

**SP-559**  
**October 2004**

Proceedings of the

SOHO 14 / GONG 2004  
Workshop

“Helio- and Asteroseismology:  
Towards a Golden Future”

12-16 July 2004  
New Haven, Connecticut, USA

***European Space Agency***  
***Agence spatiale européenne***

**Scientific Organising Committee**

Sarbani Basu	Yale, USA
Timothy Bedding	Sydney, Australia
Gabrielle Berthomieu	Nice, France
Yvonne Elsworth	Birmingham, U.K.
Philip Goode	BBSO/NJIT, USA
Frank Hill	NSO, USA
Rudi Komm	NSO, USA
Sylvain Korzennik	CfA, USA
Charles Lindsey	North West Research Associates, USA
Jesper Schou	Stanford, USA
Michael J. Thompson	Imperial College, U.K.)

Publication: Proceedings of the SOHO 14 / GONG 2004 Workshop  
12-16 July 2004, New Haven, Connecticut, USA  
(ESA SP-559, October 2004)

Editor: D. Danesy  
ESA Publications Division

Published and distributed by: ESA Publications Division  
ESTEC, Postbus 299  
2200 AG Noordwijk  
The Netherlands

Printed in: The Netherlands

Price: € 60

ISBN: 92-9092-870-0  
ISSN: 1609-042X

Copyright: © 2004 European Space Agency

## SOHO 14 / GONG 2004

### Helio- and Asteroseismology: Towards a Golden Future

#### Introduction

*The joint 14th SOHO and GONG 2004 workshop was hosted by the Astronomy Department of Yale University.*

*The past decade or so has seen a tremendous improvement in our knowledge of the solar interior because of helioseismic data from instruments on SOHO, the GONG network and other ground based networks. In addition to all helioseismic data that are available, rapid strides are being made in obtaining asteroseismic data. There have been very successful ground-based measurements of stellar frequencies. The Canadian spacecraft MOST has been launched successfully, and we should be getting new results soon. The workshop therefore focused on results obtained so far with helio- and asteroseismic data and what we can look forward to in the future. Topics covered at the meeting included local helioseismology, observations of high, medium and low degree modes, solar cycle variations, observations of oscillations in other stars, and asteroseismic results obtained so far.*

#### Contents

##### Invited Reviews and Oral Papers

AN OVERVIEW OF HELIO- AND ASTEROSEISMOLOGY .....	1
<i>J. Christensen-Dalsgaard</i>	
LOW-DEGREE HELIOSEISMOLOGY: THE STATE OF PLAY ON ITS SILVER ANNIVERSARY .....	34
<i>W.J. Chaplin</i>	
ANALYSIS AND MEASUREMENT OF LOW- $\ell$ SOLAR P-MODE PARAMETERS IN THE TIME-DOMAIN .....	44
<i>S.T. Fletcher, W.J. Chaplin &amp; Y. Elsworth</i>	
LOOKING FOR CORRELATED EXCITATION OF SOLAR P MODES .....	51
<i>F. Baudin &amp; H. Finidori</i>	
PROPERTIES OF THE ACOUSTIC SOURCE INFERRED FROM NONADIABATIC OSCILLATION SPECTRA.....	55
<i>R. Wachter &amp; A.G. Kosovichev</i>	
THE CURRENT STATUS OF ANALYZING HIGH-DEGREE MODES .....	61
<i>J. Reiter, E.J. Rhodes Jr., A.G. Kosovichev &amp; J. Schou</i>	
SPECTRAL ANALYSIS OF UNEVENLY SPACED DATA: APPLICATION TO HELIOSEISMOLOGY.....	73
<i>N. Seghouani</i>	
PREDICTIONS OF PERIODS AND GROWTH RATES OF SOLAR RADIAL, F-, AND G-MODES.....	79
<i>A.N. Cox &amp; J.A. Guzik</i>	

