

theory of 3 (or more?) forces, but do not have a unified field theory in the sense intended by Einstein, for instance.

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2/81

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THE AUTHORS COMMENT: It would be rather odd to say that there are eight strong forces just because QCD involves eight gluons. It makes more sense, it seems to us, to say that there is one strong force. Only the entire set of eight gluons shows the full SU(3) symmetry.

In the same way, if the SU(5) symmetry of a unified theory were not spontaneously broken, everyone should agree that the SU(5) theory describes a single force. Thus, at high temperatures or short distances SU(5) is "a theory of a single unified force."

Of course, the structure of the vacuum fragments the SU(5) force into the various interactions we see at accessible distances and temperatures. What you choose to call this spontaneously broken theory is up to you. We are less interested in these semantic distinctions than in the substantive question of whether or not the theory is right. If proton decay is observed at the predicted rate, there will be a strong presumption that SU(5), or some similar unified theory, is a more complete description of the world than the separate theories of strong and electroweak interactions.

On a completely different subject, we take this opportunity to make two additions to the list of contributors to the idea of baryon number generation in the early universe. Tony Zee (now of the University of Washington) was inadvertently omitted from the group of Princeton physicists who were among the first to develop a completely consistent scenario for baryon number generation in the context of unified theories. In the 1960s, well before the QCD and the electroweak theory were formulated (let alone unified theories), the great Russian physicist Andrei Sakharov pointed out that the baryon supplies in the universe could be explained if protons were unstable.

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Corrections

April, page 56—the table lists incorrect values for basic energy sciences in the Department of Energy's FY 1980 and 1981 budgets. The total basic energy sciences budget in 1980 was \$225.0 million, and the total this year will be \$239.5 million.

April, page 80—P. J. E. Peebles is a professor of physics, not astronomy, at Princeton University. □

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