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## Followup on the Monte Carlo simulation of MUSR using GEANT 4

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### Abstract content <br> &nbsp; (Max 300 words)

MUSR measurements probe local magnetism in the solid state by tracking the time dependent polarization of an ensemble of muons implanted into a sample. The polarization of the muon ensemble is detected via the decay positron. The experiments therefore combine features of accelerator, particle and solid-state physics. The use of samples smaller than the muon beam lateral dimension introduce systematic errors which are complicated functions of the particle trajectories as they are affected by the external magnetic field. In an effort to understand these systematics, a Monte Carlo model of a MUSR experiment, including the physics of the beam, the implantation, the muon decay and the positron detector system has been developed. This has been done using GEANT 4. This is a C++ library developed by CERN to simulate particle physics experiments. However, it can be also be used for other applications that need not have anything to do with particle or high energy physics. We provide an update on the work on using a GEANT 4 application to simulate an experiment on the doping of diamond with muonium as described in our paper presented at SAIP 2011. In particular, we discuss new results showing the dependency of detector efficiency on the field strength of magnetic field simulated in the experiment for both the flypast muons and those that hit the target respectively. These results allow us to model the MUSR experiment more efficiently leading to more robust data analysis.

### Apply to be<br> consider for a student <br> &nbsp; award (Yes / No)?

No

### Level for award<br>&nbsp;(Hons, MSc, <br> &nbsp; PhD)?

PhD

### Would you like to <br> submit a short paper <br> for the Conference <br> Proceedings (Yes / No)?

Yes

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