

monopoles, we will be able to tell from their properties whether such a Kaluza-Klein compactification happened sometime in the past.

Another Kaluza-Klein curiosity, this one presented by Edward W. "Rocky" Kolb of Fermilab and Richard Slansky of Los Alamos National Laboratory, is the production of supermassive stable particles known as pyrgons (from the Greek word "pyrgos" [πυργος], meaning ladder or tower) at the time of compactification. The mass of a pyrgon is determined by the compactification length and the temperature of the universe at the time of compactification.

Unfortunately in many theories of this kind, the number of pyrgons in the universe comes out equal to the number of photons. This would be acceptable in the universe as now observed only if the pyrgon mass was very small, less than 100 electron-volts. Otherwise the universe would have suffered a pyrgon catastrophe; the total mass of pyrgons would have made the universe curl up and die a premature death.

The universe has manifestly not done so, yet the mass of a pyrgon is more likely to be something like a million billion electron-volts (or a million times that of a proton). The only way to get rid of the pyrgons is to have them annihilate with antipyrgons. Kolb and Slansky point out that the details of Kaluza-Klein theories must be adjusted to permit the proper number of annihilations to get out of the dilemma. Nevertheless some pyrgons would remain, and they could become another candidate for the dark matter that astrophysicists believe dominates the universe (SN: 6/23/84, p. 396).

Motohiko Yoshimura of the KEK laboratory in Tsukuba, Japan, proposes a bouncing universe as a result of Kaluza-Klein beginnings. The universe expands, contracts, expands again, contracts again, etc. Like a bouncing ball, however, each expansion is less than the previous, so that over eons, the universe dribbles away to... whatever.

As Weinberg reminded his audience, solving one problem in physics usually opens others. With Kaluza-Klein theories physicists still have the problem of finding just the relationships and hierarchies of particles and all the relationships and particles that the actual universe seems to hold. It may be necessary to meld other theoretical approaches together with Kaluza-Klein to get them. Problems come and problems go.

Perhaps Kaluza was neither a Pole nor a German, but of the Slavic people known as Kashubians. In that case it might be apropos to quote the old Kashubian grandmother in Günter Grass's novel *The Tin Drum*. She said something to the effect that the Germans come and the Germans go, the Poles come and the Poles go, but we Kashubians just stay. □

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The Browser's Book of Beginnings: Origins of Everything Under (and Including) the Sun—Charles Panati. For those interested in the origins of things around them—such as weights and measures, thermometers, photography, glass, windmills, watches, candy, salt, bread, books and many, many more. HM, 1984, 427 p., illus., \$17.95, paper, \$9.95.

The Gene Business: Who Should Control Biotechnology?—Edward Yoxen. The history, the science and the importance of the wide range of developments in biotechnology are presented for the general reader. Using case studies, the author considers how biotechnology is transforming medicine, agriculture, the food industries and the production of energy and chemicals. Examines the social implications of this new technology. Har-Row, 1984, 230 p., \$15.95.

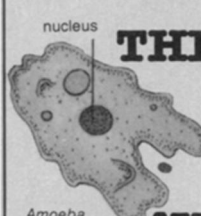
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McGraw-Hill Dictionary of Science and Engineering—Sybil P. Parker, Editor in Chief. More than 35,000 terms are included in this comprehensive, desktop dictionary of science and engineering. Focuses on the vocabulary of 100 different disciplines ranging from acoustics to zoology. Each definition is preceded by an abbreviation that identifies the field of primary use; many terms are defined in multiple fields. McGraw, 1984, 942 p., \$32.50.

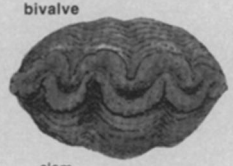
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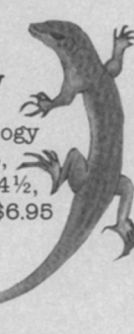
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