

Mitibule

Properties of the

by R. W. Jackson

Very few physicists in the United States have been aware of the sub-atomic particle described below, knowledge of its existence being limited in large part to the audience of the February 1950 issue of the Bulletin of the Canadian Association of Physicists, from whose pages it is reprinted here.

Evidence in support of this new sub-atomic particle was first found by A. G. Ratz and W. J. Weir in the spring of 1944 at the University of Toronto (*Phys. Rev.* 66:366, 1944). Owing to the exigencies of wartime, work on the project was suspended for almost three years. At the present time the mass and charge, if any, of the particle have still not been ascertained with any degree of accuracy, but it is felt that the discovery is likely to prove so important, and so worthy of attention, as to warrant a review of our present knowledge of the particle, in spite of the lack of reliable quantitative measurements. The difficulties in the way of experiments with mitibules will be apparent from the discussion.

The mitibule was first suspected when an examination of the fundamental laws of attraction and repulsion disclosed a serious lack of symmetry. In Electrostatics, the attraction between two charged bodies is given by $F \propto q_1 q_2 / r^2$. This force F is either an attraction or a repulsion, depending on whether the charges q_1 and q_2 are of unlike or like polarity.

Considering gravitational forces, the force between two bodies is given by $F \propto m_1 m_2 / r^2$. The identical form of the two equations is immediately apparent, yet in the gravitational case no allowance

is made for repulsion between the two bodies.

To support further generalization of the inverse square law, it was therefore necessary to find some type of matter that exhibited repulsion to ordinary matter. Evidence for such matter has been found and the elementary particle of such has been given the name of "mitibule" by its co-discoverers.

It is immediately apparent why such a particle has not been found before, especially in the free state. For if we were ever to free a mitibule on the earth's surface, being repelled by the large mass of the earth, it would shoot off into space with a velocity soon equal to that of a meteor in reverse.

The negative mass of the mitibule gives it some very interesting and important properties. For example, in our usual manner of speaking, a mitibule will weigh more when it isn't there. To weigh a mitibular mass, if you have one, place it *under* the scale pan, and remove weights from the balancing pan, or add weights to the other pan. For storing

Ray W. Jackson is just now finishing his doctorate at the Radiation Laboratory at McGill University. Being "surreptitiously a student of philosophy as well as of physics," he carried on this speculation when fellow undergraduates Ratz and Wier, who in 1944 invented the particle, were prepared to let it die. Jackson says that "The scientist who has no broader base than his scientific method is like the painter on a scaffold who cannot stand back to look critically or to smile at his own handiwork for fear of falling off."

purposes the mitibular mass must be introduced into a closed container so that, being repelled by all the matter around it, it will come to an equilibrium position in the interior of the container (near the upper wall). A bottle with a heavy screw top, or



Typical area of nuclear emulsion exposed to a beam of mitibules, showing that the mitibule leaves no track and therefore is probably uncharged.

a strong cork, has been found satisfactory. The free mitibules accumulate just under the cork, sometimes managing to expel it forcibly, with a loud report.

The most characteristic property of the mitibule, that it repels the matter around it, was the clue that led to the original observation and isolation of the particle. It is obvious that, if a mitibule is freed in a liquid, it will repel the molecules around it, forming what appears to be a bubble which will rise to the surface and disappear. This effect was first noticed in certain liquids which seemed to result in a strange, lightheaded, buoyant feeling when consumed, besides causing severe confusion to the motor nerves. The concentration of mitibules was found particularly high in champagne, to a lesser extent in beer. The above effect must not be confused with ordinary bubbles caused by gas released from solution in the liquid, such as are found in great profusion in carbonated beverages.

These well known "mitibular solutions," champagne and beer, have been the most convenient sources of mitibules for experimental purposes. Incidentally, in the interests of safeguarding the health of experimenters, it is suggested that medical investigations should be undertaken into the physiological effects of internal mitibular bombardment on the abdominal cavity.

Another interesting property of the mitibule was suggested, in that it would not go where you pushed it. The following postulation is introduced, not because it is true, but because it shows up a fault in

an existing equation and at the same time demonstrates the primary method of investigation.

