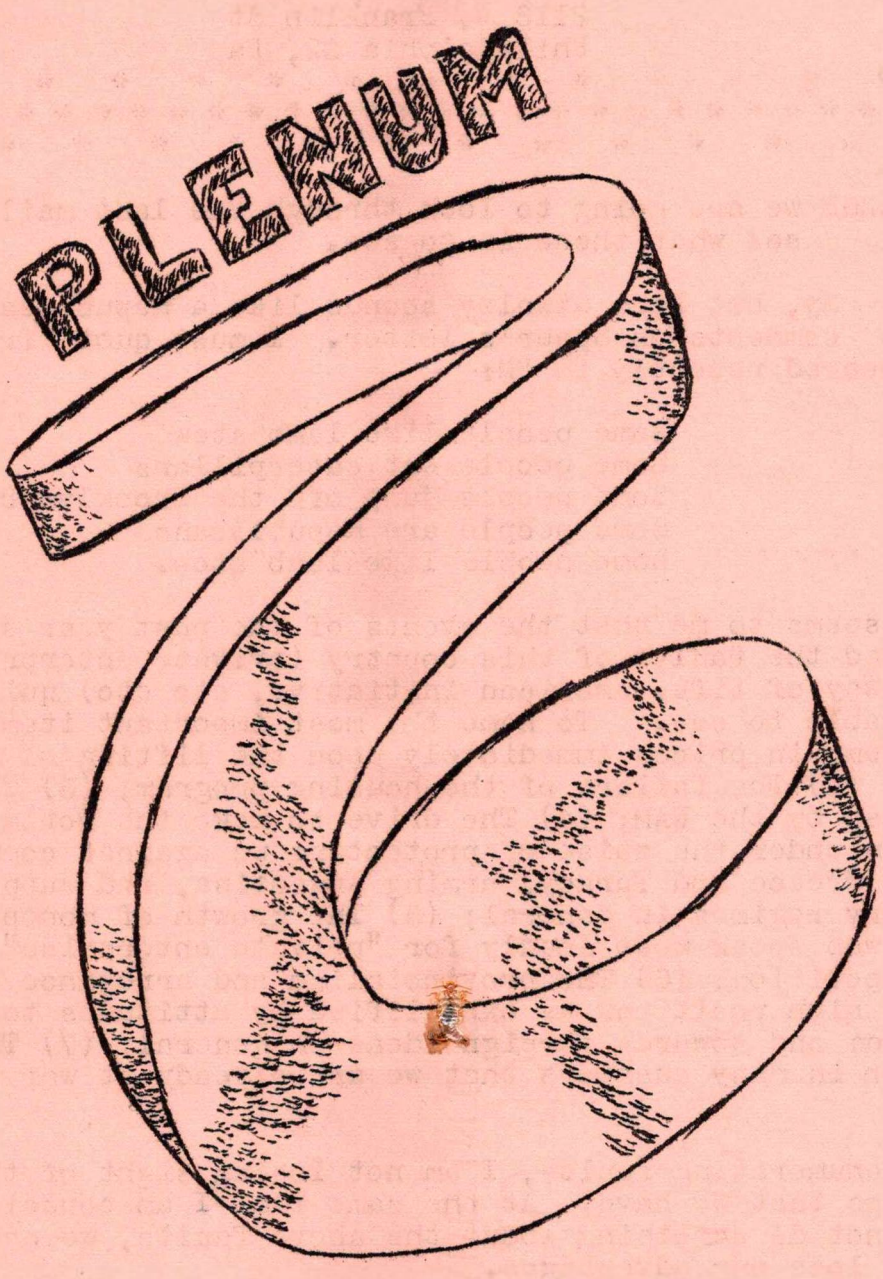
PLENUM

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Milton A. Rothman
2113 N. Franklin St
Philadelphia 22, Pa

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FOR A CHANGE we are going to look through the last mailing and see what there is to see.

FAN TODS: My, but Norm Stanley sounds like a Republican in his comments on Speer's letter. I must quote from a poem which appeared recently in PM:

Some people like lamb stew
Some people eat caterpillars
Some people jump off the Brooklyn Bridge
Some people are Republicans
Some people like lamb stew.

It seems to me that the events of the past year should have illuminated the faults of this country (private enterprise, the American Way of Life, American initiative, etc etc) quite clearly to those able to see. To name the most important items: (1) The jump in prices immediately upon the lifting of price controls; (2) The failure of the housing program; (3) The domination of congress by the NAM; (4) The drive to make the world safe for capitalism under the guise of protecting us against communism by financing Greece and Turkey, arming Argentina, and supporting reactionary regimes in general; (5) The growth of monopoly backed by those who speak most loudly for "private enterprise" and "free competition; (6) The provincialism and arrogance of many people in high positions as exemplified by attitudes toward immigration and towards foreign ideas in general; (7) The implicit assumption in many quarters that we are already at war with Russia.