GRAVITY MODES WITH A RESONANT SCATTERING SPECTROPHOTOMETER.....	85
<i>S. Turck-Chièze, R.A. Garcia, S. Couvidat, J. Ballot, S.J. Jiménez-Reyes, E. Fossat, B. Gelly, S. Mathur, P.A.P. Nghiem, P. Pallé, JM. Robillot &amp; the GOLF-NG Technical Team</i>	
SPECTRA OF MDI MAGNETOGRAMS .....	91
<i>D.J. Thomson</i>	
LATEST OBSERVATIONAL RESULTS OF SOLAR-LIKE OSCILLATIONS IN OTHER STARS .....	101
<i>H. Kjeldsen &amp; T.R. Bedding</i>	
DETECTION OF SOLAR-LIKE OSCILLATIONS IN TWO RED GIANT STARS .....	113
<i>C. Barban, J. De Ridder, A. Mazumdar, F. Carrier, P. Eggenberger, S. De Ruyter, J. Vanautgaerden, F. Bouchy &amp; C. Aerts</i>	
RECENT DEVELOPMENTS IN THE STUDY OF LONG-PERIOD VARIABLE SUBDWARF B STARS .....	119
<i>S.K. Randall, G. Fontaine, E.M. Green, P. Brassard &amp; D.M. Terndrup</i>	
ASTEROSEISMOLOGY OF PROCYON A WITH SARG AT TNG.....	125
<i>R.U. Claudi, A. Bonanno, S. Leccia, R. Ventura, S. Desidera, R. Gratton, R. Cosentino, L. Paternò &amp; M. Endl</i>	
THE STATUS OF THE GONG PROGRAM.....	128
<i>F. Hill &amp; the GONG Team</i>	
LOW FREQUENCY MODES .....	134
<i>J. Schou</i>	
THE CURRENT STATUS OF THEORY FOR TIME-DISTANCE HELIOSEISMOLOGY.....	138
<i>A.C. Birch</i>	
SUBPHOTOSPHERIC FLOWS NEAR ACTIVE REGION NOAA 10486 .....	148
<i>D.A. Haber, B.W. Hindman, J. Toomre, R.S. Bogart &amp; M.J. Thompson</i>	
SEISMIC WAVES FROM THE SOLAR FLARES OF 2003 OCTOBER 28 AND 29.....	152
<i>A.-C. Donea &amp; C. Lindsey</i>	
SEARCHING FOR SUBSURFACE SIGNATURES OF X-CLASS FLARES .....	158
<i>R. Komm, R. Howe, I. González Hernández, F. Hill, J. Sudol &amp; C. Toner</i>	
TURBULENCE CONVECTION AND OSCILLATIONS IN THE SUN.....	164
<i>N.N. Mansour, A.G. Kosovichev, D. Georgobiani, A. Wray &amp; M. Miesch</i>	
THE NEED FOR CONTROL EXPERIMENTS IN LOCAL HELIOSEISMOLOGY .....	172
<i>J. Werne, A. Birch &amp; K. Julien</i>	
MODELING HELIOSEISMIC SIGNALS.....	182
<i>V.C.H. Tong</i>	
THEORETICAL ASPECTS OF ASTEROSEISMOLOGY: SMALL STEPS TOWARDS A GOLDEN FUTURE.....	186
<i>M.P. Di Mauro</i>	
THE ROLE OF DOMINANT MODES IN ASTEROSEISMOLOGY .....	201
<i>M. Paparó</i>	
CONVECTION-OSCILLATIONS INTERACTION IN F-G TYPE MAIN SEQUENCE STARS .....	207
<i>M-A. Dupret, A. Grigahcène, R. Garrido, M. Gabriel &amp; A. Noels</i>	

