

New probe of surface and bulk magnetism using spin polarized positron beam with radioisotopes

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Measurement of electron (e-) polarization has been accomplished using Mott (electron-nucleus) scattering with efficiencies (fraction of scattered to incident electrons) of order 10^{-5} ~ 10^{-4} while positron polarization measurement is not well suited (less efficiency since positrons repelled from the nucleus). For this reason, a different method of polarization analysis for the positron employed based on the positronium (Ps) formation in the magnetic field but not based on scattering.

Spin-polarized low-energy positrons emitted from radioisotopes were considered as useful probes for studying of electron spin states of both surface and bulk materials [1] due to the spin-dependent interactions between electrons (e-) and positrons (e+), the formation of positronium (Ps). In this project we will discuss the design and operation of positron polarimeter (based on Ps formation in a magnetic field) which will be used to probe the surface and bulk magnetism combined with an electron polarimeter (Mott detector).

[References]

1. A. Rich, Rev. Mod. Phys., 53, 127 (1981)