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Letters

Neutron uncertainties

In reference to "A lifetime for neutrons in a bottle" (SN: 9/2/89, p.159), I would like to add three comments.

It is true that the error (± 3 seconds) of the experiment is not much lower than that calculated for a combination of a set of previous experiments (5.1 seconds). However, the individual errors given by other direct lifetime measurements are signifi-

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Cover: Moments after this photo was taken on April 7, 1984, astronaut Terry Hart released the experiment-laden Long-Duration Exposure Facility (LDEF) from the grasp of the shuttle Challenger's white manipulator arm. At the time, the satellite floated 257 nautical miles above Earth and was slated to return aboard Challenger sometime before 1986. Now, after a delay of more than four years, NASA plans a December shuttle mission to recover the stranded spacecraft — just weeks before LDEF would otherwise tumble Earthward like a shooting star, annihilating its precious cargo of data. (Photo: NASA)



Departments

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cantly greater, and it is only their collection in one combined value that apparently reduces the error. In view of the fact that a number of these previous individual values differ among one another by much more than their quoted errors, some scientists have their reservations with respect to this "statistical" treatment of different experiments.

Secondly, it is true that the "gravity correction" was an important ingredient in the data evaluation and that the reason for the subtlety of this effect lies in the details of the gradual softening of the neutron spectrum with longer storage times. The neutrons frequently collide with the walls, where they gain or lose a little energy as a result of the slight vibratory motion of the walls, thus suffering a sort of speed diffusion. At present, it is the limited knowledge of subtle details of this process, as well as of the initial spectra, that determines the size of the error quoted. A further study of these details may enable us to get a better grasp of the correction and, in this way, to reduce the error margins even further.

The experiment was performed at the High-Flux Research Reactor of the Institut Laue-Langevin in Grenoble, France. Unfor-

tunately, it would not be possible at this time to perform a similar experiment in the United States, because no source of ultra-cold neutrons is available in this country. It would be highly desirable to foresee such a facility in future projects of intense neutron sources.

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Proximate vs. ultimate . . . continued

Stephen Emlen and Peter Wrege's response to William Check's comments on their research with African bee eaters ("Avian Altruism," SN: 6/10/89, p.364; 7/15/89, p.44; 9/16/89, p.179) raises some interesting and controversial ideas about the relationship of proximate and ultimate explanations.

Emlen and Wrege conclude by cautioning that "proximate explanations should not be taken as answers to ultimate questions, nor vice versa." The logic of their position that

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