ACOUSTICS OF SURFACE MAGNETIC FIELDS .....	213
<i>P.S. Cally</i>	
ACOUSTIC WAVES REVEAL THE MAGNETIC TOPOLOGY OF THE SOLAR ATMOSPHERE .....	223
<i>W. Finsterle, S.M. Jefferies, A. Cacciani &amp; P. Rapex</i>	
LOCAL HELIOSEISMOLOGY OF INCLINED MAGNETIC FIELDS AND THE SHOWERGLASS EFFECT .....	227
<i>H. Schunker, D.C. Braun, C. Lindsey &amp; P.S. Cally</i>	
GLOBAL MHD THEORY OF TACHOCLINE AND THE CURRENT STATUS OF LARGE-SCALE SOLAR DYNAMO .....	233
<i>M. Dikpati</i>	
MERIDIONAL CIRCULATION AND THE SOLAR MAGNETIC CYCLE .....	241
<i>D. Nandy</i>	
THE PHASE OF GLOBAL SOLAR OSCILLATIONS .....	251
<i>R. Simoniello, W.J. Chaplin, Y. Elsworth, G.R. Isaak, B.A. Miller &amp; R. New</i>	
GLOBAL HELIOSEISMIC METROLOGY .....	254
<i>S.M. Jefferies, S.V. Vorontsov &amp; C. Giebink</i>	
PHENOMENOLOGICAL AND RIGOROUS EQUATIONS OF STATE FOR SOLAR AND STELLAR MODELING .....	261
<i>W. Dappen</i>	
HIGH DEGREE SOLAR OSCILLATIONS IN 3D NUMERICAL SIMULATIONS .....	267
<i>D. Georgobiani, R.F. Stein, Å. Nordlund, A.G. Kosovichev &amp; N.N. Mansour</i>	
3-D MHD SIMULATIONS OF THE SOLAR CONVECTION ZONE AND TACHOCLINE .....	271
<i>A.S. Brun</i>	
FULLY COMPRESSIBLE SOLAR DIFFERENTIAL ROTATION .....	282
<i>F.J. Robinson</i>	

## Poster Contributions

VARIATIONS IN LOW- $\ell$ SOLAR P-MODES WITH FLARE ACTIVITY .....	289
<i>A. Ambastha &amp; H.M. Antia</i>	
SOLAR P-MODE CHARACTERISTICS ASSOCIATED WITH SUPERACTIVE-REGIONS OBSERVED DURING OCT–NOV 2003.....	293
<i>A. Ambastha, S. Basu, H.M. Antia &amp; R.S. Bogart</i>	
VARIATION OF LOW DEGREE P-MODE AMPLITUDES .....	297
<i>B. Andersen &amp; T. Leifsen</i>	
TEMPORAL VARIATIONS IN THE SOLAR RADIUS? .....	301
<i>H.M. Antia &amp; S. Basu</i>	
TEMPORAL VARIATIONS IN ZONAL FLOWS .....	305
<i>H.M. Antia &amp; S. Basu</i>	
SEISMIC EXTRACTION OF ROTATION PARAMETERS IN SOLAR-LIKE STARS: THE PROBLEM OF THE ROTATION AXIS INCLINATION.....	309
<i>J. Ballot, R.A. García, P. Lambert &amp; A. Teste</i>	
ASTEROSEISMIC DETERMINATION OF HELIUM ABUNDANCE IN SOLAR-TYPE STARS .....	313
<i>S. Basu, A. Mazumdar, H.M. Antia &amp; P. Demarque</i>	
HELIOSEISMIC CONSTRAINTS ON PHOTOSPHERIC ABUNDANCES .....	317
<i>S. Basu &amp; H.M. Antia</i>	
ACOUSTIC MODES AND THE STRUCTURE OF THE SOLAR INTERIOR.....	321
<i>L. Bertello, F. Varadi, R.K. Ulrich &amp; S. Basu</i>	
A HIGH-RESOLUTION STUDY OF MERIDIONAL FLOWS NEAR THE SOLAR EQUATOR.....	325
<i>R.S. Bogart, S. Basu &amp; D.A. Haber</i>	
ZONALLY AVERAGED MERIDIONAL FLOWS DETERMINED FROM LONG-TERM “RING- DIAGRAM” ANALYSIS.....	329
<i>R.S. Bogart &amp; S. Basu</i>	
ASTEROSEISMOLOGY OF THE CRYSTALLIZED ZZ CETI STAR BPM 37093: A DIFFERENT VIEW (PART I) .....	333
<i>P. Brassard &amp; G. Fontaine</i>	
LOCAL HELIOSEISMOLOGY OF NEAR-SURFACE FLOWS.....	337
<i>D.C. Braun, A.C. Birch &amp; C. Lindsey</i>	
DIFFERENTIAL ROTATION WHEN THE SUN SPUN FASTER .....	341
<i>B.P. Brown, M.K. Browning, A.S. Brun &amp; J. Toomre</i>	
VARIATIONS OF SOLAR SUBSURFACE WEATHER IN THE VICINITY OF ACTIVE REGIONS.....	345
<i>B.P. Brown, D.A. Haber, B.W. Hindman &amp; J. Toomre</i>	
SIMULATIONS OF CORE CONVECTION AND DYNAMO ACTIVITY IN ROTATING A-TYPE STARS.....	349
<i>M.K. Browning, A.S. Brun &amp; J. Toomre</i>	
ON LIFETIMES OF HIGH-L SOLAR P-MODES: TON DATA.....	353
<i>O. Burtseval, A. Serebryanskiy, S. Kholikov, D-Y. Chou &amp; the TON Team</i>	

