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World is Spinning

The Office of Postdoctoral Affairs
The Graduate School | Florida State University
World

World is Spinning is my title, next few minutes, will be vital.

Five minutes are more than enough, you just need to be Kenough. For those who have Barbenheimer seen, a truly remarkable combination unforeseen.

In the picture here, the Earth rotates, but there is another Quantum World, that awaits. Today, I will tell you story about Spin, a quantum property, that has always been.

Let me show you the nanoscale world I study, electron spin resonance is my buddy. Information about the magnetic properties you obtain, as well as spin dynamics insight, you gain.
Electrons along with nuclei atoms make, many arranged atoms, molecule bake. Paramagnetic system with unpaired electron is, in no magnetic field the electrons randomly fizz.

To study the molecule of nuclei and electrons in peel, we place them into a magnetic field that they feel. Cool them down to cryogenic temperature and apply microwave, that is the resonant condition they crave.

You just learned the magnetic resonance base, let us look a bit deeper into the special case.
The colleagues from chemistry like to play, alter the surrounding ligand as a foreplay. When the right ligand clicks, happiness is seen on our lips.

If you take electrons from an atom in pair, a positively charged ion forms in despair. Scheme shows Praseodymium(II) ion, the chemical bonds are stronger than a lion.

Black powder from synthesis comes, all the effort from preparation sums. The result is coordination compound, coming to measurements, safe and sound.
The spin of an electron gives you **two energy levels**, the difference gives you **transition** with revels. **Energy** of molecule is what we look for here, kinetic and potential terms will adhere.

The energy between the levels is **quantized**, equals to **Plank constant** ($h$) times **frequency** ($\nu$) stylized. That is the **Bohr constant** ($\mu_B$) times **magnetic field** ($B_{\text{ext}}$), with the electron **$g$-factor** ($g_e$) as **magnetic property** yield.

Nature always likes the state of the **lowest energy**, this way it will let you reveal its inner synergy. This transition gives you spectrum to simulate, **quantum world** nature you emulate.

$$\Delta E = h\nu = g_e\mu_{B}B_{\text{ext}}$$
The electron with spin one half signal gives, nearby nuclear spin never forgives, the electron-nuclear interaction is seen, by these Wiggles on the screen.

By the electron spin resonance we see, the quantum world‘s deepest sea, the world we do not understand much, that is why we study it as such.

From all these terms the head might spin, you all are part of quantum world we live in. In these few minutes you learned what I do, Take care, I hope you enjoyed it too.