18) **Other systems with RMT statistics**

RMT statistics have been observed in many systems. We already discussed nuclear spectra and the Sinai billiard. Next we will discuss:

- hydrogen atom in magnetic field
- spectra of disordered solids
- Dirac spectra in QED
- zeros of the Riemann zeta function

18a) **Hydrogen in a magnetic field**

![Diagram of hydrogen atom in magnetic field]

\[ A = \left(-\frac{B}{2}x, \frac{B}{2}y, 0\right) \]

\[ H = \frac{p^2}{2m} - \frac{e^2}{r} - \omega L_z + \frac{1}{2} \omega^2 (x^2 + y^2) \]

\( B = 0 \) integrable

\( B = \infty \) integrable Landau orbits

intermediate \( B \) almost completely chaotic

\[ P(s) \quad \text{given by the GOE} \]