

## 11. Yellow Series Excitons of $\text{Cu}_2\text{O}$ in High Magnetic Fields

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The energy levels of hydrogen like atoms in high magnetic fields are not well known. For the purpose of studying the magnetic field dependence, we investigated a series of absorption lines of the yellow series excitons in cuprous oxide crystals. The series is very similar to that of hydrogen atoms.[1-3]

Experiments were carried out at 4.2 and 1.7 K using an optical multi-channel analyzer, and a grating spectrograph with an inverse dispersion of 13.9 Å/mm. Magnetic fields were generated in a coil immersed in liquid nitrogen by discharging a 200 kJ condenser bank. Absorption spectra were obtained at the flat part near the peak of the magnetic field. Samples immersed in a liquid helium. The Faraday configuration was used.

The Zeeman splitting of 2p,3p,4f,4p and 5f levels were observed. Their gradients were found to be 0.35, 0.34, 0.32, 0.33 and  $0.32 \text{ cm}^{-1}/\text{T}$ , respectively. The repulsion of absorption lines of the 4p and 5f levels were observed. A minimum difference occurred at  $B = 16.7 \text{ T}$  and the difference was  $9.0 \text{ cm}^{-1}$ . The minimum energy separation were calculated from its field strength, taking into account of a diamagnetic term. The calculated result was  $7.7 \text{ cm}^{-1}$  which was in a good agreement with experimental value of  $9.0 \text{ cm}^{-1}$ .

### References

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- [3] A.Misu, Y.Takada and H.Fukutani: High Field Magnetism, ed.by M.Date (North-Holland, Amsterdam, 1983) p.205.