

Cambridge University Press

0521548160 - UV and X-Ray Spectroscopy of Astrophysical and Laboratory Plasmas: Proceedings from the Tenth International Colloquium - Edited by Eric H. Silver and Steven M. Kahn

Frontmatter/Prelims

[More information](#)

UV and X-ray spectroscopy of astrophysical and laboratory plasmas draws interest from many disciplines. Contributions from international specialists are collected together in this book from a timely recent conference. In astrophysics, the Hubble Space Telescope, Astro 1 and ROSAT observatories are now providing UV and X-ray spectra and images of cosmic sources in unprecedented detail, while the Yohkoh mission recently collected superb data on the solar corona. In the laboratory, the development of ion-trap facilities and novel laser experiments are providing vital new data on high temperature plasmas. Recent innovations in the technology of spectroscopic instrumentation are discussed.

These papers constitute an excellent up-to-date review of developments in short-wavelength spectroscopy and offer a solid introduction to its theoretical and experimental foundations.

Cambridge University Press

0521548160 - UV and X-Ray Spectroscopy of Astrophysical and Laboratory Plasmas: Proceedings from the Tenth International Colloquium - Edited by Eric H. Silver and Steven M. Kahn

Frontmatter/Prelims

[More information](#)

UV and X-Ray Spectroscopy of Astrophysical and Laboratory Plasmas

Cambridge University Press

0521548160 - UV and X-Ray Spectroscopy of Astrophysical and Laboratory Plasmas: Proceedings from the Tenth International Colloquium - Edited by Eric H. Silver and Steven M. Kahn

Frontmatter/Prelims

[More information](#)



Cambridge University Press

0521548160 - UV and X-Ray Spectroscopy of Astrophysical and Laboratory Plasmas: Proceedings from the Tenth International Colloquium - Edited by Eric H. Silver and Steven M. Kahn

Frontmatter/Prelims

[More information](#)

UV and X-Ray Spectroscopy of Astrophysical and Laboratory Plasmas

Proceedings from the
Tenth International Colloquium
held at
Berkeley, California
3–5 February 1992

Edited by

Eric H. Silver

Lawrence Livermore National Laboratory

and

Steven M. Kahn

University of California at Berkeley



CAMBRIDGE
UNIVERSITY PRESS

Cambridge University Press

0521548160 - UV and X-Ray Spectroscopy of Astrophysical and Laboratory Plasmas: Proceedings from the Tenth International Colloquium - Edited by Eric H. Silver and Steven M. Kahn

Frontmatter/Prelims

[More information](#)

PUBLISHED BY THE PRESS SYNDICATE OF THE UNIVERSITY OF CAMBRIDGE
The Pitt Building, Trumpington Street, Cambridge, United Kingdom

CAMBRIDGE UNIVERSITY PRESS

The Edinburgh Building, Cambridge CB2 2RU, UK

40 West 20th Street, New York NY 10011-4211, USA

477 Williamstown Road, Port Melbourne, VIC 3207, Australia

Ruiz de Alarcón 13, 28014 Madrid, Spain

Dock House, The Waterfront, Cape Town 8001, South Africa

<http://www.cambridge.org>

© Cambridge University Press 1993

This book is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press.

