ASTRONOMY

Noise Heats Sun's Corona

Extreme temperatures of the sun's outer envelope may be due to the unheard noise of giant bubbles bursting on the surface of the sun.

UNHEARD noise of giant bubbles bursting on the surface of the sun may help explain the heat of the sun's famed corona, outer envelope visible during a total solar eclipse.

This flaming layer of gas, extending thousands of miles beyond the surface of the sun that we normally see, is itself many times hotter than this solar surface.

The new theory that a stream of sound waves of inaudibly low frequency keeps up the high temperature of the corona—estimated at a million degrees—has been proposed by Dr. Martin Schwarzschild of Princeton University Observatory.

Photographs of the sun taken with high-powered telescopes reveal its surface to be thickly strewn with bright granules or gas bubbles. These bubbles, hundreds of miles across, exist but a few minutes. At any time about one-tenth of the sun's surface is covered with rising bubbles.

This tremendous bubbling of gases produces subsonic noise. But even if you could solve the transportation problem and survive the intense heat of the sun, you would not be able to hear it. The noise is of the same type as the "silent" sound of huge ocean swells, which, unlike the crashing of waves, you cannot hear. Outside the range of human ears, it may carry mechanical energy.

This steady stream of compression waves, originating in the turbulent motions of the granules, passes upward through the photosphere or sun's visible surface. This region of the sun, however, is not visibly affected by the compression waves passing through it. Thus its presence is not betrayed in photographs of the sun.

When the noise reaches the less-dense region of the corona, its mechanical energy is converted into heat. The region through which it passes unnoticed, from the top of the granulation to the base of the corona, is about 500 miles wide.

"It appears likely that the energy stream in the noise produced by the turbulence of the granulation is sufficient in size to offset the heat loss of the corona," Dr. Schwarzschild explains in the *Astrophysical Journal* (Jan.).

Even though the noise carries into the higher layers of the corona only a small fraction of the energy of the granules, it is enough to provide the heat necessary for maintaining its high temperatures, Dr. Schwarzschild calculates.

How the high temperature of the corona, many times greater than that of the sun's visible surface, could be maintained has been one of the sun's mysteries. Dr. Schwarzschild believes that the noise of the sun's bubbling surface, flowing hundreds of miles out into space, may supply the corona with its great heat.

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ASTRONOMY

Infra-Red Detected

THE world's most sensitive instrument for detecting light in the near infra-red region of the spectrum of the sun or a star has been developed at Mt. Hamilton, Calif.

After a trial of several months, the effectiveness of the instrument has been proved beyond a doubt, Dr. Gerald E. Kron of Lick Observatory stated.

A modification in the circuit of the photoelectric photometer, used for detecting light too deep red for the eye to see, has made this possible. The only instrument of its kind is being used at Lick Observatory of the University of California to study how much a star's light changes when one member of a two-star team comes between us and its companion. Another of these instruments is being built at Yerkes Observatory of the University of Chicago.

By only a minor change, the effectiveness of the photoelectric cell in the near infra-red region of the spectrum has been extended two magnitudes. This means it can record light only one-sixth as bright as was possible before with the best equipment.

Although development of this improved instrument has been thought possible for a year or so, it has only now been proved "to be really good," Dr. Kron stated.

In the past few years new developments have made it possible to reach out and record much fainter light at the blue end of the spectrum's red end. Now astronomers can work as effectively with near infra-red light.

The new infra-red photoelectric photometer works much more effectively at room temperature than such instruments did in the past when dry ice or some other refrigerant was used. Chilled with dry ice, its usefulness would be further improved.

The modification that made the instrument practical was actually that of cutting down the circuit's capacity. This reduced the time required for the star's brightness to be indicated.

In the new instrument, a resistor of ten billion ohms is used. To improve the instrument's seeing ability, a resistor of a thousand billion ohms was desired. But by this change, the indication time was slowed down from 10 seconds to 1,000 seconds.

To overcome this, all but 1 per cent of the electrical capacity of the entire circuit was cancelled by an electrical method.

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DARING YOUNG APES—Shipped by air from Bangkok, Siam, to the San Diego Zoo, these gibbons are the smallest of the apes and are famed as the world's greatest aerial performers. Some zoologists rate these long-armed apes as the nearest approach to man among animals.