

## Aging and decay of beauty

In the gallant whimsy of physicists, when beauty decays, charm may sometimes remain. Don't reach for the Oil of Olay, however; in this context "beauty" and "charm" are "flavors" of quarks. Flavor is the property that makes one kind of quark differ from another. There are six flavors of quarks, and out of various combinations of them, nearly all the many subatomic particles are supposed to be built. Theory says that a beauty quark should decay into a charm quark. According to the July/August CERN COURIER, a recent experiment at the CERN laboratory in Geneva marks the first time such a decay has been directly observed.

In the event, an energetic pi meson entered a silicon detector, striking an atomic nucleus and producing a negatively charged beauty particle ( $B^-$ ) and a neutral one ( $B^0$ ). The  $B^-$  traveled 437 micrometers and then decayed into a neutral charm particle and a negative mu meson. The  $B^0$  traveled 4,430 micrometers and decayed into a negative charm particle plus an unspecified positive particle. The event is clean and comprehensive, in that all points where the Bs and the charms were produced fall within the detector. Physicists don't always have that kind of luck.

From the lengths of the trajectories of the B particles, the lifetime of negative beauty comes to  $0.8 \times 10^{-13}$  second, and that of neutral beauty to  $5 \times 10^{-13}$  second — fleeting, but *sic transit gloria mundi* [so passes away the glory of the world]. For physicists the important point is that these numbers are slightly less than those calculated for beauty lifetimes from earlier indirect evidence of beauty decays. That is a good thing, as the longer lifetimes had led some physicists to fear that their "standard model" of particle physics, which explains most things very neatly, might need some amendment.

## Zeroing in on the blackbody

The flux of radio microwaves that pervades the universe and arrives at the earth from all sides has been an object of intense interest to cosmologists since its discovery two decades ago. Because it is believed to be left over from the earliest moments of the universe's beginning, it may tell something about conditions at that time. Over the years measurements at more and more wavelengths have strengthened the conviction that the spectrum is that of a perfect thermal radiator, a blackbody.

The clinching evidence should come at short wavelengths, where the curvature that distinguishes a blackbody spectrum from other possibilities should clearly show up. A recent measurement in this range by Jeffrey B. Peterson and Paul Richards of the University of California at Berkeley and Thomas Timusk of McMaster University in Hamilton, Ontario, shows a very close fit to the spectrum of a blackbody at a temperature of 2.78 kelvins, which is what the background should be. The measurement, which is particularly difficult because the atmosphere absorbs radiation in this frequency range, was done from a balloon floating 24 miles above the ground.

About six years ago, Richards and David P. Woody did a similar measurement of this range of the background spectrum (SN: 7/7/79, p. 4). Although they found a general conformation to the 2.78 K blackbody, there were deviations from exactness. One interpretation of those deviations was that the universe was somehow a more efficient emitter of radiation than a blackbody — a contradiction in terms, as a blackbody is defined as a *perfect* thermal radiator. The other horn of the dilemma was to suppose that something other than a thermal radiator was contributing and thereby complicating the cosmological evidence. The present measurement lays those questions to rest.

Richards, Peterson and Timusk plan another balloon flight to try to refine the measurement still further. In 1987 NASA plans to launch the Cosmic Background Explorer Satellite (COBE), which will take advantage of the better observing conditions in space to probe this and other questions about the background.

## A woman's plight: Spatial slurs . . .

So many studies over the years have reported that males are superior to females in spatial abilities (nonverbal tasks involving perception and movement within defined spaces) that the "superiority" has become "common belief," say researchers at the Ontario Institute for Studies in Education in Toronto.

But according to those researchers, such studies have been so fraught with deficiencies and inconsistencies that "the conclusion that males are superior is unwarranted." In an in-depth review of the literature on the subject, Paula J. Caplan, Gael M. MacPherson and Patricia Tobin report their findings in the July AMERICAN PSYCHOLOGIST. "At most," they write, "sex-related differences that have been reported are very small and, despite what some reviewers and theorists have implied, are not reliably or consistently reported."

In their review, the researchers begin by scrutinizing "perhaps the best-known example of sex-related difference in spatial abilities that is said dramatically to show male superiority" — the maze tests of Stanley D. Porteus, which have been in use for more than 50 years. In his series of tests, Porteus consistently reported that males scored higher than females when confronted with drawing their way through line mazes.

However, the Ontario researchers report that in only 18 of his 105 studies did Porteus perform a *t* test, which is designed to measure significant differences in the data — and in only 4 of those did the results reach statistical significance.

Caplan and her colleagues found similar problems throughout the literature, not only in methodology but also in consistency in defining spatial abilities. "People invented the term spatial abilities," they write. "The fact that the term . . . exists does not prove that the humans' brains or cognitive abilities fit [the various definitions]." On the basis of their findings, the researchers conclude that either "sex differences in spatial ability do not exist" or the issue "is by no means clear as yet."

## . . . and the 'mother-blaming' problem

*I don't know what I did, but I did it, I know. . . Everything you do has something to do with me.*

—mother speaking to daughter in the play, "night, Mother,"  
by Marsha Norman

While women in general may have been unjustly saddled over the years with the reputation of having poor spatial abilities (above), mothers in particular continue to suffer the slings and arrows of behavioral researchers, according to a report in the July AMERICAN JOURNAL OF ORTHOPSYCHIATRY.

Despite "the efforts of the women's movement, . . . the present study has demonstrated that mother-blaming is a significant and serious problem that continues in the current clinical literature," report Paula J. Caplan (who also co-authored the spatial study) and Ian Hall-McCorquodale of the Ontario Institute for Studies in Education in Toronto.

The researchers studied clinical journals for the years 1970, 1976 and 1982 to see if there was any lessening of what they suggest has been a tendency to blame mothers for their children's emotional problems. In their analysis of 125 articles, they found that 72 kinds of offspring psychopathology were listed as attributable to mothers; mothers were mentioned five times more often than fathers in relation to children's problems; and 37,492 words were used to describe the mother, compared with 14,406 words for the father.

"The most striking pattern reflected in our results is that, in every category, the mothers emerged in a far less favorable, more blameworthy light," say the researchers. The sex of the author or the type of journal made little difference in the references to mother, they add. "For mothers' sakes," they conclude, "the tendency to blame mothers must be curbed."