First published 1993

First paperback edition 2003

A catalogue record for this book is available from the British Library

ISBN 0 521 43470 X hardback

ISBN 0 521 54816 0 paperback

CONTENTS

Organizing Committees	xii
List of Participants	xiii
Preface	xvii
Atomic Processes and Overview	1
UV and X-Ray Spectroscopy in Astrophysics C. McKee	3
X-Ray Spectroscopy of Laboratory Plasmas W. Goldstein	15
Methods of Calculation the Electron-Atom Cross-Sections for Kinetics Applications I. Beigman	32
Line Ratio Diagnostics for Astrophysical Plasmas F. Keenan	44
X-Ray Spectroscopy with EBIT P. Beiersdorfer, R. Cauble, S. Chantrenne, M. Chen, N. DelGrande, D. Knapp, R. Marrs, A. Osterheld, K. Reed, M. Schneider, J. Scofield, B. Wargelin, K. Wong, D. Vogel, R. Zasadzinski	59
X-Ray Transfer J. Castor	69
Laboratory Plasma Experiments Using X-Ray Heating J. Edwards	79
Dielectronic Recombination Versus Charge Exchange: Electron Capture by Metastable Ne-like Argon S. Bliman, M. Cornille	89
Some Remarks on the use of the Two State Models in Heavy Ion Collisions S. Bougouffa, P. Faucher	93
Atomic Data for the SOHO Mission A. Burgess, H. Mason, J. Tully	97
UV and Soft X-Ray Lines from Fe XVI Observed in Solar and Stellar Spectra M. Cornille, J. Dubau, H. Mason, C. Blanchard, W. Brown	101
Electron Correlation in Ionization-Excitation of Helium by Electron and Proton Impact S. Fülling, R. Bruch, P. Neill, E. Rauscher, M. Bailey, J. Thompson, E. Träbert, P. Heckmann, J. McGuire	106
Hydrogen Ions (H^+ , H_2^+ , and H_3^+) in Collisions with Helium: Target Ionization-Excitation Cross Sections S. Fülling, R. Bruch, P. Neill, E. Rauscher, M. Bailey, H. Wang, E. Träbert, P. Heckmann, J. Thompson	110
Projectile-Charge Dependence of Ionization-Excitation of Helium Following Collisions of MeV Bare Ions with $Z_p = 1$ To 6 S. Fülling, R. Bruch, P. Neill, E. Rauscher, E. Träbert, P. Heckmann, J. Thompson	114
Measurement of the $1s2s\ ^3S_1 - 1s2p\ ^3P_{2,0}$ Intervals in Helium-Like Neon W. Hallet, D. Dietrich, J. Silver	118
Energy Levels and Oscillator Strengths for Transitions in Helium-like Fe XXV and Ni XXVII L. Harra, A. Boone, P. Norrington, F. Keenan, A. Kingston	122
The K- and L-shell Absorption Spectra of CIV E. Jannitti, M. Gaye, P. Nicolosi, G. Tondello, P. Villaresi, F. Xianping	126
Electron-Impact Excitation of Hydrogenic Ions in Dense Plasmas Y. Jung	130
Multiple Auger Ionisation and Fluorescence Processes for Be to Zn J. Kaastra, R. Mewe	134

viii	Contents
A UTA Approach to the Collisional Radiative Model for Ionization Balance M. Klapisch	138
Artificial Neural Networks for Plasma X-Ray Spectroscopic Analysis J. Larsen, W. Morgan, W. Goldstein	142
Effect of Excitation-Autoionization on Fractional Abundances of Highly Ionized Krl- To Nil-Like Heavy Elements in Coronal Plasmas D. Mitnik, P. Mandelbaum, J. Schwob, J. Oreg, A. Bar Shalom, W. Goldstein	146
Radiative Lifetime of the $3s3p^3 (^5S_2^o)$ Metastable Level of P+ W. Parkinson, A. Calamai, X. Han	150
Proton and Heavy Particle Excitation of the $2s^22p^5 2P_{3/2} - 2s^22p^5 2P_{1/2}$ Transition in Fluorine-Like Zn XXII, Kr XXVIII and Mo XXXIV R. Reid, V. Foster, F. Keenan	154
Spectra of Laser-Produced Rare-Earth Ions and Theoretical Survey of Nickel-Like Resonance Lines from Br VIII to U LXV P. Renaudin, C. Back, C. Chenais-Popovics, J. Geindre, J. Gauthier, C. Bauche-Arnoult, E. Luc-Koenig, J. Wyart	157
Model Potential Method for the Calculation of the Atomic Characteristics of Ne-Like System U. Safronova, J. Wyart	161
Laboratory Absorption Spectra of Interstellar Molecules: Measurements on CO and N ₂ at ~ 30 and 295 K G. Stark, P. Smith, K. Yoshino, W. Parkinson, K. Ito, M. Stevens	165
The Effect of Fast Electrons, Penning and CX Processes on the XUV to VUV Emission of Al, Y and Zn Ions from a PID Plasma D. Stutman, M. Finkenthal, A. Bathia, J. Schwob, S. Regan, M. May, H. Moos	169
Pair Function Calculations with Screened Coulomb Potentials Z. Wang, J. Morrison, P. Winkler	174
Study of Heliumlike Neon Using an Electron Beam Ion Trap B. Wargelin, P. Beiersdorfer, S. Kahn	178
Electron Impact Ionization of Lithiumlike Ions: Ti ¹⁹⁺ , V ²⁰⁺ , Cr ²¹⁺ , Mn ²²⁺ and Fe ²³⁺ K. Wong, P. Beiersdorfer, M. Chen, R. Marrs, K. Reed, J. Scofield, D. Vogel, R. Zasadzinski	182
Toward Realistic Electron-Ion Potentials in Plasmas Y. Yan, H. Zhan, Y. Zhang, P. Winkler	186
UV Spectroscopy	191
Astronomical Observations with Normal Incidence Multilayer Optics II: Images of the Solar Corona and Chromosphere A. Walker, T. Barbee, R. Hoover	193
Issues in Solar EUV Observations J. Raymond	203
Tokamak Spectroscopy in the UV - Is This the Golden Age? A. Ramsey	210
FUV Plasma Diagnostics Available to the Hopkins Ultraviolet Telescope W. Blair, K. Long, C. Bowers, G. Kriss, A. Davidsen	224
Stellar Chromospheric and Transition Region Studies Using the Goddard High Resolution Spectrograph A. Brown	234
Lyman the Far Ultraviolet Spectroscopic Explorer W. Moos	244
The IMAPS Instrument: A New Horizon for Recording the Real Shapes of Interstellar Absorption Lines in the Far UV E. Jenkins	254
Ultraviolet Spectroscopic Instrumentation W. Cash	270
Nonequilibrium Absorption Line and Emission Spectrum Diagnostics for the Galactic Fountain R. Benjamin, P. Shapiro	280
An Imaging Extreme Ultraviolet Spectrometer P. Bergamini, T. Berger, G. Giaretta, M. Huber, G. Naletto, G. Timothy, G. Tondello	285

