National Aeronautics and Space Administration

22,300 MILES AWAY—The above sequence of photographs shows the firing of the apogee kick motor that sent Syncom II into near synchronous orbit 22,300 miles above the east coast of Africa. The solid propellant rocket aboard the 28-inch diameter spacecraft fired for about 20 seconds, while the Smithsonian Astrophysical Observatory in South Africa photographed it from the ground

ASTROPHYSICS

Deadly Sprays on Moon

The lives of any men on the moon during sudden solar flares would be endangered by eruptions of neutron streams from the moon's surface—By Walter Wingo

➤ MEN ON THE MOON would be sprayed by deadly geysers of atomic particles erupting under their feet, should the far-off sun suddenly flare up—as it often does.

Such is the disheartening opinion of Dr. M. V. K. Appa Rao, an Indian physicist who has been measuring radiation from moon-type rocks at the University of Rochester, N. Y.

For four months Dr. Rao fired protons, helium nuclei and other atomic particles at chondrite and basalt, which appear to make up the moon's surface.

Statistics on the number of neutrons—a highly penetrating form of radiation—the rocks emitted were reported in Science, 141:530, 1963.

Ordinarily the neutron spray would not be enough to damage life, Dr. Rao told SCIENCE SERVICE. But talks with radiation biologists about his measurements convince him the emissions would "certainly be a hazard" during a solar flare.

The intensity of cosmic rays, which cause atoms in the rocks to throw off neutrons, increases from 15% to 5,000% whenever giant streams of matter suddenly shoot far out from the sun.

The flare-ups, believed to occur when super-hot matter from deep inside the sun bubbles to the surface, are especially numerous when the sun is at the high point in its 11-year cycle of activity. The earth's dense atmosphere protects us from most of this intense radiation, but the moon does not have a protective atmosphere.

When cosmic particles bombard nuclei, such as those Dr. Rao believes are on the moon's surface, the nuclei eject neutrons, which are not given off in normal radioactive decay processes. Neutrons pass through most matter with ease until they collide with a nucleus.

Dr. Rao, who is on leave in this country from the Tata Institute of Fundamental Research, Bombay, hopes more detailed calculations, using computers, are carried out before man pays a visit to his nearest, but perhaps inhospitable, neighbor in space.

• Science News Letter, 84:115 Aug. 24, 1963

SPACE

Echo I Still Visible 13,700 Orbits Later

➤ ECHO I, the reflecting balloon satellite launched three years ago Aug. 12, is still visible, although somewhat dimmed.

Since its launching in 1960, it has orbited some 13,700 times, has traveled over 420 million miles around the earth and been seen by millions upon millions of persons.

Inflated in orbit by remote control, the 100-foot sphere served as a radio reflector for the first four and one-half months of its life, before solar radiation and meteoroids reduced its reflecting power.

It has also provided valuable information on air drag in the outer reaches of our atmosphere and on the effects of "solar wind."

This "wind" is actually solar radiation pressure, far more important in space than on the earth's surface. Echo I, being very large and very light for its size, is greatly affected by this solar wind, and has been blown off its orbit and back on again three times.

Although heavier more compact spacecraft are not affected as greatly by "solar wind," during a long period the effects are noticeable.

• Science News Letter, 84:115 Aug. 24, 1963

ASTROPHYSICS

Anti-Matter Particle, Last in Nuclear Family

➤ A NEW PARTICLE of anti-matter, the last member of the known family of nuclear inhabitants, has been discovered by two teams of physicists.

The particle, whose existence was predicted several years ago, is called the anti-Xi-zero. It exists for only a fraction of a billionth of a second. Since it is neutral, it cannot be spotted directly but its existence can be inferred from the way it reacts with other particles.

The Yale University and Brookhaven National Laboratory physicists report the discovery and identification of the rare particle in Physical Review Letters, 11:165, 1963. Many of these same physicists cooperated in the discovery of another anti-particle, the anti-Xi-minus, a year and a half ago.

For the experiment, a beam of anti-protons having an energy of 3.69 billion electron volts, was aimed at a 20-inch hydrogen bubble chamber. From 300,000 photographs of the reactions of the anti-protons with protons in the hydrogen liquid, three events were found in which an anti-Xi-zero was identified.

Following this discovery, any new particles found in the future will require the start of entirely new families of these fundamental building blocks of matter.

In alphabetical order, the Brookhaven physicists taking part in the experiments are Drs. B. Brian Culwick, William B. Fowler, Joshua K. Kopp, Robert I. Louttit, James R. Sanford, Ralph P. Shutt, David L. Stonehill, Robert Stump, Alan M. Thorndike and Medford S. Webster.

The Yale University physicists are Charles Baltay, and Drs. Jack Sandweiss and Horace D. Taft.

The immediate decay products are an anti-lambda-zero and a neutral pi meson, which are also unobservable. The subsequent decay of the anti-lambda particle, however, does leave visible tracks. From these decay products and other phenomena, the preceding chain of events can be deduced.

• Science News Letter, 84:115 Aug. 24, 1963