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FOR AMS SUNDAY, SEPTEMBER 14, 1958

CHICAGO--University of Chicago physicists plan to launch the largest balloon in the world next winter to take pictures of cosmic rays 130,000 feet above the earth.

They also seek clues to the mysterious "anti-matter" of the sub-atomic world.

A 250-foot unmanned balloon, buoyed by twice the volume of helium gas ever used before, is out to capture cosmic rays in their "natural state" before they hit most of the earth's atmosphere.

The effort will mark the beginning of a three-year project in cooperation with the Office of Naval Research, made possible by a $450,000 grant from the National Science Foundation.

University of Chicago physics professor Marcel Schein, who will be in charge of the explorations, said that cosmic rays at the heights set for the balloon move with energies a thousand times greater than yet produced by man.

An international group of scientists will participate in the project.

Schein said that objectives of the flights to the upper limits of the earth's atmosphere include information on:

--where cosmic rays come from

--how much energy they have

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--the possible existence of anti-matter, the opposite of material substance as we now know it.

The balloon should stay aloft for 24 to 48 hours, if all goes well, Schein said, and such a span would set a record for unmanned balloons in these experiments.

The initial launching will be made at the magnetic equator. Schein explained that only the most powerful cosmic rays can get through that invisible barrier.

He seeks records of the split second explosions of cosmic rays with energies of 10,000-billion electron volts (BEV).

This winter's balloon launching will be made with this equipment:

--a huge plastic sack with a skin thinner than paper--a thousandth of an inch thick.

--seven million cubic feet of helium gas, compared with four million used in the largest previous balloons.

--a sealed aluminum gondola encased in foam plastic and carrying a stack of 600 photographic plates each a foot and a half by two feet for a total weight of half a ton.

The stacks of photographic plates will make permanent records of the cosmic rays that pierce them and leave their marks upon the film emulsion.

Professor Schein's group will be looking for heavy nuclei, such as oxygen, lithium, magnesium, silicon, and iron, whose proportions in many stars and galaxies are well known. These nuclei will be identified by the patterns of exploding nuclear particles they leave on the film.

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These explosions also reveal the energy with which each cosmic ray enters the emulsion as determined by the length and strength of the jet of particles in a whole chain of explosions of released nuclear particles.

This stack of photo emulsions is a foot thick, the largest ever taken aloft.

Experiments with ultra-high energy cyclotrons have provided clues to the existence in the universe of a new form of matter, the antithesis of matter as we now know it, called anti-matter. Physicists believe that when matter and anti-matter meet, the result is their complete conversion to energy.

Such mutual annihilation would appear on the balloon's films as the collision of two nuclei in an explosion that would be gigantic in comparison to that of ordinary matter.

The University of Chicago is now constructing a new plant with funds from the NSF grant to process the photographic film used in this type of experiment.

After processing, the film will be studied under microscopes at the University of Chicago and at other laboratories in the United States and in Europe. The observations will then by assembled by Professor Schein for correlations and analysis. Each stack will require several months to process and study.

Earlier this week, David Haskin and Erich Lohrmann, research assistants to Mr. Schein, left for Brownwood, Texas, to launch a two million cubic foot balloon in another phase of their group's investigations.

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BACKGROUND AT A GLANCE

Who

Marcel Schein, professor of physics in the Enrico Fermi Institute for Nuclear Studies, University of Chicago. His last major experiment sent a four-million cubic foot balloon aloft, on July 19 in Minnesota, that set a record for sustained flight at 130,000 feet for nearly 20 hours.

National Science Foundation, an agency of the U.S. government established to develop a national science policy and support basic scientific research projects.

Office of Naval Research, the U.S. Navy agency that is conducting the long-range investigation called Project Skyhook for high atmosphere research.

What

Launching of the world's largest balloon to the stratosphere for what is hoped will be a record 24-48 hour flight to gather cosmic ray data at 130,000 feet.

When

Some time this winter.

Where

Somewhere along the earth's magnetic equator, which does not coincide with the geographic equator. The magnetic equator is the line where the earth's magnetic field has lines of force parallel to the ground. Only the more powerful cosmic rays, those above 20-bev, pierce the magnetic equator; weaker rays are deflected.

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Why

seek information on cosmic rays at a point where the earth's atosphere has not yet affected their energies--the middle of the stratosphere--in the hope of learning more about where cosmic rays come from, what energies they specifically have, and whether it might be possible to get a photographic record of the collision involving a postulated "anti-matter", a mysterious "something" challenging scientific investigation.