Contents	ix
HiRES: High Resolution Extreme Ultraviolet Spectroheliometer T. Berger, P. Bergamini, H. Kirby, G. Timothy, A. Walker, J. Bhattacharyya, S. Jain, A. Saxena, M. Huber, G. Naletto, G. Tondello	289
A Search for Argon in the Atmosphere of Titan R. Gladstone, S. Bowyer, T. Owen, M. Hurwitz	293
A Very High Resolution Spectrometer for EUV Astrophysics D. Cotton, B. Bush, J. Vickers, S. Chakrabarti	297
First Flight of an Extreme-Ultraviolet Spectrometer with a Multilayer Grating J. Davila, R. Thomas, W. Thompson, R. Keski-Kuha, W. Neupert	301
A New Method for Analysing Spectra Observed from Low Density and Optically Thin Plasmas P. Faucher, J. Dubau, M. Cornille, F. Bely-Dubau	305
Astronomy with the Deep UV Explorer Observatory D. Ferguson, M. Giampapa	309
Two-Dimensional Helical Delay-Line Readout of Large-Format Microchannel-Plate Detectors for Astronomy P. Friedman, J. Fleischman, C. Martin	316
EUV Lines of Mg IX as n_e -Diagnostics for High Density Flares L. Harra, F. Keenan, K. Widing, E. Conlon	320
Methods for Absolute Intensity Calibration of Survey Spectrometers in the 5nm - 150nm Spectral Region N. Hawkes, K. Lawson, N. Peacock	324
C IV Emission Lines in an Active Region Spectrum Obtained with SERTS F. Keenan, R. Thomas, W. Neupert, E. Conlon, V. Burke	337
Electron Density Diagnostics Applicable to IUE Spectra of Gaseous Nebulae F. Keenan, W. Feibelman, L. Harra, E. Conlon, K. Aggarwal	341
Solar O IV and S IV Lines from the High Resolution Telescope and Spectrograph (HRTS) and the S082B Spectrograph on Board Skylab F. Keenan, J. Cook, J. Doyle, P. Dufton, M. Hayes, A. Kingston	345
Far and Extreme Ultraviolet Spectrophotometry of the Hot DA White Dwarfs G191-B2B and HZ43 with the Hopkins Ultraviolet Telescope R. Kimble, A. Davidsen, K. Long, C. Bowers, G. Kriss, D. Finley, D. Koester	349
Temperature Diagnostic in the EUV with Broad Band Photometry M. Landini, B. Monsignori Fossi	353
Design of Compact High-Resolution Far-Ultraviolet Spectrographs Equipped with a Spherical Grating Having Variable Spacing and Curved Grooves T. Namioka, M. Koike	357
Extreme Ultraviolet Observation of Mass Flow in the Low Corona Over a Large Sunspot W. Neupert, J. Brosius, R. Thomas, W. Thompson	361
A Vacuum Ultraviolet Fourier Transform Spectrometer W. Parkinson, A. Thorne, P. Smith, K. Yoshino	365
High Spectral Resolution O VI Emission Line Mapping of the Cygnus Loop Supernova Remnant A. Rasmussen, C. Martin	369
The Cleanliness Control Program for SUMER/SOHO U. Schühle	373
Planar Delay Line Readouts for High Resolution Astronomical EUV/UV Spectroscopy O. Siegmund, J. Stock, R. Raffanti, D. Marsh, M. Lampton	383
Performance Characteristics of High-Gain Curved-Channel Microchannel Plates D. Slater, H. Kirby, M. Pertsova, J. Timothy, B. Laprade	387
Calibrated Solar EUV Spectrum from SERTS R. Thomas, W. Neupert, W. Thompson	391
Imaging Detector Systems for use at Ultraviolet and Soft X-ray Wavelengths J. Timothy	395
Modeling of UV Lines from Cataclysmic Variable Winds P. Vitello, I. Shlosman	389
Spectral Imaging of the Chromosphere of AR Lacertae F. Walter, J. Neff, I. Pagano, M. Rodonò	403

