

# Questions

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ASTROPHYSICS

# Solar Flare Mechanism

Astronomer suggests that solar flares result from the same mechanism, the "pinch effect," now being explored as a possible means of controlling thermonuclear reactions.

➤ A HINT that the same mechanism producing solar flares might also be useful in controlling the H-bomb's fusion reactions for peaceful purposes is made by an English astronomer.

The mechanism is the "pinch effect." It is a possible method of obtaining the high temperatures needed to fuse, or join, the light elements into heavier ones with release of energy.

Generating the high heat in a controlled manner requires containers that will not melt or be otherwise affected.

Using the "pinch effect" would seem to eliminate the container problem, since the reacting gas column would contract to contain itself, thus not touch any walls.

Dr. T. Gold of the Royal Greenwich Observatory, Herstmonceux Castle, Sussex, suggests that, in the sun, the "pinch effect" may cause the speeding up of particles, resulting in the solar flares, great arcs of hot, glowing gases thrown out of the sun's surface. (See SNL, April 24, 1954, p. 263.)

The pinch effect, Dr. Gold notes, was described by the Russian scientist, Dr. I. V. Kurchatov when, earlier this year at Harwell, he reported Soviet experiments on gas discharges with high density currents. Dr. Kurchatov said their observations showed some particles with energies very much higher than would be expected were produced.

The leading Russian authority on atomic energy told of studies in which temperatures near 1,000,000 degrees Centigrade were reached for very short periods of time by passing large currents through gases like deuterium, using a strong magnetic field to keep the gas ions away from the container walls.

The unexpected appearance of the few very high energy particles in deuterium was detected by the neutrons and gamma rays produced. This phenomenon, Dr. Gold says in *Nature* (Sept. 1), was always "clearly related" to the second constriction of the spark, or "pinch effect."

He proposes that, in sparks constricted in their own magnetic field, there is a mechanism for accelerating a small fraction of the particles to high energies.

In solar flares, Dr. Gold suggests, high energy particles are also present. Electric currents, evenly distributed through large volumes, normally flow in the vicinity of sunspots. When the current density becomes too high, an instability occurs, causing the currents to become constricted along one or several lines due to their own magnetic field.

If this interpretation of solar flares is correct, Dr. Gold says, the Russian experi-

ments would seem to provide an analytical laboratory method for further studies.

The "pinch effect" was first noted by E. Northrup in 1907. Two University of Southern California scientists have reported their studies of this effect, and Atomic Energy Commission scientists involved in Project Sherwood, code name for the U. S. attempt to tame the fusion reaction for peaceful purposes, are believed to be working along similar lines, although their work is shrouded in secrecy.

Science News Letter, September 15, 1956

## Do You Know?

Forty-one different species of *termites* exist in the United States.

There are nearly a thousand *languages* in Africa alone.

The average American is expected to eat about 83 pounds of *beef* in 1956, two pounds more than eaten in 1955.

On its original fuel charge, the *atomic submarine* Nautilus cruised over 40,000 miles, more than half of the distance under water.

Six bottles of *air* from the earth's outer atmosphere were collected 75 miles up by steel bottles inside the nose cones of two 20-foot Navy Aerobee rockets.

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