SCIENCE NEWS®

The Weekly Newsmagazine of Science

A Science Service Publication
Volume 134, No. 24, December 10, 1988

Subscription Department
231 West Center Street, Marion, Ohio 43305

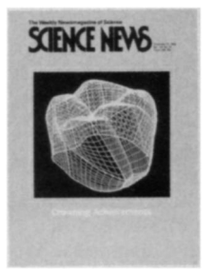
Subscription rate: 1 yr., $34.50; 2 yrs., $58.00. (Foreign postage $6.00 additional per year.) Change of address: Four to six weeks' notice is required. Please state exactly how magazine is to be addressed. Include zip code. For new subscriptions only call (1) 800-247-2160. Printed in U.S.A. Second class postage paid at Washington, D.C., and additional mailing offices. Title registered as trademark U.S. and Canadian Patent Offices. Published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N.W., Washington, D.C. 20036. (202-785-2255)
ISSN 0036-8423

This Week

Research Notes

Articles

Cover: This computer-generated, three-dimensional representation of a replacement tooth, or dental crown, foreshadows a revolution in dental restoration, researchers say. Already, dentists are using experimental, high-resolution computer graphics systems to design and manufacture dental prosthetics. In the process, they are reassessing current wisdom about the margins of error deemed reasonable in their art. (Image: Hennson International)



Departments

Letters

Those weird wormholes

It appears that the most significant effect of the wormhole, or indeed any time machine, has been overlooked ("Wormholes and time machines," SN: 11/5/88, p.302). That is, it would easily violate the law (if indeed it is a law) of conservation of matter and energy.

Consider a man with a time machine and a bar of gold who wants more gold. He sends his one bar to his past self, who then has two, the one from the machine and the one from the past. Some time goes by. Then, at the exact time as before, he sends both bars back through time. His past self now has three bars (or is it four, since he is also getting the single bar he sent the first time?).

It is my sincere hope that much effort is put into investigating wormholes, because if they become practical they will open the universe to mankind with all of its wealth of knowledge, minerals and energy (wormholes to the inside of a sun).

Richard K. Downs
Monterey, Calif.

Morris, Thorne and Yurtsever assume a wormhole might allow a violation of causality when the two "mouths" differ in age. The violation of causality, however, appears to be due to their unstated assumption that the length of the wormhole, as measured by a traveler passing through it, is short and independent of the age difference between the two mouths.

The violation is eliminated if the "internal" length of the wormhole is equal to the time difference between the mouths, but independent of the "outside" distance between them. For example, a wormhole with a 1-year age difference between mouths would have a 1-light-year length. The time spent traveling through the wormhole could then never be less than the temporal difference between mouths, permitting use of a wormhole for superluminal travel but preventing any net backward travel through time.

Under this assumption, "express" wormholes with short internal lengths would be those patiently created by pulling the mouths apart slowly, thereby minimizing age differences created by time dilation effects. This suggests a tradeoff between construction time and travel time for interstellar "wormhole freeways."

Conservation of energy also implies a gravitational field inside the wormhole which, when integrated over its length, would equal the difference in gravitational potential between the points just outside the two mouths.

In summary . . .

There was a young lady named Bright,
Who jumped through a wormhole one night.
Though she moved very fast,
She could not reach the past,
Being foiled by the time spent in flight.

Robert H. Beeman
Scottsdale, Ariz.

Address communications to:
Editor, **SCIENCE NEWS**
1719 N St., NW
Washington, D.C. 20036
Please limit letters to 250 words.
All letters subject to editing.