x	Contents
X-Rays of IC443 - Remnant of Tang Dynasty Supernova Z. Wang	407
Photographs from Colloquium	411
X-Ray Spectroscopy	413
Recent Results From X-Ray Spectroscopy of Tokamak Plasmas E. Rachlew-Källne	415
Highlights of the BBXRT Mission R. Petre, P. Serlemitsos, F. Marshall, K. Jahoda, E. Boldt, S. Holt, R. Kelley, J. Swank, A. Szymkowiak, K. Arnaud and the BBXRT Science Team	424
Spectroscopic Results from ROSAT B. Aschenbach	434
Iron K Line Diagnostics in Astrophysical Sources L. Piro	448
X-Ray Spectroscopy with AXAF T. Markert	459
Spectroscopy with XMM A.C. Brinkman	469
X-Ray Spectroscopy with the XSPECT/SODART Telescopes on SRG H. Schnopper, C. Budtz-Jorgensen, F. Christensen, R. Mewe, H. Norgaard-Nielsen, N. Westergaard	483
Applications of CCD Detectors to Spectral Analyses of the X-Ray Emission from Tokamaks A. Abbey, R. Barnsley, J. Dunn, S. Lea, N. Peacock	493
Measurement of Electron Density of Micropinch Plasma for Elements P Through Cu (Z = 15-29) E. Aglitsky, A. Panin	502
Bayesian Approach to Soft X-Ray Line Diagnostics D. Alexander, A. Garrett	505
Energy Levels $1s^2 21n'l'$ ($n=2,3,4$) of NaVIII-SXIII Ions. Comparison of Two Calculation Methods: MCDF and MZ K. Ando, U. Safronova, I. Tolstikhina	509
Broadband (1-100 Å) Bragg Spectroscopy of Impurity Ions in Tokamak Plasmas R. Barnsley, S. Lea, A. Patel, N. Peacock	513
Experimental Study of X-Ray Emission from Laser Irradiated Planar Targets on "Mishen" Facility V. Bolotin, I. Burdonskii, V. Gavrilov, A. Gol'tsov, S. Zavyalets, E. Zhuzhukalo, V. Kondrashov, M. Koshevoi, M. Pergament, A. Rupasov, A. Shikanov	521
X-Ray Spectroscopic Diagnostics of the Hydrodynamics of Flares on M Dwarf Stars C. Cheng, R. Pallavicini	525
Xe L and M X-Ray Emission Following Slow Xe ⁴⁴⁺ to 48+ Ion Impact on Cu-surfaces M. Clark, D. Schneider, J. McDonald, R. Bruch, S. Tanaka, F. Hao, R. Schuch, U. Safronova	529
Diffusion Effects on Diagnostic X-Ray Emission Line Ratio Measurements in Laboratory Plasmas I. Coffey, R. Barnsley, I. Hughes, F. Keenan, K. Lawson, N. Peacock	533
Helium-like Ne IX in the JET Tokamaks I. Coffey, I. Barnsley, F. Keenan, K. Lawson, N. Peacock	537
Determination of Element Abundances Using the Yohkoh Bragg Crystal Spectrometer A. Fludra, J. Culhane, R. Bentley, G. Doschek, E. Hiei, K. Phillips, A. Sterling, T. Watanabe	542
Femtosecond Laser-Induced Plasma X-Rays and Ionization Dynamics of High-Z Materials J. Gauthier, J. Geindre, A. Rousse, F. Falliès, P. Audebert, A. Mysyrowicz, J. Chambaret, A. Antonetti, A. Mens, R. Verrecchia, R. Sauneuf, P. Schirmann	543
ROSAT Observations of the Stellar Coronal Dividing Line B. Haisch, J. Schmitt	547