How

Stacks of photographic plates .025 inch thick carried in a sealed unmanned gondola will record the tell-tale trails of cosmic rays going through the films. The rays hit atoms in the photographic emulsion, leaving patterns which are distinctive.

Cosmic Rays

These rays form the bulk of the "natural background radiation" that is always with us. Most theories say they are atomic nuclei shot from the sun, nearby stars and galaxies. The effect of cosmic rays was first observed experimentally in Germany in 1902. Their cosmic origin was first offered in a theory in 1925 by Professor Robert A. Millikan, who won a Nobel Prize in 1923 for work done at the University of Chicago.

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"Flying Saucers" (Civilian UFO Investigation — New Zealand) v 4#4 2nd Quarter, 1957

Magnetic Engineer's Theory May Explain Some Saucer Reports

From Wilbur B. Smith of Canada's "PROJECT MAGNET" fame comes this very interesting Technical Paper. States Mr. Smith in an accompanying letter to C.S.I. of recent date.

"During our investigations and analysis of various sightings we worked out this betatron effect, and feel that it will explain a few rather tough cases, although I certainly don't think it is an across-the-board solution. We did have a few sightings that I am convinced where plasma vortices developed in accordance with our theory.

I am convinced of the reality of space ships from other parts of the cosmos, but I think that in all honesty we must separate the other effects first. Goodness knows there is such a lot we don't know yet about the atmosphere of our planet, and every little bit of knowledge we can get should be welcomed."

THE "BETATRON EFFECT"

Certain phenomena labelled flying saucers, and giving the appearance of moving luminous spots, with supporting radar data, may be explainable by the following theory.

Consider an extensive region above the earth's surface within which the earth's magnetic field is increasing in intensity. Such increase could be due to a number of causes, but it is only the fact of the increase which is of interest here. Because of the increase in field intensity within the region, there will be a potential gradient established around the region, which will be proportional to the rate of increase of magnetic flux within the region.

Suppose now that this region contains free electrons; which will immediately fall through the established potential gradient and in due course acquire velocity proportional to the total potential through which they fall. The paths of these electrons will be curves; the radius of curvature at any instant will be proportional to their velocity and inversely proportional to the intensity of the magnetic field through which they are travelling. Furthermore, these electrons in motion will be surrounded themselves by magnetic fields of such a direction as to oppose the field changes which produced the motion in the first place. This will tend to bunch the electrons together into tight sheaves.

If the mean free path of the electrons moving as depicted above is large enough for them to acquire a substantial velocity, ionization of gas molecules and atoms with which they collide will result, and the gas within the region under consideration may be reduced to a plasma. In this case, by far the greater number of particles will be electrons, which in turn will be accelerated and travel in the same general direction but along families of curves effectively filling the region. The trajectories of all the circulating electrons will, of course, be modified by the "pinch effect" described above so that the region of activity will tend to become as small as possible consistent with the energies of the fields and of ionization.

The effect of the foregoing is to produce a vortex of plasma which is circulating around within the region with quite a high velocity. Electrically this will represent an electric current flowing in an extremely large inductance. Outside the vortex wil be found a sheath of magnetic flux which continues to increase but is able to penetrate into the vortex to the extent only of replacing energy lost through radiation. The result of these conditons is to create a bubble of plasma within a sheath of magnetic flux which will exert considerable pressure on the plasma.

Suppose now that the magnetic field in the vicinity of the vortex developed a divergence, then the pressures would be unbalanced and the whole thing would move off in the direction of the divergence vector. The velocity of propagation of the vortex would depend on a number of factors including the mean velocity of the large electrons within it, gas density, etc., and could be quite large.

Of course, even though the gas within the vortex may be completely ionized, the ions both positive and negative would still be present and a certain amount of recombination would be expected with its accompanying radiation and luminosity. Therefore, the light emitted probably would contain complete spectra of the gases present against a background of continuous radiation.

The ionosphere is an ideal place in which to expect the formation of such vortices, when magnetic conditions are just right, and if the divergence of the magnetic field should be downwards the vortex could descend to quite low altitudes. Varying amounts and directions of the divergence could cause the luminous area to move about in quite an intricate pattern. The higher gas pressure at lower altitudes would induce a high rate of deionization and energy loss, accompanied by high luminosity, until the energy stored in the system could no longer sustain the losses and the whole thing would collapse and dissipate. Extinction would also result when the magnetic field ceased to increase which eventually it would be bound to do, in any case.

