

27. Spins in Magnetic Fields

Copyright ©2015–2016, Daniel V. Schroeder

In Subsection 4.4.2, Griffiths works through two lengthy examples of what happens when you put a charged particle with spin (such as an electron) into a magnetic field. In the first example, “Larmor precession,” the magnetic field is *uniform* and the particle’s spin orientation *precesses* about the axis parallel to the field, with a frequency proportional to the field strength. In the second example, “The Stern-Gerlach experiment,” the magnetic field is *nonuniform* and the particle feels a net *force* that depends on its spin state.

I wish we could perform some real laboratory experiments on spins in magnetic fields, but this requires atomic beams and vacuum systems and other apparatus that is both expensive and difficult to use (far beyond the expertise of this theoretical physicist). Instead, I hope to soon unveil a web simulation of spins in magnetic fields, along the same lines as the ABC simulation that you’ve already worked with. (In fact, the ABC simulation is an accurate model of a spin-1 system with Stern-Gerlach magnets as “analyzers.”)

In any case, please work through these examples in Griffiths and come to class with any questions you may have.