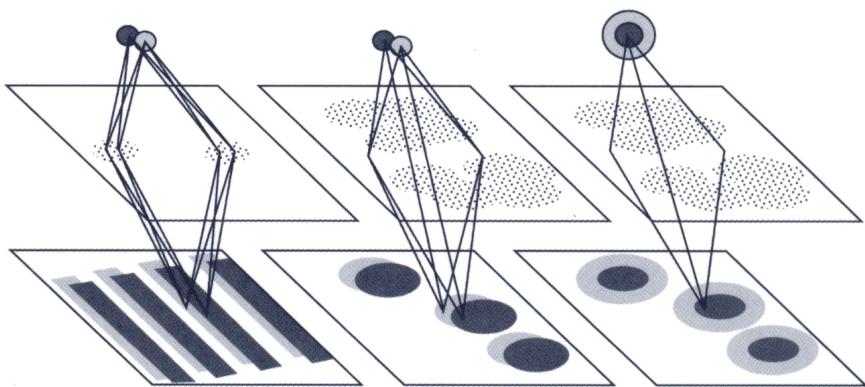


Sources and Scintillations: Refraction and Scattering in Radio Astronomy

IAU Colloquium 182

Edited by

Richard Strom, Peng Bo,
Mark Walker and Nan Rendong



Kluwer Academic Publishers

SOURCES AND SCINTILLATIONS

Sources and Scintillations:

Refraction and Scattering in Radio Astronomy

IAU Colloquium 182

Edited by

R. STROM

ASTRON, Dwingeloo and University of Amsterdam, The Netherlands

P. BO

*Beijing Astronomical Observatory, National Astronomical Observatories,
Chinese Academy of Sciences*

M. WALKER

*Research Centre for Theoretical Astrophysics, University of Sydney
Australia Telescope National Facility, CSIRO*

N. RENDONG

*Beijing Astronomical Observatory, National Astronomical Observatories,
Chinese Academy of Sciences*

Reprinted from *Astrophysics and Space Science*
Volume 278, Nos. 1–2, 2001



KLUWER ACADEMIC PUBLISHERS
DORDRECHT / BOSTON / LONDON

Library of Congress Cataloging-in-Publication Data

IAU colloquium (182th: 2000: Beijing)

Sources and scintillations: refraction and scattering in radio astronomy / edited by Richard Strom ... [et al.].

p.cm

Includes bibliographical references and index.

ISBN 1-40200-048-0 (alk. paper)

1. Radio astronomy-Congresses. 2. radio wave propagation-Congresses. I. Strom, Richard. II. Title.

QB475.A1 I38 2000

522'.682--dc21

2001038784

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

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,
P.O. Box 322, 3300 AH Dordrecht, The Netherlands.

Printed on acid-free paper

All Rights Reserved

© 2001 Kluwer Academic Publishers

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 copyright owner.

Printed in the Netherlands

TABLE OF CONTENTS

Foreword	1
Chapter One: INTRODUCTION TO INTERSTELLAR SCINTILLATION	
B. RICKETT / Radio sources and scintillation	5
J. CORDES / The galactic distribution of electron density microstructure inferred from radio scattering observations	11
P. GOLDRICH / Incompressible MHD turbulence	17
Y. GUPTA / Pulsar scintillation: Overview and some recent results	25
Chapter Two: PULSARS: THEIR SCATTERING AND INTRINSIC PROPERTIES	
R.N. MANCHESTER / The Parkes multibeam pulsar survey and interstellar scattering	33
A.K. YANGALOV, M.V. POPOV, V.A. SOGLASNOV, K.V. SEMENKOV, H. HIRABAYASHI, X. LIU and N. WANG / The study of scattering effects by VLBI observations of PSR 1329+54 with HALCA at 1650 MHZ	39
V.I. KONDRATIEV, M.V. POPOV, V.A. SOGLASNOV and S.V. KOSTYUK / Frequency structure of radio scintillations for several pulsars	43
J. CORDES / Optimizing pulsar searches against propagation effects	47
A. KUZMIN / Scattering of the low frequency pulsar radiation	53
N. WANG, R.N. MANCHESTER, A. YUSUP, X. WU, J. ZHANG and M. CHEN / Scintillation observations of strong northern pulsars	57
A.K. SINGAL / Giant radio pulses from pulsars	61
C.R. GWINN / Studying pulsar emission regions using interstellar scattering	65
T.V. SMIRNOVA and V.I. SHISHOV / Pulsar investigation using interstellar scintillation	71
Y. ISTOMIN / Propagation of electromagnetic waves in pulsar magnetospheres	77
M. LYUTIKOV / Looking into pulsar magnetospheres	81
Chapter Three: INTRA-DAY VARIABILITY, GRAVITATIONAL LENSING AND POLARIZATION	
D.J. JAUNCEY, L. KEDZIORA-CHUDCZER, J.E.J. LOVELL, J.-P. MACQUART, G.D. NICOLSON, R.A. PERLEY, J.E. REYNOLDS, A.K. TZIOUMIS, M.H. WIERINGA and H.E. BIGNALL / Radio intra-day variability: answers and questions	87
A.G. GORSHKOV, V.K. KONNIKOVA and M.G. MINGALIEV / Variability observations of a complete sample of flat-spectrum radio sources: preliminary results	93
C. JIN, T.P. KRICHBAUM, A. WITZEL, R. NAN, B. PENG, A. KRAUS, A. LOBANOV, S. QIAN and J.A. ZENSUS / VSOP observations of the BL Lac object 2007+777	97
J. DENNETT-THORPE and A.G. DE BRUYN / Monitoring the microarc-second quasar J1819+3845	101