In enumerating faults, I am not losing sight of the numerous good things that we have. At the same time I am conscious that if we do not do something about the above faults, wo are quite likely to lose our advantages.

PLENUM: It sounds as though the person who wrote that editorial denouncing various things has been reading too much Philip Wylie. Don't you know, buddy, that this business of being intense and stupendous is old hat nowadays? (Except in Russian movies.) People have to be nice nowadays. It says here. Anyway, criticizing young fans will get you nowhere. Somebody is likely to dig up some of the stuff you wrote once. It would be mighty embarrassing.

On the other hand, a certain amount of dullness is undoubtedly apparent in recent fanzines; the older fans are guilty equally with the younger ones. There's quite a bit of pedantry,

routine, and sterility of ideas permeating the recent FAPA mailings. Instead of filling pages with one guy just talking to other guys, there should be more striving for new effects, for experimentation, for something a little better than just putting one word after another word.

SUSTAINING PROGRAM: Re the photographs of molecules: The pictures of the arrangements of atoms within molecules are strictly artificial. That is, they are built up by means of calculations out of data obtained from X-ray diffraction photos. The X-ray diffraction photos, themselves, show nothing but spots of light arranged in various patterns. Upon very lengthy and complicated interpretation, the final picture of the molecule is obtained.

The electron-microscope photos, on the other hand, are practically direct pictures of molecules. In the case mentioned, the molecules were very large protein molecules, and they looked like golf balls spread out over a flat surface. This verified the positions of the molecules with respect to each other, but gave no information as to the arrangement of the atoms within the molecules.

Re matter and radiation: There is at least one sharp point of distinction between a photon of radiation and a particle of matter. A photon has no rest mass, and can travel only at the speed of light. Material particles, on the other hand, have a definite rest mass, and can travel at any velocity up to, but not including, the speed of light. So there is evidently some fundamental distinction between the two. Of course, under quantum mechanics the words "Photon" and "Material particle" must both be replaced by "group of waves." Precisely what it is that waves is rather obscure.

Re Neutrons: It used to be that a neutron was considered to be a combination of an electron and a proton, but when they got to figuring nuclear spin, they decided that such a picture was not satisfactory, and the present sentiment is towards treating each form of particle as a separate entity. Under this picture, when a nucleus splits up to form smaller particles, it is more accurate to say that the new particles are formed at the instant of splitting, rather than to say that they were there all the time, held in combination.

Re problem: Tee hee, Jack, but commonsense failed you this time. (In school we have racks out in the hall upon which to hang up our commonsense and intuition before going into the classes.) For the sake of newcomers, a problem was given in Ember concerning a hoop of zero mass on the rim of which is fixed a very heavy particle. This particle has a certain amount of kinetic energy as the hoop rolls along a plane, but at the moment when the particle is in contact with the plane, its velocity is zero. Where did the kinetic energy go? The answer, as I see it, lies in the fact that if you post a physically impossible problem, then I'm allowed to give a physically impossible answer. And the answer I give is that the kinetic energy of the weight will be transmitted into rotational kinetic energy of the hoop, and since the hoop has zero mass, then at the instant that the weight is motionless and in contact with the plane, then the hoop will be rotating around it with infinite angular velocity.

GENTLEMEN,

Hold your hats ---

I am going to use some big words.

Upon considering the letter by James H. Madole (published last mailing in Sustaining Program) and letters from other amateurs in science which I have been receiving, I am of the opinion that it is high time the concept of "energy" was clarified.

Certainly the concept has gone a long way from the original idea of energy as a measure of force operating over a distance, or as the potential ability of exerting a force over a distance. One sure sign of the dilettante scientist is that he conceives of energy as some sort of fluid which permeates space and which does things. e.g.: "The free cosmic energy of space in collective quantity is that being known to man as God." (Madole)

This is evidently a hangover from the old ideas of heat as a fluid, and also of electricity as a fluid.

As an aside, I may say that the dilettante scientists (euphemism for crackpot) , far from being advanced in their beliefs, as they like to believe, are really quite oldfashioned and unable to accept new scientific ideas. The idea of energy as a fluid is an example -- science discarded such ideas many years ago.

On the phenomenological level, energy groups itself into many forms, a few of which we may name: kinetic energy, potential energy, chemical energy, electrical energy, etc etc. These are glib words. In boiling these concepts down to lower levels of abstraction, serious difficulties are encountered -- difficulties with which many great men have wrestled.

