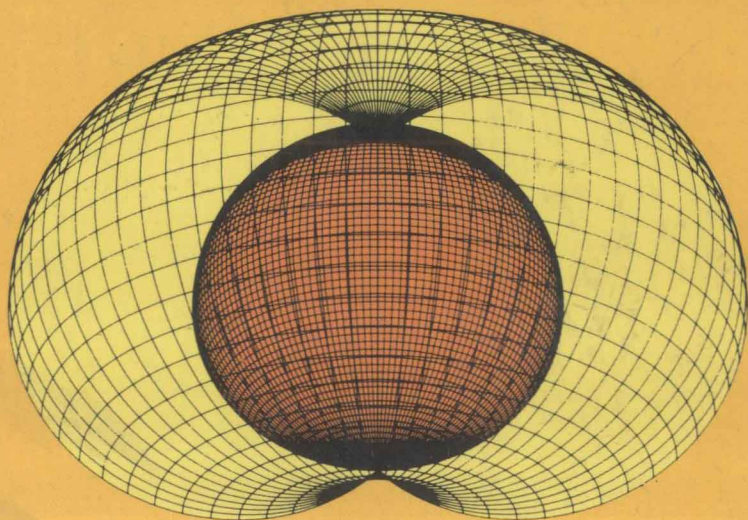


Tony Rothman,
Bernard Carr, Richard Matzner,
A.C. Ottewill, Tsvi Piran, L.C. Shepley,
E.C.G. Sudarshan, Frank J. Tipler, Bill Unruh

FRONTIERS OF MODERN PHYSICS

New Perspectives on
Cosmology, Relativity,
Black Holes and
Extraterrestrial
Intelligence



Frontiers of Modern Physics

New Perspectives on Cosmology,
Relativity, Black Holes
and Extraterrestrial Intelligence

TONY ROTHMAN

and Bernard Carr, Richard Matzner, A. C. Ottewill,
Tsvi Piran, L. C. Shepley, E. C. G. Sudarshan,
Frank J. Tipler, Bill Unruh

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Preface

Recently we have witnessed a well-documented boom in the public's interest in science. Relativity captured the physical science spotlight during the Einstein centennial in 1979. Computer sciences, virtually unknown twenty-five years ago, now have entire magazines devoted to them. The possibility of life-extending and memory-enhancing drugs captures our imagination. For the most part, this interest cannot be bad, but it strikes some of us as misdirected. In the new popular magazines devoted exclusively to science, where the average article length does not exceed one thousand words and in which the latest discoveries are encapsulated in fifty-word bits, the most important aspect of science is missing altogether: process.

The most important aspect of painting is the *painting*, not the portrait. The most important thing in writing is the *writing*, not the novel. Music is so vital because—perhaps more than any other art form—it allows musician and audience to experience *process* with each performance. So it is with science. The discovery is not as important as the search.

In these articles, therefore, you will hear surprisingly little of, “Scientists have concluded the universe was created 15.7 billion years ago in an explosion isotropic to one part in” Our statements will often end with question marks. You will be subjected to the reasoning process, insofar as it can be presented, without elaborate mathematics. Sometimes the arguments are long and difficult in concept. You will be required to think. You will not always understand everything. You will also occasionally be subjected to opinions of ours that grate on your nerves. This is okay. Contrary to popular mythology, scientists are people too, and they often hold annoying opinions.

Although the articles in this collection were written at different times and by different authors, you will notice common threads running through several works. There is a concern with models—those constructs within whose framework we view the world. There is a concern about how our own perception plays a role in the physical theories we develop. The role of perception in physics is becoming of greater and greater concern to physicists. The first halting steps are being taken to incorporate the experimenter into quantum mechanics and relativity. At the moment the steps are more philosophical than physical and some will argue it can never be anything else. Time will tell.

We cannot claim that all the articles were written with such high philosophical intent. One or two were commissioned; others were composed just for fun. Most often we saw an area in which the public was lacking information or was just plain misinformed, and we self-righteously took it upon ourselves to correct the situation. This approach can cause problems. One editor wrote in rejection: "You have explained why a certain mechanism won't work which most people have never heard of in the first place."

Communication is difficult. So is collaboration. Nonetheless, on the presumption that no single person knows everything and that scientists know their fields better than journalists, the attempt was made. The physicists here can legitimately be called leading experts. Most are either permanent staff or have been visitors at the University of Texas Center for Relativity Theory in Austin, the largest establishment for the study of the subject in the United States. Therefore, most of the articles touch on relativity. By and large, all the articles are true collaborations. It cannot be hoped that the articles are uniformly successful, but it is hoped that you will find in them new opinions with which to argue and new areas of thought to explore.

TONY ROTHMAN, in collaboration

Tony Rothman received a B.A. in physics from Swarthmore College in 1975 and a PhD from the Center for Relativity at the University of Texas, Austin, in 1981. Since then he has done post-doctoral work at the Department of Astrophysics, Oxford University, and at the Shternberg Astronomical Institute, Moscow, and is spending 1984–1986 at the University of Cape Town.

He is also the author of a novel, The World Is Round (Ballantine/Del Rey, 1978), and a play, The Magician and the Fool, which won the Oxford Experimental Theatre Club Competition for 1981–1982. His shorter works have appeared in various magazines and he is currently completing a large novel, Apocrypha. When time permits he plays the oboe and studies Russian.

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