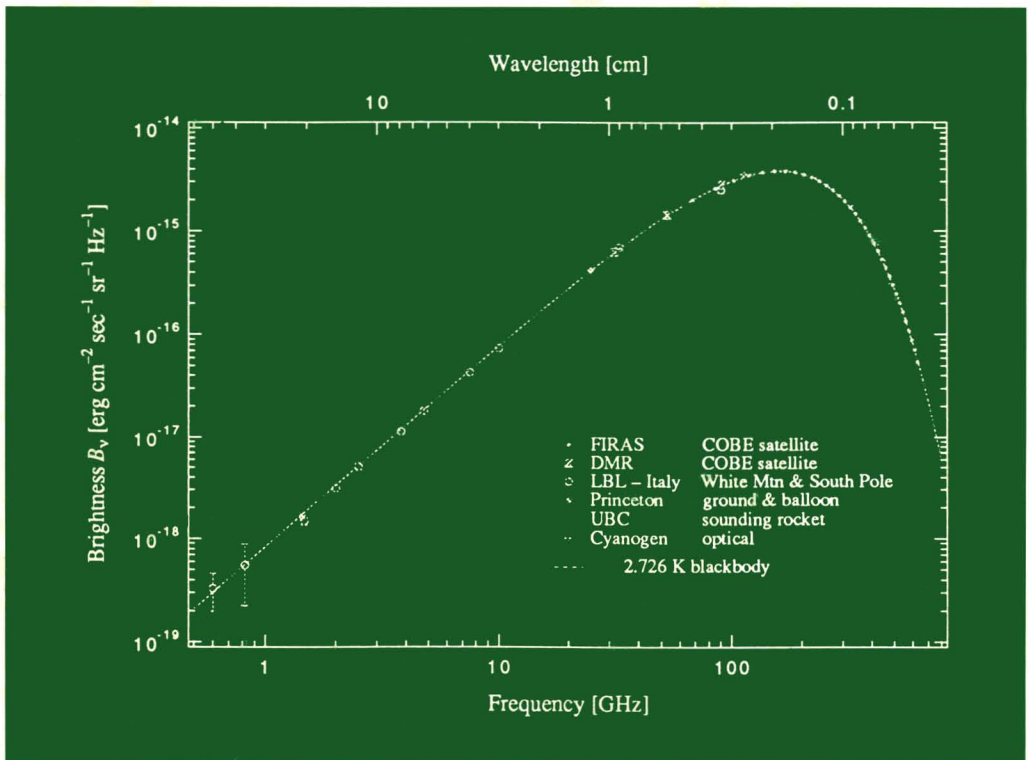


# EXAMINING THE BIG BANG AND DIFFUSE BACKGROUND RADIATIONS

Edited by MENAS KAFATOS and YOJI KONDO



INTERNATIONAL ASTRONOMICAL UNION

KLUWER ACADEMIC PUBLISHERS

**EXAMINING THE BIG BANG  
AND DIFFUSE BACKGROUND RADIATIONS**

INTERNATIONAL ASTRONOMICAL UNION  
UNION ASTRONOMIQUE INTERNATIONALE

# EXAMINING THE BIG BANG AND DIFFUSE BACKGROUND RADIATIONS

PROCEEDINGS OF THE 168TH SYMPOSIUM OF THE  
INTERNATIONAL ASTRONOMICAL UNION,  
HELD IN THE HAGUE, THE NETHERLANDS,  
AUGUST 23–26, 1994

EDITED BY

MENAS KAFATOS

*Center for Earth Observing and Space Research,  
Institute for Computational Sciences & Informatics,  
George Mason University, Fairfax, VA, U.S.A.*

and

YOJI KONDO

*NASA/Goddard Space Flight Center,  
Greenbelt, MD, U.S.A.*



**KLUWER ACADEMIC PUBLISHERS**

DORDRECHT / BOSTON / LONDON



Library of Congress Cataloging-in-Publication Data

Examining the big bang and diffuse background radiations / edited by  
Menas Kafatos and Yoji Kondo.

p. cm.