From Newton's fundamental equation, $f = ma$, we see that, if we substitute a negative mass and a positive force, the acceleration must be in direction opposite to the force. Therefore, if a force is exerted on a mitibule, the mitibule moves against the force. The import of this is apparent if we imagine a game of tennis played with a mitibular tennis ball. Suppose that the game has started and the ball is approaching one of the players; he runs up to it and strikes it with his racquet. Immediately, instead of going across the net, the ball is, by virtue of its negative acceleration, thrust back against the racquet which in turn exerts more force on it until, before anyone can say Isaac Newton, the racquet is knocked from the player's hand and the mitibular tennis ball is proceeding at a great rate through the air, gaining speed at every collision, until at last it



the Saucer's Apprentice

An obvious application—flight without aerodynamics.

has reduced itself to particles so small that they do not disturb the molecular structure of the obstacles they encounter, i.e. until the mitibular tennis ball has smashed itself into mitibules. This would also explain why it seems impossible to obtain any sizable mass of mitibules.

However, while the mitibule does exhibit behavior of the most unpredictable nature, such behavior as the above would violate the principle of Conservation of Energy. It is easily seen that if this "if you push it hard enough, it goes right through you" hypothesis were true, the mitibule when repelled by the earth would travel towards it, passing back and forth through the spheroidal mass until it reached equilibrium at the center; in other words, the mitibule would act as though *attracted* by a normal mass, which we know is not the case. Clearly there is some detail overlooked, or else a modification is required in Newton's Second Law. A simple suggested modification is $f = |m|a$, where $|m|$

is the *magnitude* of the mass and is always positive.

Discussion of the mitibule cannot remain on this trivial level, however. It is obvious that the effects of the mitibule must echo through all of Einstein's twenty-four equations. It is regrettable that the dis-



An uncollimated mitibular beam.

covery of this particle was not specially communicated to Professor Einstein before he made public his latest attempt at a unified field theory. As it is, he may have entirely omitted half of "underlying reality". A detailed discussion of the effect of the mitibule on general relativity theory must be left for a later article, to be published in about 1975.

The anomalous behavior of the mitibule, and its hitherto unsuspected existence, have caused some to seize upon it as a sort of "atomic gremlin" on which to lay the blame for the failure of some experiments for no apparent reason. It is characteristic of experiments which fail because of some totally unsuspected factor that the results obtained are seldom consistently wrong, but may vary considerably above and below correct values depending on the day of the week. This might indicate that mitibules tend to accumulate in apparatus used for the same purpose continually for many years, such as is found in the university laboratories used by undergraduates. (Laboratory Report Book No. 146C, Scriblit and Russholm, Sc. III, McGill, 1948.) It seems unfair to expect too much from the students under such conditions which, of course, did not exist when the professors were young and the laboratories new. This, however, is rather speculative and it may be quite unjust to lay these troubles at the small door of the mitibule.

The mitibule has more definite possibilities in the fields of nuclear physics and astronomy. In the combination of protons, neutrons, electrons, positrons, and other things, to form atoms the resulting atom has a mass slightly less than the sum of the masses

of the individual particles. This "mass defect" has been plausibly explained on energy considerations but the mitibule offers a much simpler solution. We have only to postulate that a certain number of mitibules must be present for the formation of a stable atom. The overlooking of the mitibular component might well account for the great difficulties encountered in evolving a satisfactory theory of nuclear disintegration. Mitibules would be released when a nucleus disintegrates, carrying away high energies and at the same time apparently adding to the mass of the other particles.

It has been suggested (E. Brannen, private communication) that the mitibule does in fact correspond to what Dirac felt required to postulate as an electron in a negative energy state. If this can

Possible physiological effect of internal mitibular bombardment.



Sketches by the author.

be shown to be a consistent correspondence, we shall have stumbled upon a result of extreme importance. For if it is found that Dirac's electron in a negative energy state occurs as a free particle (the mitibule) and not only in a continuous sea, then the positron must be said to be a *real* particle, and not a mere hole.

But of all the consequences of this particle of negative mass the most important may be yet to come. There is a note of sadness, and one of nobility, about the mitibule, for the mitibule is repelled, refused, by matter as we know it. We see the mitibule homeless, careening through space on hyperbolic orbits, perhaps to find a resting place and peace at last only at infinity, and there—why there, with many other mitibules, it may be the salvation of our unfriendly universe. For the universe, by all ungrateful accounts, is rapidly expanding as if it were exploding, and yet we are safe; there at infinity stand the mitibules patiently on guard to repel, if ever the necessity arises, our galactic claustrophobes.

It is hoped that the publication of these facts will accelerate research on this subject which plainly deserves attention from the best brains of science.