


# Flare Stars and the Radio

THE cosmic significance of the radio "stars" has been mentioned (*Science,* **113**, 3 [April 27, 1951]). These spots in the sky, which are empty of detectable stars, yet send short-wave signals that are superposed on the general radio noise from the Milky Way, tease the imagination and incite ingenuity in attempts to locate the sources—explain the phenomena.

A source has been found in a few instances. The expanding Crab Nebula, which was a supernova more than a million times the sun's brightness nine centuries ago, now sends a faint radio signal, presumably from the blue-hot nucleus that remains buried in the dissipating gas. The great Andromeda galaxy and three other spirals, Messier 33, 51, and 101, are now found to be radio transmitters.

It may be that the newly discovered phenomenon of flare stars provides a source of the background Milky Way static, even though it cannot readily account for radio stars. About half the fifty stars nearest the sun are now known to belong to the spectral class dM. They are dwarf, reddish stars with intrinsic luminosities less than one thousandth that of the sun—sometimes less than one ten-thousandth. Having radiated away most of their available energy, they are, presumably, asymptotically approaching a cold senility. Not many are known as yet, because they are too faint to appear in our ordinary surveys, but they are probably more numerous than any other kind of star in the universe; hence, the importance of finding out anything new about them.

A few years ago we first suspected that these near-by dwarfs are not dying off calmly. Some of them were under parallax study by A. van Maanen at Mount Wilson. Little attention was given to his report that two dM stars had flared up for an hour or so and then reverted to their customary steady brightness, until two years ago, when, on Harvard plates, one such faint red dwarf was found, by W. J. Luyten and others, to have flashed briefly on several occasions. We began to take the flares seriously. We computed that the total energy of a star flare was something like that of the flares on the surface of the sun (which disturb terrestrial short-wave radio). Since the sun is relatively bright, these localized blue flashes do not increase its total radiation appreciably; with the red dwarfs it is otherwise—a flare can double the total light.

A little later Gordon and Kron at the Lick Observatory saw one of the red dwarfs flaring up in their faces. They measured it with a photoelectric photometer and found rapid changes, but all was soon quiet and steady. The Harvard astronomers then looked back at some earlier measures of the nearest of all stars, Proxima Centauri, which is also a red dwarf, and found flares recorded among the observations of the 1930s. Further examination of the plates shows that within the past twenty-five years fifty of these conspicuous brief flashes have occurred on Proxima Centauri. Finally, from Swarthmore comes an unpublished report that still another of these near-by flare stars is revealed in a 1939 photograph. It quadrupled its total brightness and recovered completely from the flash in an interval of two or three hours.

The implications are startling. A fourth of the near-by red dwarfs are flare stars—further study may show that most of them are flaring. We have opened up suddenly a new phase in the study of the evolution of stellar bodies. Perhaps we have also discovered the source of some of the radio signals from interstellar space.

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SCIENCE, founded in 1880, is published each Friday by the American Association for the Advancement of Science at the Business Press, 10 McGovern Ave., Lancaster, Pa. Entered as second-class matter at the Post Office at Lancaster, Pa., January 13, 1948, under the Act of March 3, 1879. Acceptance for mailing at the special rate postage provided for in the Act of February 28, 1925, embodied in Paragraph (d-2) Section 34.40 P. L. & R. of 1948.

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