FLAG HARE-AND-HOUNDS EXERCISE: ON THE EXTRACTION OF SECTORAL MODE SPLITTINGS FROM FULL-DISC, SUN-AS-A-STAR DATA .....	356
<i>W.J. Chaplin, T. Appourchaux, F. Baudin, P. Boumier, Y. Elsworth, S.T. Fletcher, E. Fossat, R.A. García, G.R. Isaak, A. Jiménez, S.J. Jiménez-Reyes, M. Lazrek, J. Lochard, R. New, P. Pallé, C.Régulo, D. Salabert &amp; T. Toutain</i>	
NOVEL TECHNIQUES FOR THE IDENTIFICATION OF NOISE CONTRIBUTIONS TO FULL-DISC HELIOSEISMIC POWER SPECTRA.....	360
<i>W.J. Chaplin, Y. Elsworth, G.R. Isaak, B.A. Miller, R. New &amp; B. Pintér</i>	
IMPACT OF OBSERVATIONAL DUTY CYCLE ON P-MODE EIGENFREQUENCIES.....	364
<i>W.J. Chaplin, Y. Elsworth, G.R. Isaak, B.A. Miller, R. New &amp; D. Salabert</i>	
ASTEROSEISMOLOGY IN ACTION: DETERMINATION OF THE FUNDAMENTAL PARAMETERS OF THE HOT SUBDWARF B STAR PG 1219+534.....	368
<i>S. Charpinet, G. Fontaine &amp; P. Brassard</i>	
SEARCHING FOR SOLAR CYCLE VARIATIONS OF P-MODE FREQUENCIES GENERATED BY PERTURBATIONS NEAR THE BASE OF THE SOLAR CONVECTION ZONE .....	372
<i>D-Y. Chou &amp; A. Serebryanskiy</i>	
DETECTION OF JETS AND ASSOCIATED TOROIDAL FIELDS IN THE SOLAR TACHOCLINE .....	376
<i>J. Christensen-Dalsgaard, T. Corbard, M. Dikpati, P.A. Gilman &amp; M.J. Thompson</i>	
AN AUTOMATED IMAGE REJECTION SYSTEM FOR GONG .....	381
<i>R. Clark, C. Toner, F. Hill, K. Hanna, G. Ladd, R. Komm, R. Howe, I. Gonzalez-Hernandez, S. Kholikov</i>	
VALIDATION OF 3D HELIOSEISMIC INVERSIONS OF TRAVEL-TIMES THROUGH SIMULATIONS OF ARTIFICIAL DATA WITH THE CORRECT NOISE STATISTICS.....	384
<i>S. Couvidat, L. Gizon &amp; A.C. Birch</i>	
ASTEROSEISMOLOGY WITH STARE, SLEUTH AND PSST .....	388
<i>O. Creevey</i>	
WHAT CAN P-MODE ABSORPTION AND PHASE SHIFT DATA CURRENTLY TELL US ABOUT THE SUBSURFACE STRUCTURE OF SUNSPOTS? PRELIMINARY RESULTS.....	392
<i>A.D. Crouch &amp; P.S. Cally</i>	
SCRIPTABLE DATA PROCESSING TOOL FOR VARIABLE STARS: MUFRAN .....	396
<i>Z. Csabry &amp; Z. Kolláth</i>	
THE CHEMICAL COMPOSITION AND EQUATION OF STATE OF THE SUN INFERRED FROM SEISMIC MODELS THROUGH AN INVERSION PROCEDURE .....	400
<i>W. Däppen &amp; C-H. Lin</i>	
SUPERGRANULAR AND LARGER-SCALE SURFACE FLOWS WITHIN MAGNETIC ENVIRONMENTS .....	404
<i>M.L. DeRosa</i>	
THEORETICAL INSTABILITY STRIPS AND NON-ADIABATIC PHOTOMETRIC OBSERVABLES FOR $\delta$ SCUT AND $\gamma$ DOR STARS.....	408
<i>M-A. Dupret, A. Grigahcène, R. Garrido, M. Gabriel &amp; A. Noel</i>	
A NEW METHOD TO SEARCH FOR SOLAR GRAVITY MODE OSCILLATIONS.....	412
<i>T.L. Duvall Jr.</i>	
THE EFFECT OF SPECTRAL LINE SHAPE CHANGES ON GONG OBSERVATIONS OF OSCILLATIONS AND FLARES.....	416
<i>F. Edelman, F. Hill, R. Howe &amp; R. Komm</i>	