In the light of the foregoing it is easy to see how such vortices could be seen visually and by radar and tagged flying saucers. Furthermore, it is understandable how they would carefully avoid aircraft or move in a pattern with them when the large amount of magnetic material associated with an aircraft is considered.

No claim is made that the foregoing explains all or even a small number of sightings of unidentified flying objects, but there has been a few cases where all the salient features appeared to fit this betatron effect theory very well. (W. B. Smith.)

BETATRON.—An apparatus for obtaining particles of high energy by keeping a beam of accelerated electrons moving in a stable orbit.—Ed.

REPORT ALL SIGHTINGS TO C.S.I.

It is our earnest desire to obtain for study, analysis and reference the details of all observations of "Unidentified Flying Objects." Many good people never report because of fear of ridicule, embarrassment, etc. You can report to C.S.I. without any such fears, and all requests for confidence, non-publication of names, etc., will be fully respected. Address your information to . . .

C.S.I., P.O. BOX 72,
ONEHUNGA, S.E.5.

THE MOST ESSENTIAL DETAILS

Report accurately as possible; location of witnesses; date and hour of sighting; in which direction was object; its angle above horizon; give full description of object, light, etc.; describe actions of object, etc.; how long observed; weather conditions, wind direction, clouds, moon, etc.; number of witnesses, names or signatures if possible; witnesses background; was incident previously reported; if so, where to

Received from an anonymous donor.
Dated Wellington 26th June, 1954.

COULD THIS BE TRUE ??

MAGNETIC SCIENTIST GIVES DETAILS OF FLYING SAUCER.

By: Peruvian News Correspondent, Manuel Montanez.

The following report is the result of an interview between a magnetic scientist and a news reporter, regarding a Flying Saucer that went out of control and crashed into dense forest in Peruvian territory on the morning of April 11th.

"You must understand very clearly that the full story regarding the discovery of an interplanetary disc-shaped craft cannot be released for publication immediately. Furthermore, all that I may say to you will be checked and censored, if necessary, by one of my colleagues."

Such was the brief address of welcome I received from the scientist on being assigned to get the facts regarding a Flying Saucer which had been seen by many observers over Peruvian skies to come hurtling down to earth, apparently out of control.

"To give the public some idea of the composition and method of propulsion of this magnificent space craft, and possibly the origin of it's source, it will be most necessary for me to do some very simple explaining, and hope that it will appeal to the average scientific mind."

Most people know that an atom of matter is a composite structure of a variety of particles bearing positive, negative and non-electric charges. It's nucleus consists of electrons, neutrons and protons, the last two gaining or losing a positive charge. That is, a proton can become a neutron, and vice versa.

In between the nucleus and the orbiting electrons and positrons (positively charged electrons)are particles known as mesons, which are found to be either positively or negatively charged. The mass of a positive meson is 285 times that of an electron, whilst that of a negative meson stands at 212 times.

It should be interesting to note that an orbiting electron and positron originate from the same particle, the gravitational attraction of the nucleus keeping them in orbit. Therefore, an atom may be described as a minute solenoid whose coils correspond to the electronic orbits, the gyroscopic action of which tend to maintain the spatial orientation of their rotational axes with no one direction being more likely than another.

However, when subjected to a magnetic field these axes of electronic rotation align themselves with the magnetic lines of force, but not without resistence from their gyroscopic stability. The resultant effect is one of repulsion due to the precession of the electronic orbits. This is known as Diamagnetism, or more simply, negative magnetism. Diamagnetic substances which have a magnetic permeability lower than unity, diffuse instead of increasing the number of magnetic lines of force passing through them from the open poles of a magnet.

These substances tend to range themselves at right angles, or East to West, instead of aligning with the magnetic lines of force. Uranium, platinum, silver, gold, copper, zinc, bismuth, cadmium, arsenic, etc., differ in their angles according to their diamagnetic properties. Most gases, too, are diamagnetic. Where oxygen is attracted, liquid oxygen is repelled. Hydrogen is repelled, and so on.

In paramagnetic substances the axes of electronic rotation show little or no resistance and readily accept the alignment with the magnetic lines of force. Being strong enough to overpower the diamagnetic effect they produce a positive reaction and are obviously subject to magnetic attraction.