"International Astronomical Union Symposia. Volume 168"--T.p.  
verso.

Includes index.

ISBN 0-7923-3814-6 (hardcover : alk. paper)

1. Cosmic background radiation--Congresses. 2. Big bang theory--  
Congresses. 3. Galaxies--Congresses. I. Kafatos, Minas C.

II. Kondo, Yoji.

QB991.C64E93 1996

523.1--dc20

95-40169

ISBN 0-7923-3814-6 (HB)

---

*Published on behalf of  
the International Astronomical Union  
by*

*Kluwer Academic Publishers, P.O. Box 17, 3300 AA Dordrecht, The Netherlands.*

*Kluwer Academic Publishers incorporates  
the publishing programmes of  
D. Reidel, Martinus Nijhoff, Dr W. Junk and MTP Press.*

*Sold and distributed in the U.S.A. and Canada  
by Kluwer Academic Publishers,  
101 Philip Drive, Norwell, MA 02061, U.S.A.*

*In all other countries, sold and distributed  
by Kluwer Academic Publishers Group,  
P.O. Box 322, 3300 AH Dordrecht, The Netherlands.*

*Printed on acid-free paper*

*All Rights Reserved  
©1996 International Astronomical Union*

*No part of the material protected by this copyright notice may be reproduced or utilized  
in any form or by any means, electronic or mechanical including photocopying,  
recording or by any information storage and retrieval system, without written permission  
from the publisher.*

*Printed in the Netherlands*

## TABLE OF CONTENTS

PREFACE .....	ix
SCIENTIFIC ORGANIZING COMMITTEE .....	xi
<b><i>PART 1: INVITED REVIEWS</i></b> .....	<b>1</b>
L. WOLTJER: Introductory Remarks .....	3
VIRGINIA TRIMBLE: Backgrounds and the Big Bang: Some Extracts from Their History .....	9
JOHN MATTER: Measurement and Implications of the Cosmic Microwave Background Spectrum .....	17
G.F. SMOOT: Of Cosmic Background Anisotropies .....	31
I. STRUKOV, et al: Status of the Relict-2 Mission and Our Future Plans . . .	45
R. B. PARTRIDGE: Fluctuations in the Microwave Sky .....	59
A.K. SINGAL: Radio Galaxies and Quasars as Cosmological Probes .....	71
JAMES S. DUNLOP: High Redshift Radio Galaxies .....	79
HUBB ROTTGERING: Cold Material in Distant Radio Galaxies .....	89
P.N. WILKINSON, et al: A Search for Gravitational Milli-Lenses .....	95
MICHAEL G. HAUSER: The COBE DIRBE Search for the Cosmic Infrared Background .....	99
C.J. CESARSKY and D. ELBAZ: Galaxy Formation -- ISOCAM Counts .....	109
H. OKUDA: Observations of Diffuse IR Background Radiation by IRTS and IRIS .....	117
P.M. LUBIN: Degree Scale Anisotropy -- Current Status .....	125
JOHN P. HUCHRA: Galaxy Motions in the Nearby Universe .....	143
SIDNEY VAN DEN BERGH: The Hubble Parameter - A Status Report at EPOCH 1994.5 .....	157
G.A. TAMMANN and ALLAN SANDAGE: The Local Velocity Field and the Hubble Constant .....	163
D.S. MATHEWSON and V.L. FORD: Large-Scale Flows in the Local Universe .....	175
RICCARDO GIOVANELLI, et al: Spiral Galaxies and the Peculiar Velocity Field .....	183
J. EINASTO: Formation of the Supercluster-Void Network .....	193
DAVID C. KOO: Faint Field Galaxy Counts, Colors, and Redshifts .....	201
PETER SCHNEIDER: Cosmological Applications of Gravitational Lensing .....	209
R.E. GRIFFITHS, et al: The HST Medium Deep Survey -- Galaxy Morphology at High Redshift .....	219
PETER JAKOBSEN: The Far-Ultraviolet Background .....	229

