star would doubtless throw further light on the matter. I do not, however, adopt the view that the outburst was definitely due to such a collision.

There has also been some misunderstanding in regard to the separation of the stars. The figure of one-fifth of a second was merely a hypothetical figure which I adopted for the sake of argument to show that if the companion was in reality a background star, previously hidden by the nova but afterwards uncovered, the proper motion required to render it visible in a large telescope was not excessive. I adopted the figure of one-fifth of a second as the minimum separation at which the duplicity would be certainly detected with the 26½-in. refractor at Johannesburg, as at that time I was not aware of the separation observed at Johannesburg. It is unfortunate that it has been interpreted as a measure of the separation made at this observatory. With the 18-in. visual refractor here, the duplicity has not been conclusively seen, though suspected. The most prominent feature of the star is the very strong nebulous envelope.

The Johannesburg observers are satisfied that there are three components, and suspect a fourth, thus still further adding to the mystery of this extraordinary star. The star is surrounded by rings which are probably due to matter ejected with high velocity at the outburst. The diameter of these rings suggests that the star is relatively near, much nearer than indicated by the spectroscopic parallax derived by Mr. Davidovich, and that the parallax should be easily measurable by direct methods. The star has therefore been placed upon the parallax observing list of the Cape Observatory.

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May 3.

Mechanical Production of Short Flashes of Light.

IN the study of phenomena which occur in a very short interval of time, it is usually necessary to have some kind of 'light shutter' that operates with extreme rapidity. An electro-optical shutter which lets through very short flashes of light has been previously described (Beams, *J.O.S.A. and R.S.I.*, **13**, 597; 1926; Lawrence and Beams, *Proc. N.A.S.*, **13**, 207; 1927), but in some experiments it is highly desirable that the shutter operate as many times per second as possible in order that enough intensity can be obtained to observe the phenomena accurately.

If one sends monochromatic light into an interferometer, say of the Michelson type, and projects approximately straight fringes upon a slit or slit system parallel to the fringes, and then changes the optical path in one arm of the interferometer with respect to the other, the fringes move perpendicular to their length. The slit then becomes a source of light flashes the duration of which depends upon the time required for a bright fringe to cross the slit. If, then, the optical path in one arm of the interferometer is changed rapidly enough with respect to the other, very short flashes of light can be produced. Thus, if light of 5000 A. is used, and the optical path changed at the rate of 1 cm./sec., then 2×10^4 flashes are produced per second, each flash lasting not longer than 5×10^{-5} sec.

There are, of course, several ways of changing the optical path with considerable rapidity, but the following device has been adopted because of its simplicity and the tremendous rate of change of optical path which it effects: two right angle prisms of identical material and dimensions are placed in one arm of the interferometer so that their hypotenuses are parallel, and so oriented that if the hypotenuses were in contact, the two prisms will form a rectangular block.

Light incident perpendicular to one of the sides is then undeviated as it passes through the prisms. If the two prisms are moved with respect to each other horizontally and parallel to the side upon which the light is incident, the optical path is changed and the fringes in the interferometer move. The rate of change in optical path depends upon the index of refraction of the glass, the angles of the prisms and the speed with which the prisms move, while the total difference in optical path at any time is limited only by the coherence length of the monochromatic light used.

In my preliminary experiments a single glass prism with a small vertical angle was mounted on a balanced steel arm, which was fastened to the shaft of an electric motor so that the prism moved approximately parallel to an identical fixed prism in the optical path. On the same shaft an opaque disc with a small slit in its edge revolved in front of a mercury arc source, so that light passed through the interferometer only while the optical path was being changed. A filter which permitted only the mercury green line to pass was used in front of the arc. The duration of each light flash was slightly less than 10^{-7} sec. These light flashes when sent back through the interferometer form two sets of fringe systems. These fringes are viewed by means of a mirror placed in front of the mercury arc in such a way as to avoid undesirable reflected light. One of these fringe systems is approximately stationary and serves to indicate when the apparatus is working properly. Although not used in this preliminary work, the instrument can be calibrated if desired in terms of the velocity of light by letting the light flashes pass over a measured distance before sending them back through the interferometer and observing the relative shift of this stationary fringe system. In fact, it is even possible to make this calibration with the slit removed.

One of the applications of this apparatus might be mentioned. If light flashes of the proper wave-length are focused on a bulb containing metallic vapour, and the resonance light from the bulb sent back through the interferometer, the resulting fringes will appear stationary, due to a sort of stroboscopic effect when the length of light flashes are constant, but will move or change their character when the flashes are shortened, depending upon the average time between excitation and emission for the vapour.

The present arrangement is not very satisfactory, because the two prisms twist slightly, and hence a very narrow slit in the opaque disc must be used, thereby sacrificing light intensity. However, a new apparatus is to be constructed in the near future that should eliminate these difficulties as well as give shorter light flashes. It should be easy to produce flashes of 10^{-8} sec. and possibly 10^{-9} sec. duration.

The writer desires to express his appreciation of the valuable suggestions made by Mr. Donald Cooksey with regard to the design of the mechanical parts of the apparatus.

J. W. BEAMS.
Yale University,
April 19.

The Band Spectrum of Mercury excited by a High Frequency Discharge.

A METHOD of exciting spectra by a high frequency discharge has been described by Wood and Loomis (NATURE, **120**, 510; 1927), Clarke (NATURE, **120**, 727; 1927), and others. The method consists of sending a high frequency current through a wire coiled around the tube in which the discharge is excited. While

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Arctic Aviation.

THE development of aviation, which may already be regarded as a safe means of transport for even comparatively long distances, promises before long to bring the realisation of the sixteenth-century dreams of the north-west and north-east passages and the transpolar routes between Europe and Pacific lands. For three centuries the polar ice has baffled man, but at length the aeroplane and airship have shown him how to avoid it. In 1919, Dr. W. Bruns suggested a series of transpolar commercial routes for airships, and a few years later Mr. V. Stefansson pointed out the advantages that the Arctic offered for flying. Plans for Arctic exploration by air were further discussed at a representative meeting in Berlin in November 1926, which led to the formation of the Internationale Studiengesellschaft zur Erforschung der Arktis mit dem Luftschiff, under the presidency of Dr. F. Nansen. The second general meeting of the society is to be held at Leningrad on June 18-23, when a long programme of papers on Arctic problems will be discussed.

Polar exploration by ship and sledge has made slow advances in recent years. A new method of attack on the inaccessible inner regions of the Arctic Sea is desirable if the remaining problems of the Arctic are to be solved. It was Dr. Nansen who, in defiance of all the accepted canons of polar exploration of the day, introduced the novel idea of a drifting ship in his journey in the *Fram* in 1892–95. At Berlin he dwelt on the value of the airship as an improvement on other means of transport. The new international organisation, of which several well-known British meteorologists are members, aims at raising funds for systematic polar exploration by air, and incidental to that work, the institution of meteorological and magnetic observations in high latitudes. In furtherance of the Association's aims, a quarterly journal entitled *Arktis* (Gotha: Justus Perthes) is being published. The first number, containing several valuable articles on polar work in German, French, and English, has just appeared. It contains also the constitution and membership of the Association, which, for convenience sake, is known as Aeroarctic.

International co-operation in polar exploration is not a new idea. So long ago as 1882–83 eleven States co-operated in a scheme for thirteen Arctic and two Antarctic observatories. The results of that one year's work was the basis of much of our knowledge of Arctic meteorology. To-day there are permanent observatories in west and east