2. Principle

A Larmor spectrometer is based on the rotation of the polarisation of a neutron beam when travelling through a magnetic field (see figure 1). This rotation angle is proportional to the magnitude of the magnetic field. For a constant magnetic field, *B*, the polarisation rotates around the magnetic field with a *Larmor frequency,* $\omega = \gamma_L B$, where γ_L = 1,832472.10^8 $T^{-1}s^{-1}$.

When a neutron beam crosses a magnetic field region with constant field and length L, the total rotation angle is given by

$$\phi = \omega t = \gamma_L B t$$

As the neutron travels with a velocity inversely proportional to its wavelength, the time the neutron needs to traverse the magnetic field region is proportional to the wavelength of the neutron. Hence, the total rotation angle is given by

$$\phi = c\lambda BL$$

where $c = \frac{\gamma_L m}{h}$ = 4,63209.10^{14} $T^{-1}m^{-2}$.

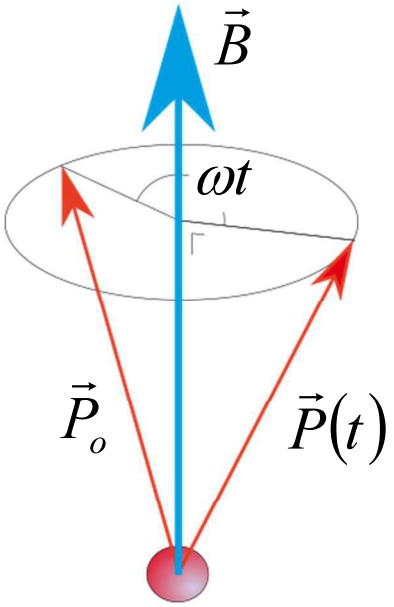

Fig 1. *Larmor rotation of neutron polarisation around magnetic field from the initial direction,* $\vec{P}_o$ *to the direction after some time t,* $\vec{P}(t)$.