Iron, cobalt and nickel, the ferromagnetic elements, are the most strongly paramagnetic substances we know of. The capacity of soft iron to absorb magnetism is placed at about 300, so that in a magnetic field it's power increases that many times. Unfortunately, soft iron demagnetizes almost immediately when removed from the field, but certain alloys have been produced which remain magnetized and whose susceptibility are close to one million times that of soft iron, These alloys are of paramagnetic and diamagnetic substances, and who knows what the future will bring with regard to higher powered substances.

Magnetism, like gravitation and electromagnetism, is subject to the law of inverse square in that it decreases with the square of distance. The difference between magnetic and gravitational fields is that the former is polarized force while the latter is undirectional. Every magnet is always a dipole, one is North seeking and the other is South seeking. Here it will be informative to add that the force of one dyne will accelerate a mass of one gramme one centimetre per second.

Although a weak force when compared to the earth's attraction at sea level which is 981 times stronger, let us remember that the mass of the earth's crust is tremendous in size, but weakly magnetized. The earth's centre could not be magnetized because of the extremely high temperatures. Steel, nickel and cobalt demagnetize at temperatures of 870, 320, and 1,120 degrees Centigrade respectively.

All bodies on earth which exhibit magnetism have polarity of two distinct kinds, North and South seeking, and we learn that like poles repel and unlike attract. The earth is a giant but weak magnet (do not confuse with the gravitational power of the earth) whose magnetic lines of force are vertical at the poles but otherwise slanting. Normally, a compass needle, being attracted to the North and South poles, turns round to face them by aligning itself with the magnetic lines of force; but if the needle were free to move in the three dimensions it would stand on its south point if the compass were at the earth's North magnetic pole. Similarly, if the compass were placed on the earth's South magnetic pole, the needle would stand on it's north point.

Being attracted by both poles with equal strength, so the needle would be repelled if it's north seeking point were made to face south. Now, depending on th mass and capacity of a substance to absorb magnetism, so the force of repulsion by inversion could be calculated. The fact that certain alloys have a magnetic susceptibility many hundreds of thousands of times that of soft iron opens up the present day possibility of our being able to overbalance the inward pull of gravity by magnetic repulsion.

I think I have completed my introduction of simple explanation which should be appreciated by those interested, as I now proceed to say something about the vehicle from space!

"Don't let me stop you, Professor," I said, "I'm learning things fast!"

"Very well," he replied, "to continue. I mentioned that the space vehicle was disc-shaped. It is also elliptical with a diameter of 99 feet and 18 feet thick in the centre with a razor-sharp edged circumference. It consists of an inner stationary shell and an outer rotating shell both of ¼-inch thickness and made of transparent cystallized carbon, or diamond to us on earth!

It takes tremendous heat and pressure to make a diamond, and anyone knows what tremendous heat and pressure a diamond can stand. My colleagues and I fully agree that the disc-shaped space craft is a far more advanced type of vehicle than we predicted from the various reports of earlier sightings. But if that was a shock there was more in store.

We now know that 50% of the space craft is made from positive matter and 50% from negative matter, making the ship immune to gravitational reaction. The craft is absolutely weightless! I cannot express our feelings of awe and wonder as we examined this master creation of another world. We went into immediate consultation and agreed that the existence of nucleons, those particles comparable to an atomic nucleus, but bearing a negative charge and found in the cosmic rays, pointed a terrifying finger at the probability of planets made up of negative matter.

Such planets might be the source of cosmic rays. After all, who knows whether some extra-terrestrial scientist investigating the properties of similar rays, did not discover certain particles bearing a positive charge comparable to the negative nucleus of the atoms of matter on his planet? Who knows whether he was not able to produce positive matter in his super atomic furnaces realising what an immense stride it would be towards developing an anti-gravity space ship? One day we shall most certainly do just that. We know that space is anything but empty. That it is full of energy of electro-magnetic, gravitational and magnetic oscillations which are at right angles to each other where these three meet in space, three dimensional matter is the result which, of course, explains why everything os three-dimensional.

At the bottom of the disc in the centre is situated the variable attraction/repulsion magnets consisting of four rectangular blades. Two blades, opposite each other, are constructed of hundreds of very thin metal sheets containing a high percentage of cobalt. The other two blades, also opposite each other, and constructed in a like manner, contain uranium and one other metal. We have calculated the susceptibility of these paramagnetic and dia-magnetic substances and found them to be over the three million mark.

