

by 120° , but for the reverse direction the maximum accelerating potentials, V_{AC} max., C_{CB} max., V_{BA} max., are separated by 240° . Thus, resonance in the forward direction is favoured and will not be critical, while in the reverse direction resonance is unfavoured and critical.

This sort of scheme should lead to higher velocities as well as to higher intensities.

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The Value of G

ASSUMING the validity of the theory published by Sir Arthur Eddington recently¹, and assuming his suggestion that we have

$$N = 136 \times 2^{256} \text{ exactly,}$$

I have deduced an estimate of the Universal Gravitational Constant G , using only the following experimental data :

$$\left\{ \begin{array}{l} c = (2.9978_5 \pm 0.0000_5) \times 10^{10} \text{ cm./sec. (ref. } 2,3). \\ F = 9648.9 \pm 0.7 \text{ abs. E.M.U./gm.-equiv. (ref. } 2). \\ H^2 = 1.00756 \pm 0.00005 \text{ (ref. } 4). \end{array} \right.$$

The value I obtain is :

$$G = (6.658_8 \pm 0.001_2) \times 10^{-8} \text{ cm.}^3 \text{ gm.}^{-1} \text{ sec.}^{-2}.$$

This does not agree well with Heyl's values, namely :

$$\left. \begin{array}{l} 6.664 \pm 0.002 \text{ (ref. } 2) \\ 6.674 \pm 0.002 \\ 6.678 \pm 0.003 \end{array} \right\} \text{ (ref. } 5)$$

but is in excellent agreement with the values of C. V. Boys and Carl Braun, namely⁶ :

$$\left. \begin{array}{l} 6.6576 \pm 0.001 \\ 6.65786 \pm 0.0017. \end{array} \right.$$

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¹ *Mon. Not. Roy. Ast. Soc.*, **95**, 636 (1935); *Proc. Roy. Soc., A*, **152**, 253 (1935).

² R. T. Birge, *Rev. Mod. Phys.*, **1**, 1 (1929).

³ Michelson, Pease and Pearson, *Astrophys. J.*, **82**, 26 (1935).

⁴ R. T. Birge, *Phys. Rev.*, **40**, 319 (1932).

⁵ P. R. Heyl, *Bur. Stand. J. Research*, Dec. 1930.

⁶ "Ency. Brit.", 10th Edn., **25**, p. 739.

Magnetic Susceptibility of Vapours of some Organic Substances

IN his well-known investigation of organic substances, Vaidyanathan¹ claimed that the molecular susceptibilities of benzene and carbon disulphide are much greater in the vapour state than in the liquid state.

Using a new method for measuring the magnetic properties of gases and vapours², we found that the molecular susceptibility of benzene does not change noticeably when passing from the liquid to the vapour state³. When our results were published, Rao and Varadachari re-examined the data previously obtained by Vaidyanathan and agreed with us so far as concerns benzene⁴. But they still claimed that the susceptibility of carbon disulphide jumps when passing from the liquid to the vapour state.

As there are no theoretical arguments for expecting a jump in carbon disulphide, we investigated the vapour with our apparatus. The substance was very pure and was many times redistilled in high vacuum. We obtained for the susceptibility of the vapour (χ_g) $\chi_g = -(0.53 \pm 3) \times 10^{-6}$, while Vaidyanathan found $\chi_g = -0.99 \times 10^{-6}$.

The susceptibility of liquid carbon disulphide as measured by many authors⁵ lies between $\chi_l = -0.56_5 \times 10^{-6}$ and $\chi_l = -0.59 \times 10^{-6}$.

We may thus conclude that there is at present no evidence for a change in the susceptibility of organic substances, when passing from the liquid to the vapour state.

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¹ Vaidyanathan, *Phys. Rev.*, **30**, 512 (1927).

² R. Jaanus and J. Shur, *C.R., U.S.S.R.*, **2**, 465 (1934).

³ R. Jaanus and J. Shur, *NATURE*, **134**, 101 (1934).

⁴ S. Rao and P. Varadachari, *NATURE*, **134**, 812 (1934).

⁵ G. Meslin, *Ann. chem. Phys.*, **7**, 145 (1906). Varadachari, *J. Annamalai Univ.*, **4**, 73 (1935).

Axial Rotation and Stellar Evolution

IF, as is now generally supposed, stars exhibiting spectra containing uniformly widened lines, commonly designated by the suffix n , are in rapid axial rotation, then the following interesting condition is imposed upon the problem of stellar evolution. It arises from the comparatively recent determination¹ that a large number of the early F -type stars (as well as B and A stars) have noticeably widened lines, while but few of the later F 's and practically no G or later type stars exhibit this characteristic; and that such n stars cluster closely about the absolute magnitude $+2.0$, and thus, by virtue of the mass-luminosity relation, about the stellar mass of twice that of the sun.

O. Struve² has shown that the linear speeds of rotation of many n stars are considerable, and it follows therefore that some means must be had of accounting for either a very marked loss or gain in angular momentum at about spectral class $F5$, depending on whether the course of stellar evolution is considered as proceeding down or up the main sequence of the Russell diagram. The alternative is to assume that a star retains the same spectral class throughout its life.

If, as seems probable at present, the normal course of evolution is toward later spectral types along the main sequence as a consequence of loss of mass by radiation, many stars must lose great quantities of angular momentum in passing from F to G spectral class. Or, to put it somewhat differently, since rapidly rotating stars have a strongly preferential mass of about twice that of the sun (at least for A and F stars), and since practically no stars of the sun's mass are known to rotate rapidly, much angular momentum must be lost as the star passes from mass 2 to mass 1.

It has been suggested that as a star loses mass by radiation, it rotates faster and faster in order to preserve its angular momentum, and that after a certain critical point in mass is reached, the angular speed is sufficient for fission to occur, thus causing a large transfer of rotational momentum to orbital momentum. This critical mass would imply a critical luminosity for the most rapidly rotating stars. The observed clustering of rapidly rotating stars about