PCA INVERSIONS FOR THE ROTATION OF THE SOLAR RADIATIVE INTERIOR.....	420
<i>A. Eff-Darwich, S.G. Korzennik, S. Jiménez-Reyes &amp; R.A. García</i>	
OSCILLATION MODES IN AXIALLY SYMMETRIC STARS .....	424
<i>F. Espinosa, F. Pérez Hernández &amp; T. Roca Cortés</i>	
TIME-DISTANCE HELIOSEISMOLOGY: A FOURIER TRANSFORM METHOD AND MEASUREMENT OF REYNOLDS STRESSES.....	428
<i>N.A. Featherstone, B.W. Hindman, D.A. Haber &amp; J. Toomre</i>	
HELIOSEISMOLOGY FROM THE BLUE AND RED WINGS OF THE NA PROFILE AS SEEN BY GOLF .....	432
<i>R.A. García, S.J. Jiménez-Reyes, S. Turck-Chièze &amp; S. Mathur</i>	
SOLAR LOW-DEGREE P-MODE PARAMETERS AFTER 8 YEARS OF VELOCITY MEASUREMENTS WITH SOHO .....	436
<i>R.A. García, S.J. Jiménez-Reyes, S. Turck-Chièze, J. Ballot &amp; C.J. Henne</i>	
GLOBAL MHD INSTABILITIES IN A THIN-SHELL MODEL OF THE SOLAR TACHOCLINE.....	440
<i>P.A. Gilman, M. Dikpati &amp; M.S. Miesch</i>	
MERIDIONAL VARIABILITY FROM LARGE-APERTURE RING DIAGRAMS .....	444
<i>I. González Hernández, R. Komm, F. Hill, R. Howe &amp; T. Corbard</i>	
MEDIUM-L SPHERICAL HARMONIC RINGS.....	448
<i>I. González Hernández, F. Hill, Sh.S. Kholikov, K. Gressett &amp; S.J. Jiménez-Reyes</i>	
GOLF : PROBING THE OBSERVED LOW FREQUENCY SPECTRUM WITH A NUMERICAL MODEL.....	452
<i>G. Grec, J. Provost, C. Renaud &amp; G. Berthomieu</i>	
CAN RECENTLY DERIVED SOLAR PHOTOSPHERIC ABUNDANCES BE CONSISTENT WITH HELIOSEISMOLOGY? .....	456
<i>J.A. Guzik &amp; L.S. Watson</i>	
COMPARISON OF LOCAL HELIOSEISMIC TECHNIQUES APPLIED TO MDI DOPPLER DATA .....	460
<i>B.W. Hindman, N.A. Featherstone, D.A. Haber, S.Musman &amp; J. Toomre</i>	
THE EFFECT OF HELIUM IONIZATION ON STELLAR EIGENFREQUENCIES .....	464
<i>G. Houdek &amp; D.O. Gough</i>	
HOW SENSITIVE ARE ROTATION INVERSIONS TO SUBTLE FEATURES OF THE DYNAMO? .....	468
<i>R. Howe, M. Rempel, J. Christensen-Dalsgaard, F. Hill, R.W. Komm, J. Schou &amp; M.J. Thompson</i>	
CONVECTION-ZONE DYNAMICS FROM GONG AND MDI, 1995-2004 .....	472
<i>R. Howe, R.W. Komm, F. Hill, J. Christensen-Dalsgaard, D.A. Haber, J. Schou &amp; M.J. Thompson</i>	
THE PHASE OF THE TORSIONAL OSCILLATION PATTERN .....	476
<i>R. Howe, R.W. Komm, F. Hill, J. Christensen-Dalsgaard, J. Schou &amp; M.J. Thompson</i>	
A TALE OF TWO REGIONS: ACOUSTIC POWER MAPS AND MAGNETIC ACTIVITY IN AR 10486 AND AR 10488.....	480
<i>R. Howe, R.W. Komm, I. González Hernández, F. Hill, D.A. Haber &amp; B.W. Hindman</i>	
LOCAL FREQUENCY SHIFTS FROM GONG AND MDI.....	484
<i>R. Howe, R.W. Komm, I. González Hernández, F. Hill, D.A. Haber &amp; B.W. Hindman</i>	



