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The Effect of Magnetic Fields on Vertex Reconstructed Muon-Spin Spectroscopy

The use of a Si pixel-based particle tracking scheme in μSR will, among others, allow measurements using a ten-fold increased stopped muons rate and samples ten times smaller than currently possible at continuous muon source facilities. In this contribution we present simulation results to assess the effects of magnetic fields on two spectrometer configurations using a two-layered tracking scheme for the incoming and outgoing particles (see Figure). At a low magnetic field of up to ~50 mT, the tracking and vertex reconstruction accuracy is only minimally influenced. For magnetic fields larger than 80 mT the tracking capabilities diminish significantly. Operating a two-layered scheme using small magnetic fields hence does not require adaptations. Only at large magnetic fields, a tracking scheme that makes use of an accurate field map or at least three tracking layers must be employed to achieve reliable particle tracking.

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Email

pascal.isenring@psi.ch

Funding Agency

Swiss National Science Foundation, SNSF 215167

Supervisors Name

Zaher Salman

Supervisors Email

zaher.salman@psi.ch

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Primary author: ISENRING, Pascal (Paul Scherrer Institute)

Co-author: Dr SALMAN, Zaher (PSI)

Presenter: ISENRING, Pascal (Paul Scherrer Institute)

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