

# physical sciences

## Antiproton's magnetic moment

A most basic theory of physics requires symmetry between matter and antimatter. To every particle there corresponds an antiparticle with the same mass but with many other properties reversed. It has been possible to verify this idea with respect to the masses and electric charges of antiparticles, but antiparticles have such a short existence in a laboratory full of ordinary matter that measuring their other properties is extremely difficult.

The first measurement of such a property, the magnetic moment of the antiproton, is reported in the July 17 *PHYSICAL REVIEW LETTERS*. The work was done at Brookhaven National Laboratory by a group of 14 physicists led by J. D. Fox of Brookhaven.

The experiment involved capturing antiprotons into atoms of lead and uranium where they took the places normally occupied by electrons. The antiproton's magnetic moment, that is, its intrinsic magnetic field, interacts with the electric field of the atomic nucleus in a way that affects the frequencies of X-rays given off as the energy states of the atom change. From the frequencies of the X-rays a measurement of the magnetic moment can be made. It comes out equal to the proton's but oppositely directed, as theory says it should.

## Clock paradox

According to the theory of special relativity a clock that is moving will record less time than one that is standing still. This leads to the famous clock paradox: that a clock which makes a round trip will be slow with respect to one that stays put. An astronaut on an interstellar flight would come back to earth perceptibly younger than his twin who had stayed home.

People have refused to believe it could happen. In the July 14 *SCIENCE* J. C. Hafele of Washington University and Richard E. Keating of the Naval Observatory report that it does.

The test involved cesium-beam clocks flown around the world, one eastward, one westward. Compared to clocks on the ground (which move with the rotation) the eastward flight should lose about 40 nanoseconds, the westward should gain about 275. The results agree with the prediction, and Hafele and Keating conclude: "There seems to be little basis for further arguments about whether clocks will indicate the same time after a round trip, for we find that they do not."

## Muons for communication

Radio communications channels are becoming rather crowded. To supplement them Richard C. Arnold of Argonne National Laboratory proposes using beams of muons, physical particles similar to electrons but weighing 200 times as much. Since muons can easily penetrate the atmosphere, muons in well-defined beams could be used for point to point communications, Arnold suggests in the July 14 *SCIENCE*. They would be pulsed so as to deliver signals like Morse code to detectors.

Muons are unstable particles, but Arnold figures that at an energy of 5 billion electron-volts (5 GeV) they will last long enough to go 35 kilometers. At 50 GeV, because relativistic time dilatation extends the muon lifetime, muons could communicate over 500 to 1,000 km. Arnold has done experiments to show that a muon beam can actually convey information.

# behavioral sciences

## Changing racial preference

In the 1950's and early 1960's, studies of racial preference of children showed black children choosing white models and rejecting dark models. Black children with impaired self-concepts, black males and middle-class blacks were especially white-oriented. Susan Harris Ward of Children's Hospital of Pittsburgh and John Braun of the University of Bridgeport in Bridgeport, Conn., reexamined these values in black children who have grown up since 1963. Results are in the July *AMERICAN JOURNAL OF ORTHOPSYCHIATRY*.

Sixty black girls and boys between the ages of seven and eight were chosen: 30 from a middle-class suburban school, 30 from a lower-class inner-city school. Each was given a self-esteem concept test and then asked questions about a black and a white puppet. Those who had the highest self-esteem showed more preference for the black doll (about 80 percent). There were no significant sex or social class differences. "It is possible that this relationship between self-esteem and racial preference may signify a new spirit of dignity in the lives of Afro-American children," the researchers say.

## An alcohol antagonist

Propranolol hydrochloride, a drug commonly used to control irregular heartbeat, appears to have the ability of blocking the psychological and behavioral effects of alcohol. Jack Mendelson of Harvard University tested the drug at Boston City Hospital on 24 alcoholic men. He reported this week in San Francisco at an international congress on pharmacology that men who had been given the drug for three days were immune to the effects of alcohol on the fourth day. After drinking the amount of alcohol usually consumed at a cocktail party, these men showed no change in mood, reaction time or other psychomotor functions.

Like a narcotic antagonist (*SN*: 7/15/72, p. 38), this drug blocks receptor sites in the brain. A person on the drug could take a drink and not get a high. With this reinforcement, an ex-alcoholic might not be tempted to start drinking again.

## Why wives overeat

It has been suggested that overweight women become obese, and thereby less attractive, in order to avoid sexual relations. It has also been suggested that some husbands encourage their wives to overeat, hoping the extra poundage will serve as a sort of chastity belt. William G. Shipman and Ronald A. Schwartz, working at the Medical Research Institute of Michael Reese Hospital and Medical Center in Chicago, selected two sets of 15 couples. In one set the wives were overweight. The other set contained normal-weight wives of the same age, educational level and years of marriage. The husbands were similarly matched.

Comparing sexual drive, the researchers found that 13 of the 15 overweight wives wanted sex more frequently than did the normal-weight wives. There was no difference in this regard between the sets of husbands. Food does not replace sex for these women, the researchers conclude. Instead the overweight women crave both food and sex for the same reason. They need both to satisfy needs of affection that were not fulfilled when they were children.