has been disregarded. As a result of this, neither the solid angle covered by the beam of recoil atoms nor the time can be simply determined from the distance source-screen.

Experiments are in progress to test the following

two points. (1) In the case of ThC', λ_a from the Geiger-Nuttall formula may be expected to be very large. Provided λ_{γ} is of the same order of magnitude as the velocity of the recoil atoms from ThC, we should expect to find an exponential decay of the a-activity of ThC' with time.

(2) When a preparation of RaC deposited on nickel is placed in a vacuum, part of the γ -radiation should originate from the space surrounding the source; by a suitable screening it should be possible to detect a variation with the pressure in the apparatus of the ionisation due to the γ -rays.

I desire to express my thanks to Prof. Bohr for the interest he has taken in the work.

J. C. JACOBSEN, Institute for Theoretical Physics, University, Copenhagen, Oct. 14.

The 'Green Flash.'

REFERRING to Sir Oliver Lodge's conviction that the green flash at sunset is mainly physiological (NATURE, Dec. 3, p. 807), I would point out that this does not explain the appearance at sunrise, The green flash has been seen at sunrise by numerous observers; I have myself seen it repeatedly. As seen through field glasses the green flash at sunset has no appearance of being physiological; the two ends of the last visible segment of the sun take on the green hue first, and this spreads rapidly over the whole segment as it grows smaller, until the last visible part of the sun becomes a vivid blue green. This appearance as seen through field glasses has been described more than once. The green flash is only seen when the sun sets behind a distant horizon, whether this be sea, land, or cloud, as would be expected if the flash were due to refraction. If the cause were physiological the flash should be seen when the sun sets behind a horizon close at hand, but so far as I know this is not the case.

With regard to Sir Oliver Lodge's observation of the appearance of a momentary greenness when he switches off a bright light, I have tried a similar experiment (1) with the naked eye, when the first after-image seemed to me to be golden; (2) looking through a yellow, Wratton G, filter, when the first after-image was a deeper gold; and (3) through a deep red, Wratton A, filter, when the first after-image was a very deep red. Some seconds later, when its intensity began to fade, the after-image became a dirty green, and this lasted for a considerable time. Probably different observers react differently, for I notice that my two eyes react in a slightly different manner. It would be interesting to know whether the greenish appearance mentioned by Sir Oliver Lodge has any of the vividness and distinctness of any of the appearances of the green flash that he may have seen.

The green flash at sunrise and sunset lasts a vory short time. I should estimate it as half a second at most as seen with the naked eye; it does not fade away gradually as would an after image, but 'goes out' suddenly at sunset, and at sunrise it changes as suddenly to the yellow of the sun. The appearance at sunrise seems to me definitely to rule out the physiological explanation. The literature of the green flash is very voluminous,

and extends into fiction, but the whole subject was

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dealt with by Dr. A. A. Rambaut in the Meteorological Magazine, vol. 41, pp. 21 and 41. After reading these articles, and after having myself seen the green flash many times both at sunrise and at sunset, I can feel no sort of doubt that the explanation is physical and not physiological. The explanation as a refraction phenomenon is so simple, and fits the facts so well, that it is curious that there should be such a reluctance to accept it.

Stoner Hill, Petersfield, Hants, Dec. 3.

MUCH confusion has beset this subject, because two entirely different things are unfortunately covered by the phrase 'green flash.' If separate names had from the first been given to the two things, each would have been treated apart from the other and a great amount of controversy avoided. A greenish light appears as a physiological effect on ceasing to look at the red disc of the setting sun, as Sir Oliver Lodge points out in NATURE of Dec. 3. But there is also a purely physical phenomenon of sunset which is seen at the instant when the last portion of the sun's disc disappears on a sharp horizon. During the years when I was much at sca I used to watch every clear sunset, and raroly failed to observe this phenomenon though it was sometimes incomplete. It appeared at its best on half-a-dozen occasions when the thinnest segment of the sun's disc was still above the horizon, but with its light so much reduced that it could be looked at easily through a field-glass. However red the sun may have been when fully visible, the tiny shaving of a flat arc had become distinctly vellow, and as it was disappearing, the ends turned greenish and seemed to shrink towards the centre, at which the last light visible seemed to be intensified to a clear green point, which changed into blue and vanished in violet in a fraction of a second too short to estimate.

During the visit of the British Association to South Africa in 1905, I had many arguments on the subject with sceptical fellow-members, some of whom denied the existence of a green ray, and others explained it as an optical illusion or an effect of fatigue of the retina. The sturdiest doubter was Dr. A. A. Rambaut, the Radcliffe Observer at Oxford, but at last he saw the light from the deck of the Durham Castle as the sun was setting behind Cape Guardafui. A few days later, he, along with Sir Henry Miers and others, caught the first rays of the rising sun and found the colours change in the reverse order from blue or green to yellow. Dr. Rambaut went into the matter fully in a paper, "The Green Flash on the Horizon," published in Symon's Meteorological Magazine for March and April 1906 (vol. 41, pp. 21-23, 41-45). His explanation was that the images of the sun formed by light of different wave-length are not exactly superimposed, and that as the last of the disc passes below the horizon the red image disappears before the yellow, the yellow before the green, and the green and blue images respectively go before the violet image fades. The duration of this change was worked out for various dates and different latitudes, and the conclusions arrived at in this paper have not been controverted so far as I know.

Dec. 3.

HUGH ROBERT MILL.

THE physiological theory of the green flash, resuscitated by Sir Oliver Lodge, is not now held by any competent observer who has made a careful study of the phenomenon. The late Mr. Whitmell was, I