Description of the ZF-μ’SR Technique

μ’SR in its various forms (ZF, LF, TF) is a powerful probe of the magnetic properties of materials. The 100% spin-polarised μ’ beam is stopped in the sample and the time histograms of μ’ decay positrons are recorded by forward (F) and backward (B) counters as a function of time. Since a positron is emitted preferentially towards the μ’ spin direction, the time-dependent asymmetry $A(t) = (F - B)/(F + B)$ reflects the time evolution of the μ’ spin polarisation. After coming to rest at interstitial sites of the solid, the μ’ precess in the local magnetic fields $<B_{\mu}>$ with a precession frequency, $\nu_{\mu} = (\gamma_{\mu}/2\pi)<B_{\mu}>$, where $\gamma_{\mu}/2\pi = 13.55$ kHz/G. In the absence of an applied field, a precession signals the onset of an ordering (FM or AF) transition. Application of a longitudinal magnetic field (LF) allows the decoupling of the μ’ spin from the static internal fields. Although for powder samples such as the present fulleride, the exact μ’ site is not known, it is expected that the μ’ will reside near the negatively charged C$_{60}^{3-}$ units.