secondaries has already given evidence that at least one of them was a π-meson.

It is interesting to observe that our detailed analysis of the event was made possible by the fact that it took place in a very thick emulsion; for the great inclination of the plane of the π-mesons to the plane of the emulsion would not otherwise have allowed the tracks to be sufficiently long for that purpose.

We wish to acknowledge the help of the Brussels group and especially of Prof. G. Occhialini in developing the plate. The event was discovered by Mr. M. Greco.

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[1] Brown, Camerini, Fowler, Muirhead, Powell and Ritson, *Nature*, **163**, 82 (1949).

[2] Harding, *Phil. Mag.*, **41**, 405 (1950).

[3] Fowler, Menon, Powell and Rochat, *Phil. Mag.*, **42**, 1040 (1951).

Detection of *S* Waves in the Earth's Inner Core

A THEORETICAL calculation by one of us[1] shows that, if the earth's inner core has a rigidity comparable with its incompressibility, then the seismic phase *PKJKP* would, on present available knowledge, be most likely to be detected over a range of epicentral distance Δ given by $130° \leqslant \Delta \leqslant 155°$, the expected energy and amplitude in this phase being about 0·04 and 0·2, respectively, of that in the companion phase *PKIKP*. The phase *PKJKP* appears, therefore, to be on the border of observability and, if the solidity of the inner core is to be established, it becomes important to investigate the practical question of detecting a phase of such low amplitude.

The difficulty of the process of detection has been sharply focused by work of one of us (T. N. B.-G.), who has searched for the phase *PKJKP* over the series of seismograms recorded at the Riverview College Observatory from 1909 to the present day. The work, details of which are to be published elsewhere, shows that, of the whole series, there were only seventeen shocks for which Δ was in the above range and for which the amplitude of P' was greater than or equal to 4 μ. Of these seventeen shocks, Δ was approximately in the range 142°–145° in ten cases, and there was a fair probability that the observed P' related to a branch other than *PKIKP*. Of the remaining seven shocks, one had P' amplitudes of 6 μ, two of 5 μ and four of 4 μ. In the case of P' amplitude 6 μ (at $\Delta = 133°$), there were microseisms of amplitude 3 μ near the theoretical arrival-time of *PKJKP* and no impulse was observed. In one of the cases of P' amplitude 5 μ, microseisms were significant, and in the other the seismogram was changed at the expected *PKJKP* arrival-time. In the cases of P' amplitude 4 μ, there were movements near the expected arrival-time of *PKJKP* of amplitudes greater than or equal to those of P'; the size of these amplitudes means that they must be attributed to other causes.

The "International Seismological Summary" is of limited value in the search for *PKJKP* as it does not record amplitudes. A search was made over a section of the "Summary", and, while a limited number of recorded impulses were found to agree with the travel-time of *PKJKP*, it was not possible statistically to make any inference.

The main point which emerges from this investigation is the relatively small number of records from which the existence of the phase *PKJKP* is likely to be substantiated. It appears that, unless a record is traced far inland where microseisms are negligible, a prerequisite for observation of *PKJKP* is that the *PKIKP* amplitude should be at least about 20 μ. Not one of the Riverview seismograms over a period of more than forty years both conforms to this criterion and has the value of Δ in the correct range. The important question as to whether the earth's inner core is solid can therefore not be decided in this way, unless many routine observatory workers would be willing to record significant onsets (preferably on vertical component seismograms) within 20–30 sec. (say) on either side of the expected arrival-time[2] of *PKJKP*, whenever the *PKIKP* amplitude reaches 20 μ. The first of the signatories to this letter would appreciate it if details of such recordings could be transmitted to him. It appears that the best ranges to consider are $130° \leqslant \Delta < 142°$, $145° < \Delta \leqslant 155°$ (for $142° \leqslant \Delta \leqslant 145°$, it is difficult to estimate the amplitude of *PKIKP*).

It may be remarked that in the large earthquake of November 25, 1941 ($\varphi = 37·5°$ N., $\lambda = 18·5°$ W.), the P' amplitude at Riverview was 74 μ, while amplitudes of 11 μ and 15 μ were recorded on the vertical component, respectively 2 sec. before and 11 sec. after the expected arrival-time of *PKJKP*. The value of Δ for this earthquake is 171°, for which the calculated amplitude of *PKJKP* is only 0·03 times that of *PKIKP*. The theoretical amplitude calculations could be in appreciable error if the region F of the earth[3] differs seriously from the simple model assumed in the calculations, so that the onsets recorded at Riverview in the case of this earthquake could just possibly be significant in relation to *PKJKP*. It is suggested that the records of this earthquake might well be examined at observatories within the ranges of distance mentioned in the previous paragraph.

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[2] Bullen, K. E., *Mon. Not. Roy. Ast. Soc., Geophys. Supp.*, **6**, 125 (1950).

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Silver Films and Dielectric Multiple Films in Interferometry

THE work on multi-layer dielectric films as described recently by A. H. Jarrett and H. v. Klüber[1] is of interest in two respects: the reflectivities reported are rather higher than those found by other workers, and the successful use with étalons shows that these films must have a considerable degree of uniformity. But the comparison of the relative merits of these films and silver films for use with Fabry–Perot interferometers is very misleading. Jarrett and v. Klüber do not mention recent publications on the resolving power of silvered étalons and the reflectivity of