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THE FARTHEST THINGS IN THE UNIVERSE

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JAY M. PASACHOFF
WILLIAMS COLLEGE

HYRON SPINRAD
UNIVERSITY OF CALIFORNIA AT BERKELEY

PATRICK S. OSMER
THE OHIO STATE UNIVERSITY

EDWARD S. CHENG
NASA – GODDARD SPACE FLIGHT CENTER

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PREFACE

This book originated as a symposium at the American Association for the Advancement of Science annual meeting in San Francisco in 1989. The topic, *The Farthest Things in the Universe*, suggested itself to me as the most interesting and significant topic that people could hear about. An earlier AAAS Symposium had led to a book, *The Redshift Controversy*, that was still in use, and we hope that this volume will prove itself of similarly lasting interest.

Two of the original speakers, Hyron Spinrad of the University of California at Berkeley, and Patrick Osmer, then of the National Optical Astronomy Observatories, revised their pieces to bring them up-to-date for inclusion in this book. Further, Ed Cheng of the COBE Science Team and NASA's Goddard Space Flight Center agreed to write a new piece for inclusion in the book. We appreciate his taking time during the period of his duties as Chief Scientist for the Hubble Space Telescope's repair mission to complete his piece. During the interval from the time of the symposium to the present, the Cosmic Background Explorer spacecraft was launched and has had its tremendous successes in showing that the Universe has a black-body spectrum and in finding ripples in space that may be the seeds from which galaxy-formation began. Thus this book appears at an optimum time.

During the period of preparation of the book, I was resident for a year at the Institute for Advanced Study at Princeton, and I thank John Bahcall for his hospitality there. In Williamstown, I have been assisted by Susan Kaufman. The book was completed during a sabbatical leave at the Harvard-Smithsonian Center for Astrophysics, and I thank Harvey Tananbaum for his hospitality there.

Ed Cheng thanks Mike Hauser, Matt Kowitt, John Mather, Steve Shore, and Rai Weiss for their helpful and critical comments on the various drafts of the manuscript. Any remaining inaccuracies are, of course, a consequence of his persistent blockheadedness. He especially thanks the COBE team of scientists, engineers, and computing experts for showing what teamwork, in the best NASA tradition, can accomplish.

Hy Spinrad thanks especially the staffs of the Kitt Peak National Observatory and of the Lick Observatory for much cooperation over the years. He again acknowledges the help of his colleagues, students and recent ex-students for keeping this research going over a long and productive decade. In particular he thanks Wil van Breugel, Pat McCarthy, and Mark Dickinson. Much of his research on galaxies has been supported by the U.S. National Science Foundation – and he thanks them, also.

Patrick Osmer thanks the National Optical Astronomy Observatories (NOAO) and their staff for support of his research and of the writing of his contribution. NOAO is operated by the Association of Universities for Research in Astronomy, Inc., under contract with the National Science Foundation. He is particularly grateful to his collaborators Paul Hewett and Stephen Warren for discussions on the search for high-redshift quasars.

We are grateful to Nancy Kutner for the index. We all thank Simon Mitton and Adam Black of the Cambridge University Press for their interest in the book and for bringing it to completion.

Jay M. Pasachoff
Williamstown, Massachusetts