OPTIMAL MASKS FOR DEEP FOCUSING .....	488
<i>S.J. Hughes, F.P. Pijpers &amp; M.J. Thompson</i>	
COMPARISON OF GONG AND MDI SOUND-SPEED ANOMALIES BENEATH TWO ACTIVE REGIONS.....	493
<i>S.J. Hughes, S.P. Rajaguru &amp; M.J. Thompson</i>	
APPLICATION OF LOCAL-AREA HELIOSEISMIC METHODS AS PREDICTORS OF SPACE WEATHER.....	497
<i>J.M. Jensen, H. Lundstedt, M.J. Thompson, F.P. Pijpers &amp; S.P. Rajaguru</i>	
THE HIGH FREQUENCY SPECTRUM OF VIRGO AND GOLF EXPERIMENTS ABOARD SOHO .....	501
<i>A. Jiménez, S. Jiménez-Reyes &amp; R.A. García</i>	
ON THE STRANGE BEHAVIOUR OF THE P-MODE PEAK ASYMMETRY OBSERVED IN GOLF DATA .....	505
<i>S.J. Jiménez-Reyes, R.A. García &amp; C.J. Henney</i>	
ON THE MERIDIONAL MIGRATION OF STELLAR ACTIVE REGIONS: EFFECTS OF DIFFERENTIAL ROTATION AND STELLAR CYCLE .....	509
<i>E.Kh. Kaghashvili</i>	
TRAVEL TIME MEASUREMENTS IN SUNSPOTS.....	513
<i>S. Kholikov</i>	
FLOWMAPS COVERING SIX CONSECUTIVE CARRINGTON ROTATIONS .....	516
<i>R. Komm, R. Howe, J. Bolding, K. Donaldson Hanna, I. González Hernández, F. Hill &amp; C. Toner</i>	
SOLAR SUBSURFACE FLOWS AND VORTICITY.....	520
<i>R. Komm, R. Howe, I. González Hernández, F. Hill, D. Haber, B. Hindman &amp; T. Corbard</i>	
A MODE FITTING METHODOLOGY OPTIMIZED FOR VERY LONG TIME SERIES.....	524
<i>S.G. Korzennik</i>	
GOLF LOW DEGREE P-MODE FREQUENCIES AND SPLITTINGS ACCURATELY CORRECTED FOR THE SOLAR MAGNETIC ACTIVITY.....	528
<i>M. Lazrek, E. Fossat, G. Grec, C. Renaud &amp; F.X. Schmider</i>	
SOLAR RADIUS MEASUREMENTS AT MOUNT WILSON.....	532
<i>S. Lefebvre, L. Bertello, R.K. Ulrich, J.E. Boyden &amp; J-P. Rozelot</i>	
A 2-D STELLAR EVOLUTION CODE INCLUDING ARBITRARY MAGNETIC FIELDS .....	536
<i>L. Li, S. Basu, S. Sofia &amp; P. Demarque</i>	
A CONVECTION ZONE DYNAMO INCLUDING THE EFFECTS OF MAGNETIC BUOYANCY AND DOWNWARD FLOWS .....	540
<i>L. Li, S. Sofia &amp; G. Belvedere</i>	
SOLAR LUMINOSITY VARIATIONS MAY OCCUR ON SHORT TIME SCALES.....	544
<i>L. Li, S. Basu, S. Sofia &amp; P. Demarque</i>	
EMULATING THE OPAL EQUATION OF STATE .....	548
<i>A. Liang &amp; W. Däppen</i>	
THE PENUMBRAL ACOUSTIC ANOMALY.....	552
<i>C. Lindsey &amp; D.C. Braun</i>	

