Carl E. McIlwain comments on nuclear test ban

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The nuclear test ban may have to stay in effect 20 or 30 years before scientists can fully assess the results of 1962's four high-altitude nuclear explosions on radiation in outer space, says Carl E. McIlwain, Associate Professor of Physics, University of California, San Diego.

The reason is that before the 1962 tests no one had a very precise picture of the radiation belts girdling the globe.

Since the time of the explosions more data have come in from satellites, but, since natural and artificially induced radioactivity cannot be distinguished, the exact effects of the tests are still uncertain. All evidence points to the effects lasting two or three decades.

The American explosion, Starfish, particularly, has obscured the picture, McIlwain says. It was set off high in equatorial regions, where detailed information on natural radiation was sparse. The Russian tests, set off at higher latitudes because Russian missile bases happened to be located there, have caused less trouble, since electrons injected at high latitudes do not stay trapped in the earth's magnetic field as long as those injected from lower latitudes.

McIlwain's conclusions form part of a paper, published recently in Science, in which he describes the results of measurements of the belts of trapped radiation around the earth.

Since the discovery of geomagnetically trapped radiation early in 1958, McIlwain says, more than 200 detectors have been launched into space. However, for various reasons, no clear picture emerged. It was only with NASA's launching of Explorer XV in October 1962 that some of the more serious gaps could be filled in.

Two detectors designed by McIlwain at UCSD rode Explorer XV. His paper summarizes the results gained.

One discovery was the existence of a secondary peak in the distribution of high-energy protons at an altitude of about 5,000 miles. The first peak lies about 2,000 miles above the earth.

The electron flux of lower-energy electrons at a height of about 21000 miles are sufficiently intense that they constitute a hazard to satellites and astronauts, McIlwain says. Most of these electrons may have been produced by nuclear tests, he says.

One of the objectives of McIlwain's research has been to program radiation intensities on the UCSD computer. This has now been done for the date January 1, 1963. The data allows scientists to compute the radiation damage a space vehicle or astronaut would suffer along an arbitrary trajectory.