

LETTERS TO THE EDITOR.

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Hyperfine Structure in Germanium.

THE isotopic constitution of germanium, according to Aston, is as follows:—

Mass Number	..	70	72	73	74	76
Relative Abundance	..	21.2	27.3	7.9	37.1	6.5

A study of the hyperfine structure of some significant arc lines of germanium was undertaken to investigate the presence, if any, of the even isotopic displacements in the gross multiplet levels; and it was also hoped to determine the nuclear spin of the odd isotope Ge^{73} . Using a hollow cathode discharge, the following arc lines of germanium were examined for hyperfine structure:—

λ in \AA .	Classification*
3039.07	$4p^2 \text{}^1\text{D}_2 - 4p5s \text{}^1\text{P}_1$
2754.59	$4p^2 \text{}^3\text{P}_2' - 4p5s \text{}^3\text{P}_1$
2709.63	$4p^2 \text{}^3\text{P}_1' - 4p5s \text{}^3\text{P}_0$
2691.35	$4p^2 \text{}^3\text{P}_1' - 4p5s \text{}^3\text{P}_1$
2651.57	$4p^2 \text{}^3\text{P}_0' - 4p5s \text{}^3\text{P}_1$
2651.19	$4p^2 \text{}^3\text{P}_2' - 4p5s \text{}^3\text{P}_2$
2592.54	$4p^2 \text{}^3\text{P}_1' - 4p5s \text{}^3\text{P}_2$

All the arc lines listed above were found to be single. The known relative abundance of the even isotopes of germanium renders

it certain that none of the levels here examined shows any isotope displacement. The absence of hyperfine components arising from the nuclear spin moment of the odd isotope Ge^{73} leads to the conclusion that the magnetic moment of the nucleus is very small. The possibility of the appearance of the faint hyperfine components due to Ge^{73} on longer exposures (*i.e.*, longer than two hours which I have tried) is very little, though it is not definitely ruled out.

I wish to thank Prof. A. Venkata Rao Telang for his helpful guidance.

L. SIBAIYA.

Central College,
University of Mysore,
Bangalore,
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* Gartlein, *Phys. Rev.*, 1928, **31**, 782-92.

A Possible Origin of the Shift of Spectral Lines in Nebulae.

SPECTROSCOPIC examination of the extragalactic nebulae by Slipher and Humason has revealed the fact that the absorption lines, especially the H and K lines, are displaced towards the red in most cases. Assuming this effect as arising from a Doppler shift, Hubble has concluded that the speeds of recession of the nebulae are proportional to their distances; the claim that this conclusion is accurate to 20% is not conceded by many astronomers. There are, besides, a few galaxies which, on the