LETTERS TO THE EDITORS

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IN THE PRESENT CIRCUMSTANCES, PROOFS OF "LETTERS" WILL NOT BE SUBMITTED TO CORRESPONDENTS OUTSIDE GREAT BRITAIN.

Origins of Electric Transmission by Resonance

THE death of Sir Oliver Lodge, full of years and honour, recalls brief episodes in the early development of wireless telegraphy. One remembers Lodge describing how he and his assistant at Liverpool were experimenting with a Hertzian spark vibrator: another such vibrator, a duplicate of it, happened to be at the distant end of a long lecture bench, and they noticed an extraordinary development of receptive sparking in it. With the simplicity of genius Lodge recognized that this was due to resonance, for the period of vibration in the receiver must be the same as that of the identical transmitter. One result was a master patent, which was for long a thorn in the side of practical adventurers. (The Bell telephone happens to be another instance of reciprocity of emitter and receiver.)

One may ask, did Hertz in his classical experiments on wave-lengths take this very striking role of Fourier resonance into his chain of ideas ? (FitzGerald had remarked on it five years earlier.) His broken ring receiver would probably have had to be inconveniently large to bring it into resonant relation. One seems to remember that it gradually occurred to informed minds that the vagaries of reception were due to the disturbance selected by the receiver being largely a Fourier component of its own wave-length, as that one was intensified by resonance, so that the wave-length observed would be that of the receiver, not the emitter; a principle now of utility in the other direction to prevent sympathetic leakage into adjacent systems.

During a lecture by Lodge at the Royal Institution, a vibrator on the table was observed to excite sparks on the gold-patterned paper on the walls: but these were perhaps more likely ordinary electrodynamic effects due to completion across a gap of metallic circuits. The converse case was D. E. Hughes's much earlier uninstructed detection of electric waves at the appropriate much greater distance, from which he was dissuaded by the conservative frame of mind of Stokes, strikingly effective also on the mentality of his disciple Lord Kelvin, though he was himself the detector of fluorescence.

In the well-known contemporary account of Hertz's discovery by G. F. FitzGerald of Trinity College, Dublin, which now happens to be accessible here in his Collected Papers, I find, however, some reference to tuning of the receiver. One remembers, by the way, the excitement then produced in Dublin by the direct reception of the news of a regatta in the Bay from Marconi who was a guest on the flagship. FitzGerald was a close friend and indeed instructor of Lodge, who after his premature death became a life-long apostle. The wave properties of electric transmission on analogy with those of light were closely pursued in his few later years in FitzGerald's laboratory, which then included the present Provost of that illustrious College.

These considerations are largely out of date in practice, but though simple they are far from obsolete in theory, which should avoid abstruseness.

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Holywood,
N. Ireland.
August 23.

Structure of Liquid Argon

MOST of the X-ray investigations of liquids have led to a distribution function which cannot be compared directly to the corresponding distribution of atoms in the solid since one peak in the liquid distribution function usually corresponds to several peaks in the distribution function of the solid. For this reason we investigated several years ago the structure of molten salts such as potassium chloride and lithium chloride where one can assign to each peak in the liquid distribution function one peak in the distribution function of the solid. We have shown that the co-ordination in the liquid and the solid is the same; number of first neighbours N_1 in the solid equals 6 and in the liquid 5·8. The number of second neighbours N_2 in the liquid (K–K or Cl–Cl) is already greatly disturbed; in the solid there are 12 and in the liquid 9·8.

Since the development in recent years of a more refined theory of liquids[1] has permitted the prediction of the number and position of nearest neighbours in a normal liquid, it was of particular interest to study the structure of liquid argon.

Because liquid argon at atmospheric pressure is only stable over a temperature range of 3·5° (boiling

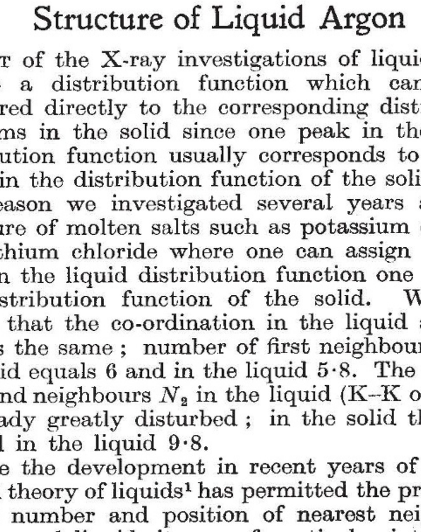

Fig. 1.

DIFFRACTION PATTERN OF LIQUID ARGON SHOWING DIFFRACTION RINGS AT $(\sin\theta)/\lambda = 0{\cdot}152,\ 0{\cdot}284,\ 0{\cdot}410$ AND A FAINT RING IS INDICATED AT 0·59. THE LAUE SPOTS ARE DUE TO THE MICA WINDOWS.