CAUSE OF SHRINKING SUN EFFECT IN LOCAL CORRELATION TRACKING AND IMPACTS ON THE MAPPING OF SSW FLOWS.....	556
<i>J. Lisle &amp; J. Toomre</i>	
DEVELOPMENT OF MOLECULAR-DYNAMICS TOOLS TO STUDY HOT DENSE COULOMB SYSTEMS.....	560
<i>D. Mao, K. Mussack &amp; W. Däppen</i>	
A RADIAL VELOCITY SEARCH FOR P-MODES IN VIR.....	563
<i>M. Martic, J.C. Lebrun, T. Appourchaux &amp; J. Schmitt</i>	
ASTEROSEISMOLOGY OF SUN-LIKE STARS.....	567
<i>T.S. Metcalfe, T.M. Brown &amp; J. Christensen-Dalsgaard</i>	
TWENTY-EIGHT YEARS OF BISON DATA.....	571
<i>B.A. Miller, S.J. Hale, Y. Elsworth, W.J. Chaplin, G.R. Isaak &amp; R. New</i>	
SOLAR MODEL WITH CNO REVISED ABUNDANCES.....	574
<i>J. Montalbán, A. Miglio, A. Noels, N. Grevesse &amp; M.P. Di Mauro</i>	
GLOBAL MAGNETIC FIELD STRENGTH AT SOLAR SURFACE: MEAN VALUE AND VARIATIONS WITH THE ACTIVITY CYCLE.....	577
<i>P.A.P. Nghiem, R.A. García, S. Turck-Chièze &amp; S.J. Jiménez-Reyes</i>	
CHROMOSPHERIC MODES: WHAT ARE THEY, AND ARE THEY INTERESTING?.....	581
<i>P.A.P. Nghiem</i>	
THE RADIAL WAVENUMBER OF GLOBAL ACOUSTIC MODES.....	585
<i>P.A.P. Nghiem</i>	
THE EFFECT OF STRONG MAGNETIC FIELDS ON ACOUSTIC POWER IN THEIR SURROUNDINGS AT THE SURFACE OF THE SUN.....	590
<i>C.J. Nicholas, M.J. Thompson &amp; S.P. Rajaguru</i>	
ABOUT MODELS AND OSCILLATIONS OF THE SOLAR-LIKE STAR PROCYON A.....	594
<i>J. Provost, M. Martic &amp; G. Berthomieu</i>	
ON THE DRIVING MECHANISM AND THE COEXISTENCE OF VARIABLE AND NONVARIABLE STARS IN THE DOMAIN OF THE PULSATING PG 1159 STARS.....	598
<i>P-O. Quirion, G. Fontaine &amp; P. Brassard</i>	
A RADIATION-HYDRODYNAMICAL SIMULATION OF THE ENVELOPE OF PROCYON A.....	602
<i>F.J. Robinson, P. Demarque &amp; Y.-C. Kim</i>	
SOLAR ROTATION AND GRAVITATIONAL MOMENTS: SOME ASTROPHYSICAL OUTCOMES.....	606
<i>J-P. Rozelot, S. Pireaux, S. Lefebvre &amp; A. Ajabshirizadeh</i>	
EFFECT OF LOCAL TREATMENTS OF CONVECTION UPON THE SOLAR P-MODE EXCITATION RATES.....	611
<i>R. Samadi, M.J. Goupil, Y. Lebreton, C. Van't Veer &amp; F. Kupka</i>	
OSCILLATION POWER SPECTRA OF THE SUN AND OF CEN A: OBSERVATIONS VERSUS MODELS.....	615
<i>R. Samadi, M.J. Goupil, F. Baudin, D. Georgobiani, R. Trampedach, R. Stein &amp; A. Nordlund</i>	
AN ALTERNATIVE INTERPRETATION OF THE DOUBLE-RIDGE STRUCTURE IN THE HIGH- FREQUENCY TIME-DISTANCE AUTOCORRELATION FUNCTION?.....	619
<i>T. Sekii, H. Shibahashi &amp; S.M. Jefferies</i>	

