File-6: Nuclear Quadruple Interaction.

A nucleus that has a nuclear spin quantum number $I \geq 1$ also has as electric moment, and the unpaired electron interacts with both the nuclear magnetic and electric moments. The electric field gradient at the nucleus can interact with the quadruple moment as in **NQR**, and this interaction affects the electron spin energy states via the nuclear – electronic magnetic coupling as a second order perturbation. The effect of quadrupole interaction is usually complicated because it is accompanied by a much larger magnetic hyper fine interaction. The orientation of the nuclear moment is quantized with respect to both the electric field gradient and the mantic field axis. When the magnetic field and the crystal axes are parallel, the only quadruple effect is a small displacement of all the energy levels by a constant amount, which produces no change in the observed transitions. However, when the two axes are not parallel, the effect is a competition between the electric field and magnetic field. This has two effects on the spacing of the hyperfine lines a displacement of all energy levels, by a causes the spacing between adjacent EPR lines to be greater at the ends of the spectrum than in the middle.

This quadruple effect can be distinguished from another second order effect that produces a increase or decrease in the spacing from one end of the spectrum to the other. The variation in the spacing from this other. The variation in the spacing from this other second order effect occurs when the magnetic field produced by the nucleus becomes comparable in magnitude to the external field. In this case, the unequal spacing can be eliminated by increasing the applied magnetic field.