S.J. WAGNER / Multi-frequency studies of intrinsic intraday variability	105
L. KEDZIORA-CHUDCZER, D.L. JAUNCEY, M.A. WIERINGA, A.K. TZIOUMIS and H.E. BIGNALL / Examples of extreme intraday variability	113
S.J. QIAN, A. KRAUS, T.P. KRICHBAUM, A. WITZEL and J.A. ZENSUS / Multifrequency polarization variations in 0917+624	119
J. WAMBSGANSS / Gravitational lensing	123
B. RICKETT / ISS of polarized compact extragalactic radio sources	129
J.-P. MACQUART, L. KEDZIORA-CHUDCZER, D. JAUNCEY and D. RAYNER / Strong, variable circular polarization in PKS 1519-273	135
A.G. DE BRUYN and J. DENNETT-THORPE / The microarcsecond quasar J1819+3845: polarization observations and detailed lightcurve analysis	139
H.Y. ZHANG and R.D. NAN / Magnetic fields in quasar 3C147 on milliarc-second scales	143

Chapter Four: EXTREME SCATTERING EVENTS, DISTRIBUTION OF MATERIAL AND IPS

M.A. WALKER / Interpretation of extreme scattering events	149
T.J.W. LAZIO, A.L. FEY and R.A. GAUME / Extreme scattering events: an observational summary	155
A. MINTER / An ESE event for PSR 0329+54	159
V.I. SHISHOV / Interstellar scintillation and clouds of the interstellar turbulent plasma	163
N.D.R. BHAT, Y. GUPTA, A.P. RAO and P.B. PREETHI / Interstellar scintillation studies of pulsars and distribution of scattering plasma in the local interstellar medium	171
R.R. ANDREASYAN and T.G. ARSHAKIAN / The radio luminosity of pulsars and the distribution of interstellar electron density	175
J.L. HAN / Magnetic fields in our galaxy: how much do we know?	181
V.S. ARTYUKH /Investigations of AGNs by the interplanetary scintillation method	185
J. WU, X. ZHANG and Y. ZHENG / IPS observations at Miyun Station, BAO	189
P. GOTHOSKAR, K.R. ANANTHARAMAIA, K. DESAI and A.P. RAO / VLA observations of angular broadening close to the sun	193
Y. PARIJSKIJ and V. CHERNENKOV / On post-SKA radio astronomy	199
W. BROUW / Australian research effort for the SKA	205
R.G. STROM, B. SMOLDERS and A. VAN ARDENNE / Active adaptive arrays: the astron approach to SKA	209
B. ZHU, Y. NIE, R. NAN and B. PENG / The FAST/SKA site selection in Guizhou Province	213
B. PEENG, R. NAN, Y. SU, Y. QIU, L. ZHU and W. ZHU / Five-hundred-meter aperture spherical telescope project	219
L. GUOQIANG, S. LIYUAN, L. YONGFENG, D. CHANGGEN and H. YAMEI / Analysis for reflector aluminum mesh panels of five-hundred meter aperture spherical telescope	225

Y.F. LUO, C.G. DENG, G.Q. LI and Y.M. HE / Structural analysis of FAST reflector supporting system	231
B.Y. DUAN, Y.Y. QIU, Y.X. SU, W.L. WANG, R.D. NAN and B. PENG / Modelling, simulation and testing of an optomechatronics design of a large radio telescope	237
R. GEXUE, L. QIUHAI and Z. ZHOU / On the cable car feed support configuration for FAST	243
S. WU, S. WANG, Y. MAO and Y. SU / Trying to enlarge the sky coverage of the FAST	249
L. GUODING, R. NAN and B. PENG / Extending the observable zenith angle of FAST using an offset feed	255
Y. QIU and L. ZHU / The control system of the active main reflector for FAST	261