Now do not rush to conclusions that this space craft just consists of a powerful magnet set high in a rotational velocity circular aerofoil whose efficacy depended on it's angular momentum to counterbalance the magnetic couple by inversion. That is the case as far as vertical ascent and descent are concerned. A magnetic motor placed directly above the blades holds them in an inverted position when the disc is required to rise vertically. A halfway inversion causes the disc to remain suspended in space or atmosphere provided there is no rotat-ional velocity.

The horizontal propulsion of the craft is not done magnetically. A second and large magnetic motor drives the outer shell many hundreds of revol-utions per second if necessary and the centrifugal force created by the rotat-ional velocity is used to propel the disc in any horizontal direction.

A little explanation will serve its purpose here. You know that centrifugal force is like gravity turned inside out and that it exerts an out-ward force covering 360 degrees. Well, inside the disc we observed a semi-circular rotatable screen made of negative matter, as we came to know later, and which was directly responsible for the steering and horizontal propulsion of the craft by deflecting and concentrating 359 degrees of centrifugal force in one straight line in which the craft would follow.

We learned that when the screen is swung rapidly at right angles, or even opposite to its previous setting, then, regardless of the speed and direct-ion of the ship, it will instantaneously follow the new line of thrust. This is possible because of the craft's immunity to gravity. The speed of the space ship is dependent on it's rotational velocity.

This principle is exactly the opposite to that of rocket propulsion which is based on reaction. A rocket treads on the gases of it's exhaust and is propelled in the opposite direction of it's thrust. This use of sheer brute force is wasteful, costly, and rapid acceleration possibly very dangerous. An interplanetary rocket designed for reaching escape velocity by means of chemical fuels like liquid oxygen and alcohol would assume gigantic proportions.

If atomic power is used for propulsion, heavy shielding would be required and the danger of radio-activity spreading over the take-off platform would threaten the safety of human life. Rocket propulsion is crude in comparison to magnetic flight, which will definitely be the ultimate for atmosphere and space craft.

At this stage you may have wondered how entry is made into the disc shaped craft when I have said that the outer shell rotates while the inner remains stationary. Well, the two shells, approximately one inch apart, are separated by a vacuum only when the outer shell is required to rotate. When exit or entry is required, the outer shell is brought to a standstill and air pumped into the empty space to facilitate the opening of two ramp-like doors,

one each on the inner and outer shells which open when they are exactly in line with each other. The actual opening and closing is controlled magnetically.

I would like to state that no means of interior illumination was discovered, nor any means of outward communication like radio or television. We particularly noticed the absence of sleeping accomodation, which gave rise to the thought that the people of this strange planet perhaps do not sleep or have conquered it.

The space ship contains one deadly weapon of utter destruction, but which we understand is designed solely for the complete disintegration of high velocity meteoric matter which could prove fatal in the event of collision with the craft. The weapon can provide a protective screen up to a radius of about two thousand miles, and yet it can reduce that radius to a few inches more than that of the craft itself.

The disintegration of matter is effected by disentangling the triple oscillations of energy which form three dimensional matter. Here, one can see why the horizontal propulsion is not done magnetically. The diameter of the protective screen is increased or decreased as the craft recedes or approaches a planet. While we have not witnessed the power of this weapon, we understand the principle of it.

Obviously, when flying in atmosphere the space craft would encounter air resistance and would seriously affect its propulsion at air compression speeds at various altitudes. Fortunately, the designers of such a craft were not ignorant of sound and heat barriers. The extremely high rotational velocity of the outer crystallized carbon shell heats the immediate surrounding air to incandesence, burning it up so to speak, and creating a free path for the craft.

Under such conditions there would be no propagation of sound waves, and hence no noise would be heard. The glow of the incandesent air would vary in colour from red, orange, amber, blue and green, depending on the rotational velocity. One can't fail to appreciate the idea of heat resisting aerofoil of crystallized carbon. "

"Pardon me, Professor, for interrupting," I said, "but would you care to say a few words on the occupants of the craft. I mean the little men or other unearthly creatures we hear about. The public can hardly wait for a description of the space visitors, and to know where they came from."

"Oh, yes," the Professor replied, "I did wonder when you were going to ask me that important question, and I can give you a full answer. There were no occupants! No little men or other fantastic creatures with super intelligence, but there was S-O-M-E-T-H-I-N-G ! We shuddered as it approached us for it seemed alive. Yes, a robot had piloted the space vehicle and even charted a return course to a planet of another solar system! We still can't believe it, because all along we had suspected one of our own planets. Can you wonder why the information on this space craft is so restricted!