Two main branches in the energy family are encountered at the first attempt to classify the types. We find energy in the form of motion (kinetic), and energy in the form of position (potential.) A body in motion has kinetic energy, and if the body can be harnessed properly, this kinetic energy can be converted or transformed into electrical, heat, light, or even into potential energy. Potential energy is present in a body due to its position. An object supported at an elevation has potential energy with respect to lower positions, and this potential energy will be converted into kinetic energy if the body is allowed to fall. Or we may say it in this way: it required work to lift the body to the elevation originally, and that work is still present in the body (or some say in space). It requires energy to compress a spring; it requires energy to charge a battery -- that energy remains in existence as a potential of some sort.

Yet we are still perched at high levels of abstraction. Can we dig deeper and find a common denominator which will connect all forms of what what we call "energy"?

This is the aim of those who deal in "field theory." In this study, all the phenomena of nature are boiled down to the properties of what are called "fields." Fields of the common, or garden variety are given the labels of "electric," "magnetic," and "gravitational." These three fields may, or may not be sufficient to describe all the properties of matter, as well as energy. Einstein is doing his best with it, but it's a tough fight, ma.

In an offhand manner, fields are pretty cute for describing things simply. You say potential energy is caused by a "strain" in a gravitational field. The motion of particles is accomplished by the vibrations, or transmissions of disturbances through the fields. And so on.

To the amateur in science this seems as though all the problems of nature are now solved. The scientific dilettante, believing that to name a thing is the same as knowing what it is, grabs on to these words and squeezes the living daylights out of them, not realizing that he possesses nothing more substantial than a bunch of words which may, or may not have any real relation to nature.

But we have not yet said what a field is. Unfortunately, the words "electromagnetic vibrations" and "magnetic field" became familiar to the public ear long before there was any conception of what the words really represented. In fact, even at the present time the word "field" means quite little to a physicist.

Really, about the most you can say concerning the nature of a magnetic field is that it is a region in space in which a magnetic particle experiences a force. But since the magnetism of a particle is due to the magnetic field created by the motion of an "electric charge" then we are left with interactions between two fields, and we are up a tree again.

Which is as enlightening as Eddington's notorious paraphrase of Newton's first law: "Every particle continues in its state of rest or uniform motion in a straight line, except in so far as it doesn't."

Again and again we are reminded that "science cannot explain -- it can only describe." We can say that a field is a region of space with certain properties that we can describe. If we attempt to indicate the fundamental nature of the field, we will find that we are merely replacing one word by another word -- a process which is often performed by the naive, but which is certainly not very helpful to the scientist.

At the most we could describe a field in terms of lower orders of abstraction -- in the same manner that we say an atom is made of electrons and protons. If we could find some lower stuff which constitutes the field, then we would undoubtedly gain more information, but in the long run we would be no closer to "ultimate reality." But according to certain current theories, it is even meaningless to question what constitutes the field. But this we won't go into.

Be that as it may, the world "field" is the lowest order of abstraction that we can use intelligibly. Despite the fact that we can't say just what it is we can say quite a bit about what it does, which is the most you can ask for any science.

Apparently a field has the property to store energy, for when we apply an electric charge (whatever the hell that is) to the plates of a condenser, we have to do work, and when we take the charge away we get the energy back. However, it is not correct to say that the field is energy -- no more than it is correct to say that a battery is electricity.

Thus, we are correct in a certain awkward sense if we say that space is permeated by energy, but only in the sense that space consists of fields which we can say possess energy. And this, it seems to me, makes a hell of a difference from the way some of the boys have been using the words. To speak of "free energy" floating around in space is just not using the words the way the words are supposed to be used, and invites plenty of trouble.

Chalk one up for consciousness of abstraction..

So I'm standing there with about five drinks swimming around inside me, and this guy comes up and asks "What's a poundal?"

Well, reports in so far on the last PLENUM are about two to one on the side of the guys who couldn't understand the piece about complex numbers. Ah me. However, Jim Blish complimented me very nicely on it, so all is not lost. Some day I shall try again. It would be fun to write something about conformal mapping, except I'm afraid that would require too much of a build-up. And then again maybe it wouldn't.

Finally a good rationalization for studying atomic physics came to me. You see, a person could feel that he should stay away from atomic energy, because such study will be contributing to the destruction of civilization in the next war. But then I ask myself: Is it better that a liberal or a conservative work on atomic energy? The stuff has been discovered, and its going to be worked on willy nilly. The fault of liberals has often been that they wash their hands of the matter, whereupon the conservatives take over. If the atomic scientists had not been liberal they could not have been successful in keeping the military away from control of atomic energy. Its better for liberals to get right into atomic energy work, and to press for proper use of the stuff through their organizations -- better for them to do that than to walk out and leave the field open to less scrupulous people.

A look at the results of final exams shows why physics is not likely to become an overcrowded field. It was murder.

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