JILL BECHTOLD: Evolution of the EUV Background from Quasar Absorption Line Studies . . . . .	237
G. HASINGER: The X-Ray Background . . . . .	245
GIANCARLO SETTI and ANDREA COMASTRI: The Sources of the Hard X-Ray Background . . . . .	263
P. LAURENT: The Cosmological Diffuse $\gamma$ -Ray Background: Myth or Reality? . . . . .	271
P. SREEKUMAR and D.A. KNIFFEN: Diffuse Gamma Rays of Galactic and Extragalactic Origin: Preliminary Results from EGRET . . . . .	279
I. NOVIKOV: Big Bang Scenario and Nature of Dark Matter . . . . .	289
MICHAEL S. TURNER: The Hot Big Bang and Beyond . . . . .	301
J.A. FRIEMAN: Inflation, Microwave Background Anisotropy, and Open Universe Models . . . . .	321
F. HOYLE, G. BURBIDGE and J.V. NARLIKAR: The Quasi-Steady State Cosmology . . . . .	329
H. ARP: X-Ray Observations of Galaxy-Quasar Associations . . . . .	369
D.W. SCIAMA: The Present Status of the Decaying Neutrino Theory . . . . .	381
MARTIN J. REES: Background Radiation -- Probes and Future Tests . . . . .	389
YOJI KONDO: A Panel Discussion of "Major Unsolved Problems of Cosmology" . . . . .	399
H. ARP: Fundamental Observational Problems . . . . .	401
G. BURBIDGE: Redshifts of Unknown Origin . . . . .	407
JOHN C. MATHER: Future Cosmic Microwave and Cosmic Infrared Background Measurements . . . . .	419
PHILIP MORRISON: Three Cosmological Remarks . . . . .	423
R.B. PARTRIDGE: Panel Contribution -- IAU Symposium 168 . . . . .	427
MENAS KAFATOS: Knowledge Limits in Cosmology . . . . .	431
<b>PART 2: CONTRIBUTED PAPERS . . . . .</b>	<b>439</b>
S.N. DUTTA and G. EFSTATHIOU: Temperature Fluctuations of the Microwave Background in Primeval Isocurvature Baryon Models . . . . .	441
E. MARTINEZ-GONZALEZ and J.L. SANZ: CMB -- Anisotropies Due to Non-Linear Clustering . . . . .	445
J.L. PUGET, et al: Planning Future Space Measurements of the CMB . . . . .	447
R.D. DAVIES, et al: New Results on CMB Structure from the Tenerife Experiments . . . . .	453
M. MELEK: On the Use of COBE Results . . . . .	461
E.M. DE GOUVEIA DAL PINO, et al: Is the Early Universe Fractal . . . . .	465
P. DRIESSEN: A Fractal Model of the Universe . . . . .	467
R.A. DALY: Powerful Extended Radio Sources -- A Goldmine for Cosmology . . . . .	469
I.B. VAVILOVA: On the Use of Fractal Concepts in Analysis of Distributions of Galaxies . . . . .	473