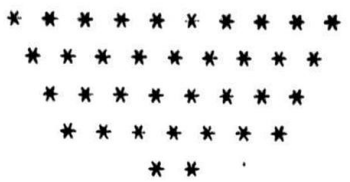
The robot is not only capable of making it's own decisions, but has made it known to us that the huge space craft was sent with the intention of returning with some intelligent humans aboard! We were given to understand that it would not be the first time human beings were taken with their consent to another planet.

Two men were reckoned to have gone from North Africa somewhere about July, 1924. A wealth of information has been supplied with numerous scenes of life on the distant planet from whence the disc craft came.

In the interests of science most of my colleagues and myself have volunteered to go with the robot and hope to return with some valuable information, as we have been promised a safe return to earth. There is plenty of room in the craft which seems to have been so planned, and we cannot see anything forbidding about it. After all, are we not preparing to visit other planets after the conquest of the moon? So what is more safe and reliable than to go with one who knows the way?

"Thank you very much, Professor, for such an authentic and sensational story. And now, before closing this interview, I wonder if I may ask how such a super craft came to make such a bad landing. Every eye witness said they thought it was out of control."

"I cannot say for certain at the moment," the Professor answered, "but knowing how paramagnetic cobalt is -- well, a disruption of the earth's magnetic lines of force could result if a cobalt bomb was exploded, say in the Pacific, and suppose a fast moving magnetic craft were to encounter a gigantic magnetic fault while descending, who is qualified to say how and where it would land?



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FOR RELEASE
September 14, 1958

NATIONAL SCIENCE FOUNDATION GRANTS $450,000 FOR HIGH ENERGY NUCLEAR PARTICLE RESEARCH IN BALLOONS

Tiny nuclear explosions with energies of ten thousand billion electron volts will be captured in blocks of photographic film in a series of balloon flights made possible by a National Science Foundation research grant.

The $450,000 grant was made to the University of Chicago for work by a group of scientists under the guidance of Dr. Marcel Schein of the University.

The balloon flights will be part of a project investigating cosmic rays in the region of 10,000 Bev (Bev: Billion Electron Volts) - one thousand times the 10-Bev energy developed by the world's largest accelerator, the Russian Dubna device. Scientists presently believe that elementary particles at these extremely high Bev energies react according to laws which differ from those in effect at low Bev energies.

At these high energies, Einstein relativity effects such as time dilatation are exaggerated.

Teams of American and foreign scientists will prepare the flight and work on the findings. Among the foreign scientists who have indicated to the National Science Foundation their interest in participating is Prof. C. F. Powell, Nobel-prizewinner of the University of Bristol, England.

Flights will be made with the assistance of the Office of Naval Research of the Navy Department. Large stacks of photographic sheet emulsion will be sent by unmanned SKYHOOK balloons to an altitude of 120,000 feet for a 24-hour period. Pressurized, light-tight gondolas attached to the balloon will contain the stacks, each of which measures approximately 2' x 1½' x 1'. This is about five times the size of comparable film stacks which have previously been sent up.

A particle from outer space, such as a proton, entering the stack collides with a heavy atomic nucleus in the emulsion and the resulting nuclear explosion generates a jet of very energetic particles. This jet, like a burst of particles in an accelerator, strikes other nuclear targets and produces a whole series of new nuclear reactions, all recorded on the emulsion stacks.

The purpose of the study, which will continue for three years, is to investigate high energy elementary nuclear particles which can only be observed at the high altitudes reached in balloon flights. Calculations show that the flights should yield a substantial number of collisions above 10,000 Bev and as many as 30,000 interactions at the lower but still significant 100-Bev energy level.

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Particles at lower Bev energies are investigated through the use of accelerators such as the 6-Bev cyclotron at the University of California, Berkeley. Extremely high energies cannot, however, be duplicated in the laboratory and must be explored as they occur in nature.

Among the information which may be produced from the flight will be data bearing on the desirability of building still larger accelerators. The findings may also shed additional light on recent galactic theories of cosmic origin.

Quantities to be measured by the experiment include: primary energies of nucleons, number of charge and neutral secondary particles, interaction mean free paths of secondary particles, cross sections from primary and secondary interactions as a function of their energy, energy loss per collision by nucleons, angular and energy distribution of secondary particles as a function of primary energy, energy spectra of heavy nuclei, and break-up in the cosmic radiation.