# Tunnelling Times in Quantum Mechanics

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## 1 Larmor Precession

We consider the case of scattering in one dimension with particles of mass $m$, spin $\frac{1}{2}$ and kinetic energy $E = \frac{\hbar^2 k^2}{2m}$. The particles move along the y-axis with spins aligned with the x-axis and interact with a rectangular barrier,

$$V = \begin{cases} V_0 & -\frac{d}{2} < y < \frac{d}{2} \\ 0 & \text{otherwise} \end{cases} \tag{1}$$

A small magnetic field $\vec{B_0}$ points along the z-axis and is confined to the barrier. As particles enter the barrier, the magnetic field induces a Larmor precession with frequency $\omega_L = \frac{g\mu B_0}{hbar}$