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Observation of a Solar Eclipse in Sri Lanka

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Introduction

A partial solar eclipse was visible to Sri Lanka from 2.26 p.m. to 4.49 p.m. (local time) on 15th February this year. The news media in the island, quite justifiably, advised the general public against looking at the sun either directly or indirectly using smoked glasses, water basins and the like during the event since there was the ever present danger of damaging one's eyes. But, however, we felt that this was a negative approach to the problem considering the rarity of this heavenly spectacle. So we endeavoured to popularise a safe but simple and inexpensive method for observing the sun, and this method was used throughout the island on that occasion.

Apparatus

1. A piece of plane mirror of about $0.02 \times 0.02 m^2$ (A black demy paper with an opening of the same size, fixed on to a looking glass may be used).
2. A clean white paper.

Experimental Procedure

Place the plane mirror in sun and adjust its tilt so that light reflected by it is directed to screen placed indoors. Either a clean white paper or simply a wall could be used as the screen. When the mirror is at a distance of about 16m from the screen, an image of about 0.15m of the solar disc is obtained.

Discussion

The method is a modified version of the pin-hole camera. Here the mirror acts as a "pin-hole" which reflects light (Fig. 1). Since the angular diameter of the sun is nearly 107th of a radian the size of the image too is about 107th of the separation between the mirror and the screen, i.e., this separation determines the dimensions of the image. The contrast of the solar image is improved by both reducing the size of the mirror and darkening the background of the screen at the same time. The size of the mirror effectively controls the brightness of the image.

An image of required size and quality is easily obtained by varying the above factors according to one's needs, for instance, one with a diameter of several meters could be obtained in a very dark place such as inside a tunnel.

The passage of the reflected light also effects the definition of the image. Hence, it is advisable to pass the reflected beam through a shady (cool) area so that the undesirable "boiling" effects caused by the hotter layers of air near the ground is avoided. This is of paramount importance, if one wants to view the sun's surface details such as sunspots.

This method provides all with an equal opportunity for observing the sun disregarding the availability of facilities, hence its special relevance to the countries in the third world where the resources for science education is scant.

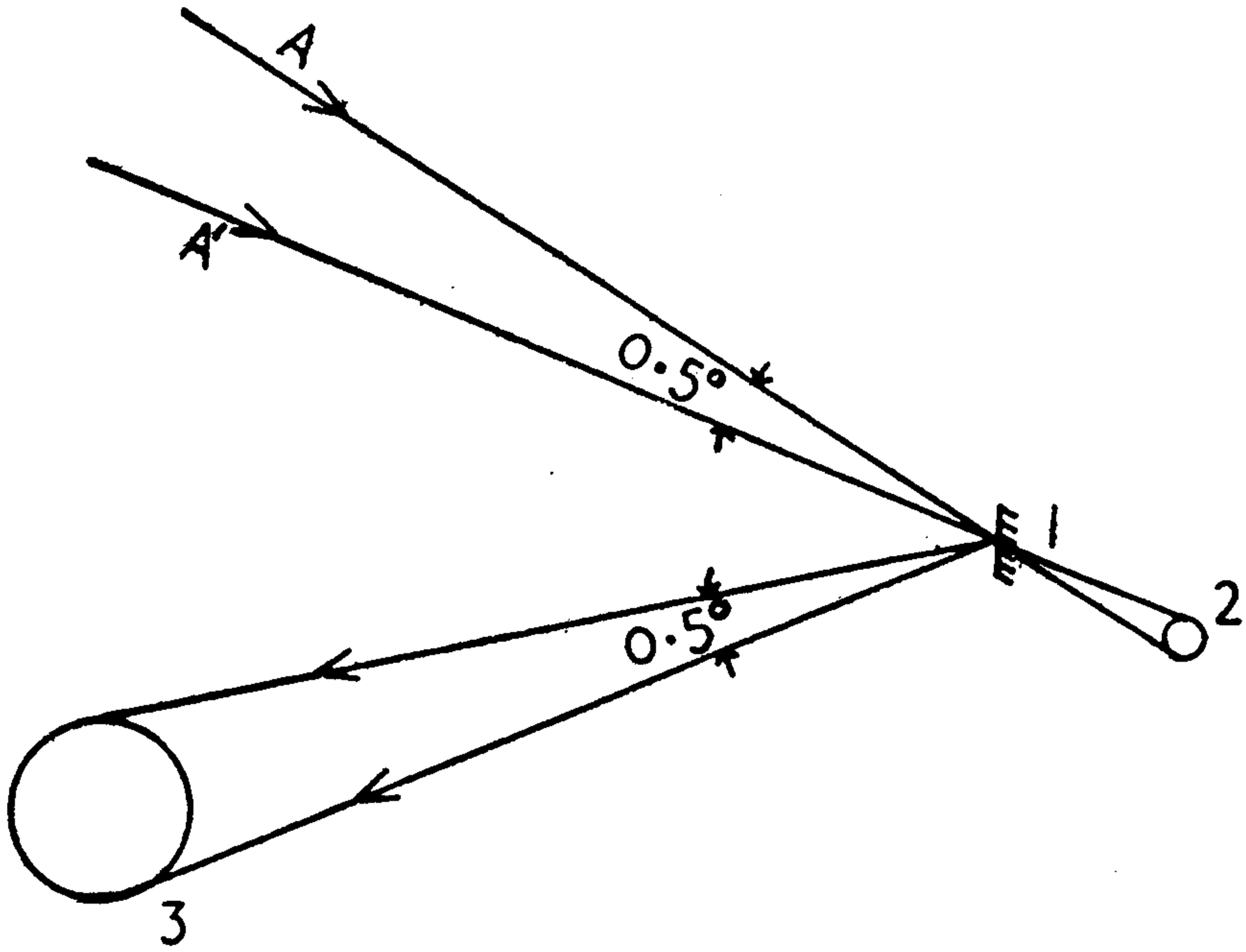

Fig. 1. IMAGE FORMATION.

AA1 Rays from two limbs of the solar disc.

1. Pin hole or small mirror.
2. Solar image due to pin hole without mirror.
3. Solar image by small mirror acting as a pin hole.

After getting a solar image this way, one could revive the student's interest in our nearest star and thereby proceed to introduce the concepts such as black body radiation, the presence of magnetic fields, the differential rotation and the like connected with the sun. It is obvious that this could be done at various levels of understanding. We found that in Sri Lanka (a country in the third world) this simple method could be utilised as a trigger point for stimulating the interest of the general public in science. And not only at a moment when everybody's attention is drawn towards the sun, but even at any other time this method could be used to enlighten the layman on the life dominating member of our solar system literally in a down to earth manner.

Acknowledgement

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Reference

1. Jenkins, F. A. and H. E. White, *Fundamentals of Optics*, 4th edition (Mc Graw-Hill, 1976), Section 1.1.