HELIOSEISMOLOGICAL IMPLICATIONS OF RECENT SOLAR ABUNDANCE DETERMINATIONS .....	623
<i>A.M. Serenelli, J.N. Bahcall, S. Basu &amp; M.H. Pinsonneault</i>	
POTENTIAL OF ASTEROSEISMOLOGY OF SOLAR-LIKE STARS .....	627
<i>H. Shibahashi &amp; K. Takahara</i>	
EXPLORING P-MODES BIG EXCITATIONS USING 10 YEARS OF BISON DATA.....	631
<i>R.Simoniello, W.J.Chaplin &amp; Y.P. Elsworth</i>	
ANGULAR MOMENTUM EVOLUTION IN SOLAR CONVECTION ZONE .....	635
<i>H.F. Song &amp; S.L. Bi</i>	
MULTI-SITE TIME SERIES PHOTOMETRY OF THE OPEN CLUSTER M67.....	639
<i>D. Stello, T. Arentoft, T.R. Bedding, M.Y. Bouzid, H. Bruntt, Z. Csubry, T.H. Dall, Z.E. Dind, S. Frandsen, R.L. Gilliland, A.P. Jacob, H.R. Jensen, Y.B. Kang, S-L. Kim, L.L. Kiss, H. Kjeldsen, J.-R. Koo, J-A. Lee, C-U. Lee, J. Nuspl, Y. Qiu, C. Sterken, R. Szabo &amp; P. Xiao</i>	
CHANGES IN THE LONGITUDINAL MAGNETIC FIELD DURING SOLAR FLARES.....	643
<i>J.J. Sudol &amp; J.W. Harvey</i>	
AN INTEGRAL OF THE DIPOLE-MODE OSCILLATIONS AND THE MODE CLASSIFICATION.....	649
<i>M. Takata</i>	
ROTATION: DISTORTED CO-ORDINATE SYSTEMS AND A GENERALIZATION OF THE TRADITIONAL APPROXIMATION.....	653
<i>W.A. Thorne</i>	
A FIRST LOOK AT THE JUNE 8, 2004 VENUS TRANSIT AS OBSERVED BY GONG.....	657
<i>C. Toner, J. Goodrich, C. Shroff &amp; R. Kneale</i>	
THREE DIMENSIONAL NUMERICAL SIMULATIONS OF NEAR SURFACE SOLAR CONVECTION WITH REALISTIC PHYSICS .....	660
<i>S.D. Ustyugov</i>	
ON THE OBSERVATION OF CONVECTION IN LATE TYPE STARS.....	664
<i>H. Vázquez Ramió, C. Régulo, T. Roca Cortés &amp; R. Alonso</i>	
OSCILLATION SPECTRA OF LINE DEPTH, INTENSITY AND VELOCITY FROM RADIATIVE TRANSFER CALCULATIONS.....	668
<i>R. Wachter, M. Haberreiter &amp; A.G. Kosovichev</i>	
PROBING SOLAR DYNAMICS IN THE UPPER CONVECTION ZONE BY TIME-DISTANCE HELIOSEISMOLOGY .....	672
<i>J. Zhao &amp; A.G. Kosovichev</i>	

### **Additional Material**

LIST OF PARTICIPANTS

WORKSHOP PHOTOS

Group Photo

Various Photos

Photos courtesy of Jaymie Matthews

Photos courtesy of Patrick B.M. van Kooten