Cosmic Rays on the Pacific Ocean*

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AT the Cosmic-Ray Symposium held at Chicago last year, the significance of sidereal time variations was considered with regard to a possible effect of the rotation of the galaxy on the intensity of rays coming from outside the galaxy. An important objective of the studies of the distribution of cosmic rays on the Pacific Ocean has been to determine the relative intensity of rays in the Northern and Southern Hemispheres. According to the theory of the galactic rotation effect, if the cosmic rays do not share the rotational motion of the galaxy, the intensity in the Northern Hemisphere should be roughly 0.5 percent greater than in the Southern Hemisphere.

The result of 26 trips on the *R. M. S. Aorangi* from Vancouver, British Columbia, to Sydney, Australia, and on the *S.S. Talune* to Hobart, Tasmania, extended over a period of about 32 months, was to show very little difference between the two hemispheres. On both sides of the equator the intensity was found to be greater in the colder than in the warmer months. This observation led to the determination of an atmospheric temperature coefficient of the intensity of cosmic rays. This coefficient was found to vary from about -0.25 percent per degree C above latitude of 40° to about -0.05 percent at 25° latitude, a result predicted by Blackett from his disintegrating mesotron theory of the temperature effect.

When suitable corrections are applied to the observed intensity for this temperature effect and the familiar barometer effect, it is found that no detectable variation with latitude occurs at distances farther than 40° from the magnetic equator. At these higher latitudes the difference in the cosmic-ray ionization between the Northern and Southern Hemispheres is $0\pm$about 0.1 percent.

This result is inconsistent with the predicted difference of 0.5 percent magnitude, but is consistent with the smallness of the observed sidereal time variations. This may mean either that the motion of the sun with the rotation of the galaxy is much slower than has generally been supposed, or that the cosmic rays share the rotational motion of the galaxy. The former view is supported by certain recent astronomical studies by Camm, and the latter view is strongly argued by Alfvén.

* Cf. P. S. Gill, Phys. Rev. **55**, 1151 (1939) for complete paper.