nucl. Sci., 53 (2006) 270.
- [2] T. Lancaster, *et al.*, Nucl. Instr. Meth. A, 580 (2007) 1578.
- [3] T. Shiroka, *et al.*, Nucl. Instr. Meth. A, 591 (2008) 306.