L.I. GURVITS: Milliarcsecond Radio Structure of AGN as a Cosmological Probe . . . . .	477
J.V. WALL, C.R. BENN and A.J. LOAN: Mapping Large-Scale Structure with Radio Sources . . . . .	481
J.L. JONAS: The Rhodes/Hartrao 2300 Mhz Horn Telescope . . . . .	487
J.C. JACKSON and MARINA DODGSON: Vacuum-Energy and the Angular-Size/Redshift Diagram for Milliarcsecond Radio Sources . . . . .	489
RENDONG NAN and ZHENG DONG CAI: A Hint to Possible Anisotropy in Radio Universe . . . . .	491
E. MARTINEZ-GONZALEZ, et al: Projected Clustering Around $1 < Z < 2$ Radiogalaxies . . . . .	493
E. MARTINEZ-GONZALEZ, et al: Upper Limits on the $LY\alpha$ Emission at $Z=3.4$ . . . . .	497
J.L. SANZ, et al: Intermediate Resolution Spectroscopy of the Radio Galaxy B2 0902+34 at $Z \approx 3.4$ . . . . .	499
J. VON LINDE, et al: Foreground Galaxies around Luminous Quasars . . . . .	501
MIRTA MOSCONI, PATRICIA TISSERA and DIEGO GARCIA LAMBAS: Evolution of Galaxy Luminosity in the CDM Model . . . . .	503
DORU MARIAN SURAN: Cosmological Parameters Determinations from Deep Sky Redshift Surveys . . . . .	505
CARLOS A. VALOTTO and DIEGO GARCIA LAMBAS: A Statistical Study of Environment Effects on Galaxy Properties . . . . .	509
JOANNA ANOSOVA and LUDMILA KISELEVA: Chance and Non-Chance Clustering in the Universe and Problems of High Redshift Galaxies in Compact Groups . . . . .	511
S.P. BHAVSAR and D.A. LAUER: Analysis of the CFA "Great Wall" Using the Minimal Spanning Tree . . . . .	517
I. KUNEVA and M. KALINKOV: Superclusters and Supervoids . . . . .	521
J. ANOSOVA, S. IYER and R.K. VARMA: Clusters and Voids in General Galaxy Field . . . . .	523
LUDMILA KISELEVA and JOANNA ANOSOVA: Typical Characteristics of Chance and Non-Chance Compact Groups of Galaxies . . . . .	525
U. BORGEEST, K.-J. SCHRAMM and J. VON LINDE: A Dedicated Quasar Monitoring Telescope . . . . .	527
JEFFREY LINSKY: Accurate Measurements of the Local Deuterium Abundance from HST Spectra . . . . .	529
A.V. MANDZHOS: Mutual Interference and Structural Properties of Object Images in the Vicinity of the Gravitational Lens CUSP Point . . . . .	533
T. SCHRAMM: Complex Theory of Gravitational Lenses Part I . . . . .	535
V.L. AFANASIEV, et al: Field Spectroscopy Observations the Gravitational Lenses H1413+117 and Q2237+030, Preliminary Results . . . . .	537
J. PELT, et al: The Time Delay Between QSO 0957+561 A, B . . . . .	539

<b>S.V. KHMIL: Gravitational Macrolensing and Quasar Spectra</b> . . . . .	<b>541</b>
<b>JONATHAN E. GRINDLAY and EYAL MAOZ: Halo/Thick Disk CVS and the Cosmic X-Ray Background</b> . . . . .	<b>543</b>
<b>I.M. GIOIA, et al: Arcs in X-Ray Selected Clusters</b> . . . . .	<b>549</b>
<b>NOAH BROSCHE: Tauvex and the Nature of the Cosmological UV Background</b> . . . . .	<b>553</b>
<b>D. DUARI, P. DASGUPTA and J.V. NARLIKAR: Peaks and Periodicities in the Redshift Distribution of Quasi-Stellar Object</b> . . . . .	<b>555</b>
<b>YUVAL NEEMAN: Inflationary Cosmogony, Copernican Releveling and Extended Reality</b> . . . . .	<b>559</b>
<b>M. ROOS, et al: Do Massive Neutrinos Ionize Intergalactic HI?</b> . . . . .	<b>563</b>
<b>ALEXANDER GUSEV: Phase Transition at the Metric Elastic Universe</b> . .	<b>569</b>
<b>ALEXANDER GUSEV: Non-Singular Metric Elastic Universe</b> . . . . .	<b>571</b>
<b>M.I. WANAS and M.A. BAKRY: Stability of Cosmological Models</b> . . . .	<b>573</b>
<b>M.I. WANAS: Cosmological Models in AP-Spaces</b> . . . . .	<b>575</b>
<b>MARIO G. ABADI, DIEGO G. LAMBAS and PATRICIA B. TISSERA: Cosmological Simulations with Smoothed Particle Hydrodynamics</b> . . . . .	<b>577</b>
<b>AUTHOR INDEX</b> . . . . .	<b>579</b>
<b>SUBJECT INDEX</b> . . . . .	<b>581</b>
<b>OBJECT INDEX</b> . . . . .	<b>585</b>