Electron Spin

The investigation of alkali spectra with a high resolving power spectroscope revealed that many spectral lines consists of a group of lines close to each other. To explain this multiple structure of the spectral lines the Dutch physicists G. E. Uhlenbeck and S. A. Goudsmit put forward in 1925 the hypothesis of spinning electron. According to this hypothesis, the electron revolves about its own mechanical axis in a way similar to top motion. The spin angular momentum is given by,

$$P_s = s\hbar \quad \text{——} \quad (1)$$

where, s is called the spin quantum number having only one value,

$$\text{i.e,} \quad s = \frac{1}{2} .$$

Sunday 09

Magnetic Moment Due to Electron Spin :—

A magnetic field (fig, given below) is generated due to the spin motion of the electron. The direction of the spin angular momentum ($\vec{s}$) and the associated spin magnetic moment ($\vec{\mu_s}$) are also shown in fig.

The magnetic moment μ_s is given by

$$\mu_s = g_s \frac{e}{2m} P_s = 2 \frac{e}{2m} P_s \quad \text{——} \quad (1)$$

where, the Lande Splitting factor g_s is 2 for the spin motion.

$$\text{or,} \quad \mu_s = e\hbar/2m \quad \text{——} \quad (2)$$

Notes Appointment Contacts

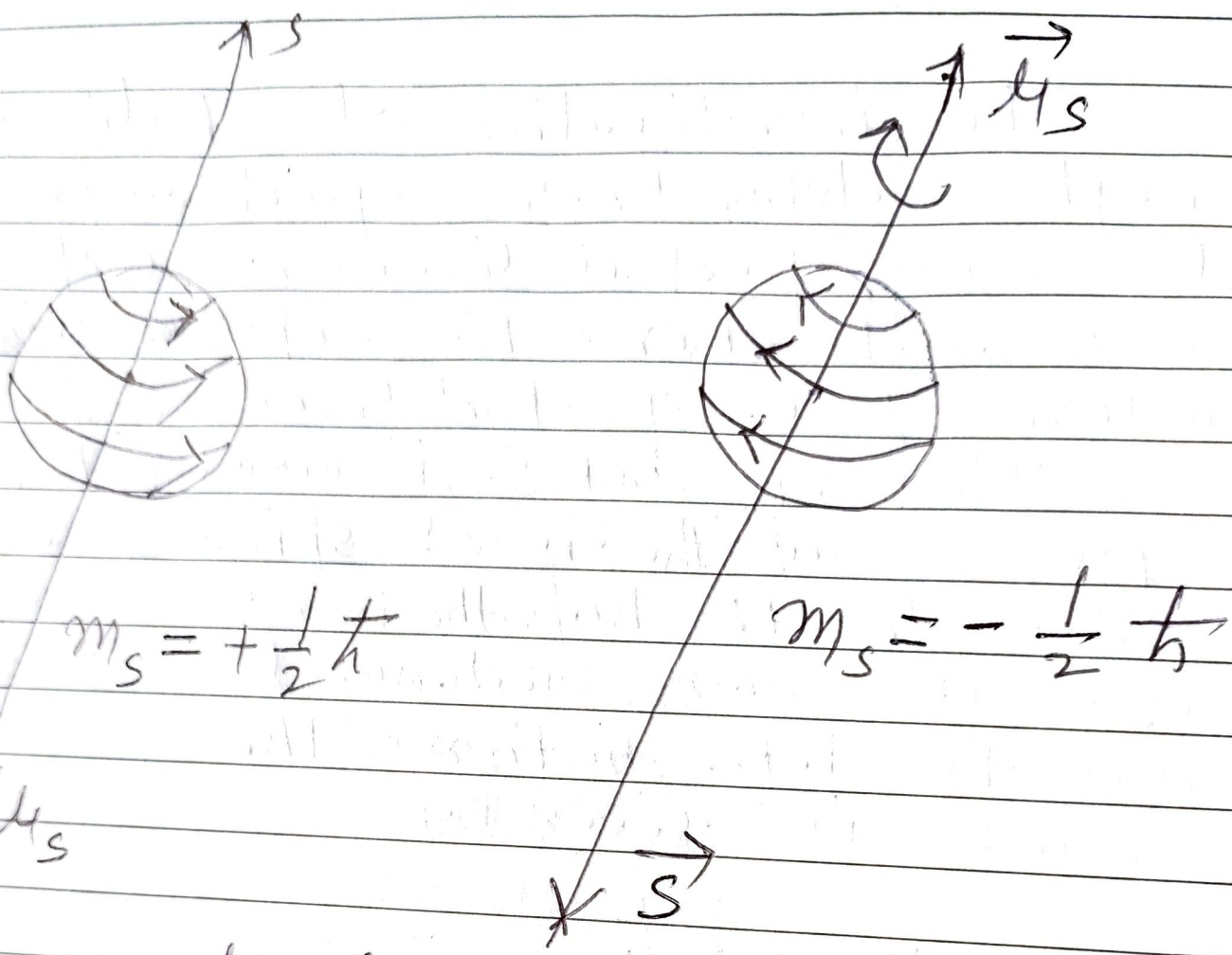

fig (a)

comparing equation ① and ②, we get

$$\mu_s = 1\mu_B \quad \text{——} (3)$$

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