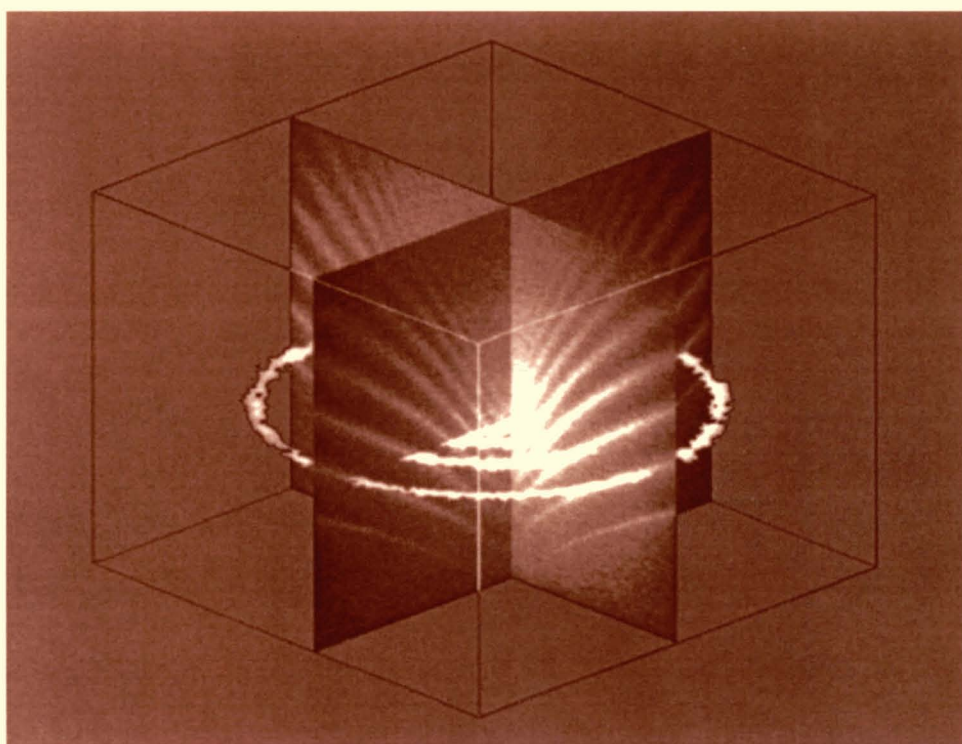


INTERNATIONAL ASTRONOMICAL UNION

SYMPOSIUM No. 181

SOUNDING SOLAR AND STELLAR INTERIORS

Edited by JANINE PROVOST AND FRANÇOIS-XAVIER SCHMIDER



INTERNATIONAL ASTRONOMICAL UNION

KLUWER ACADEMIC PUBLISHERS

SOUNDING SOLAR AND STELLAR INTERIORS

INTERNATIONAL ASTRONOMICAL UNION
UNION ASTRONOMIQUE INTERNATIONALE

SOUNDING SOLAR AND STELLAR INTERIORS

PROCEEDINGS OF THE 181ST SYMPOSIUM OF THE
INTERNATIONAL ASTRONOMICAL UNION,
HELD IN NICE, FRANCE,
SEPTEMBER 30–OCTOBER 3, 1996

EDITED BY

JANINE PROVOST

Observatoire de la Côte d'Azur, Nice, France

and

FRANÇOIS-XAVIER SCHMIDER

Université de Nice, France



KLUWER ACADEMIC PUBLISHERS

DORDRECHT / BOSTON / LONDON



A C.I.P. Catalogue record for this book is available from the Library of Congress.

ISBN 0-7923-4838-9 (HB)
ISBN 0-7923-4839-7 (PB)

*Published on behalf of
the International Astronomical Union
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 Group,
P.O. Box 322, 3300 AH Dordrecht, The Netherlands.*

Printed on acid-free paper

*All Rights Reserved
©1997 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

List of participants	ix
Préface (en français)	xxiii
Preface (in english)	xxv
Dedication: Philippe Delache	xxvii

Introduction

Sounding solar and stellar interiors: general introduction <i>J. Leibacher</i>	1
---	---

Part I : Helioseismology : From ground or space, a worldwide cooperation

The state of art in helioseismic ground-based experiments <i>P. Pallé</i>	15
Present status of the Taiwan Oscillation Network <i>Dean-Yi Chou et al.</i>	31
A review of space helioseismology <i>Th. Toutain</i>	39
Performance and first results from the GOLF instrument on SoHO <i>A. H. Gabriel et al.</i>	53
First result from VIRGO on SoHO <i>C. Fröhlich et al.</i>	67
New Time-distance helioseismology results from the SOI/MDI experiment <i>T. Duvall Jr, A.G. Kosovichev and P.H. Scherrer</i>	83
GOLF results: today's view on the solar modes <i>G. Grec et al.</i>	91
Precision solar astrometry from SoHO/MDI <i>J. F. Kuhn et al.</i>	103
Plane-wave analysis of SOI data <i>R.S. Bogart et al.</i>	111

Part II : Internal structure and rotation. Seismic inversions

Theoretical solar models <i>J. Provost</i>	121
---	-----

The seismic Sun	
<i>S. Basu</i>	137
The seismic structure of the Sun from GONG	
<i>E. Anderson et al.</i>	151
Structure inversions with the VIRGO data	
<i>Th. Appourchaux et al.</i>	159
A seismic solar model deduced from the sound speed distribution and an estimate of the neutrino fluxes	
<i>H. Shibahashi and M. Takata</i>	167
Stellar rotation and mixing	
<i>J.P. Zahn</i>	175
Internal Solar rotation	
<i>T. Sekii</i>	189
Internal structure and rotation of the Sun: First results from MDI data	
<i>A.G. Kosovichev et al.</i>	203
Internal rotation and dynamics of the Sun from GONG data	
<i>S. Korzennik et al.</i>	211
 Part III : Special session dedicated to Philippe Delache	
The scientific achievements of Ph. Delache	
<i>R.M. Bonnet</i>	221
Long-term solar-irradiance variability	
<i>J.M. Pap</i>	235
Giant planets seismology	
<i>B. Mosser</i>	251
Apparent solar diameter and variability	
<i>A. Vigouroux</i>	265
 Part IV : Inputs from helioseismology to solar physics	
Solar activity and solar oscillations	
<i>Y. Elsworth</i>	277
Excitation of solar acoustic oscillations	
<i>P. Kumar</i>	287
An observational study of the interaction of impulsive and periodic perturbations in the solar atmosphere	
<i>F.L. Deubner and R. Kleineisel</i>	307
 Part V : Asteroseismology : Theory and methods.	
Sounding stellar interiors	
<i>W. Dziembowski</i>	317

Asteroseismology: ground based observational methods	
<i>S. Frandsen</i>	331
Asteroseismology from space: COROT and other projects	
<i>A. Baglin and M. Auvergne</i>	345
Three years of ANTENA: what we have done!	
<i>J. A. Belmonte et al.</i>	357

Part VI : Results on some selected types of stars.

Asteroseismology of white dwarf stars	
<i>G. Vauclair</i>	367
Observational asteroseismology of δ Scuti stars	
<i>M. Breger and N. Audard</i>	381
Probing the interior of roAp stars: stellar tubas that sound like piccolos	
<i>J. Matthews</i>	387

Conclusion

Sounding solar and stellar interiors: Conclusion and prospects	
<i>D. Gough</i>	397
List of posters published in the poster volume	425
Author Index	435