

ASTRONOMY

Milky Way Light Changed

Although not apparent to the naked eye, light from distant stars in the Milky Way is made to vibrate more in one direction than in another.

► LIGHT from stars within the Milky Way, so clearly visible these winter evenings, differs from light reaching us from other stars in the heavens.

To the naked eye it may seem no different from other light, yet it dances in a restricted way. It vibrates more in one direction than in another. Scientists call it "polarized" light.

Light from faint stars within the Milky Way is unusual in that as much as 12% more rays vibrate in one plane than in another, Dr. W. Arthur Hiltner of Yerkes and McDonald Observatories of the Universities of Chicago and Texas reports in SCIENCE (Feb. 18). His studies were conducted with the McDonald 82-inch reflecting telescope.

Dr. John S. Hall of the U. S. Naval Observatory states in the same issue that work with the 40-inch reflector at Washington also indicates that light from the Milky Way stars is polarized.

Furthermore, the amount of polarization appears to be the same for light of different colors, Dr. Hall says.

Ordinary light might be considered a sensation caused by looking end-on at a large number of violin strings, vibrating in random planes or directions. If more strings vibrate in one plane than in another, this light is said to be polarized.

A piece of polaroid will let through light vibrating in only one plane just as a directional antenna receives certain radio

waves. Such polaroid film is used for sunglasses to cut down glare.

If we examine polarized light through a piece of polaroid, the intensity of this light will change as the film is rotated. The brilliance of stars in the direction of the Milky Way was found to be dimmed as much as 12% by turning the polaroid.

This change in intensity can be measured accurately by a photoelectric photometer. Such a device, which converts light into electrical energy that can be measured precisely, was used for the study.

Dr. Hiltner's photoelectric photometer incorporated polaroid film. Dr. Hall constructed a "flicker" photometer in which the polarizer is rotated at a fixed speed.

The two astronomers originally worked together at McDonald Observatory on this important research which for the first time has shown that starlight reaching the earth from certain regions of the sky is polarized.

Light from stars well separated from the Milky Way gives no evidence of polarization. Since these stars are basically similar to those in or near the plane of the Milky Way, it must be assumed that the light is not polarized when it leaves the distant stars. Thus interstellar particles known to exist between us and such Milky Way stars must be assumed in some way to change the direction in which the light vibrates.

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EXAMINING POLARIZED LIGHT—Here is shown the scanning mechanism and photometer mounted on the 40-inch reflecting telescope at the U. S. Naval Observatory. The A. C. amplifier and automatic recorder shown at right were used by Dr. Hall in this work.

cylinder, and two wire contacts were mounted above, their points resting on the germanium surface.

In the new unit, the germanium disk has depressions ground into each side of its center section, so that this center section is only a few thousandths of an inch thick. The disk is then fitted into the center of the cylinder and the point contacts, which emit and collect the current, are placed against it on opposite sides.

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ENGINEERING

Germanium for Transistors

► A TINY BIT of germanium metal may soon be used instead of a vacuum tube in radio receivers and other instruments where simple amplifying is required. In telephony and electronics in general the germanium device has great possibilities, the American Institute of Electrical Engineers was told by scientists of the Bell Telephone Laboratories. They revealed an improved germanium amplifier.

The device which utilizes this semiconductor metal is called a transistor. Basic work on the transistor, which was announced in July, 1948, was carried on at the Bell Laboratories by Drs. John Bardeen and Walter H. Brattain. Later developments were described at the meeting by Dr. Winston E. Kock and R. L. Wallace, Jr. All four men are members of the laboratory's technical staff.

These transistors, the meeting was told, are about the size of medicine capsules but can perform most of the key jobs now done by vacuum tubes. They operate entirely without vacuum, they have no filament to cause warm-up delay, and they are smaller and lighter than commercially available vacuum tubes. They function on an entirely new physical principle discovered in the course of Bell Laboratories' program of fundamental research into the electrical properties of solids.

A unit has now been developed which promises to be more stable and efficient and to handle greater amounts of power than the type originally designed, the scientists revealed. Like the first model, the new transistor requires the use of a tiny pin-point of germanium. In the first type, the metal was mounted at the base of a hollow

GENERAL SCIENCE

Fewer "Extra Families" Now, Group Reports

► FEWER married couples are now living with in-laws than were before the war in 1940, a construction industry spokesman said.

Melvin H. Baker, chairman of the Construction Industry Information Committee, reported that some 2,100,000 married couples are now living as "extra families." This is 612,000 fewer than two years ago, and a drop of seven percent from 1940.

In 1940, he said, one in every 16 couples did not have its own household. At the peak of the housing shortage in 1947, one in every 12 was an extra family, and now only one in every 17 couples is doubled up in housing.

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