Cambridge University Press

0521548160 - UV and X-Ray Spectroscopy of Astrophysical and Laboratory Plasmas: Proceedings from the Tenth International Colloquium - Edited by Eric H. Silver and Steven M. Kahn

Frontmatter/Prelims

[More information](#)

Contents	xi
The Determination of Solar Coronal Electron Temperatures From Mg XI Emission Lines in SMM-FCS Spectra of Flares and Active Regions	
L. Harra, K. Phillips, F. Keenan, E. Conlon, A. Kingston	551
Accretion Disk Corona Modelling	
Y. Ko, T. Kallman	555
Emission Line Polarization in SS433?	
J. Laming	559
Monte-Carlo Calculations of X-Ray Spectra For a Source with Spherical or Planar Circumstellar Matter	
D. Leahy, J. Creighton	563
Study of Micropinch Plasma Parameters with Temporal and Spatial Resolution by Measurements in Soft X-Ray Spectral Region	
B. Mironov	567
New Trends in Stark Broadening of Multicharged Ion Spectral Lines in Plasmas	
Y. Ispolatov, E. Oks	571
Spatially Resolved X-Ray Spectra of Micropinch Plasma	
A. Panin	575
Ar XVII X-Ray Lines Emitted by Solar Flares	
K. Phillips, F. Keenan, L. Harra, S. McCann	579
Gamma Ray and Neutron Spectroscopy with COMPTEL on the Compton Gamma Ray Observatory	
J. Ryan, H. Aarts, K. Bennett, H. Bloemen, R. Diehl, A. Connors, H. Debrunner, C. deVries, W. Hermsen, G. Lichti, J. Lockwood, M. McConnell, D. Morris, V. Schönfelder, H. Steinle, A. Strong, B. Swanenburg, B. Taylor, W. Webber, C. Winkler	583
The Relative Coronal Abundance of Fe:Ne in Solar Active Regions Observed with the Solar Maximum Mission Flat Crystal Spectrometer	
J. Saba, K. Strong	587
Timing of Beginnings of Solar Fast-Drift Bursts by H-alpha and X-Ray Solar Flares	
A. Tlamicha, L. Krivsky	591
X-Ray Irradiation of Magnetic White Dwarfs	
A. van Teeseling, J. Heise	595
Relative Elemental Abundances of a Solar Active Region	
K. Waljeski, D. Moses	599
Flare Dynamics Observed in S XV	
D. Zarro	603
Carbon Transport Estimates in a Tokamak Plasma During Auxiliary Heating Experiments using Soft X-Ray CVI Emission	
A. Zwicker, M. Finkenthal, S. Lippmann, H. Moos	607

Cambridge University Press

0521548160 - UV and X-Ray Spectroscopy of Astrophysical and Laboratory Plasmas: Proceedings from the Tenth International Colloquium - Edited by Eric H. Silver and Steven M. Kahn

Frontmatter/Prelims

[More information](#)

**Tenth International Colloquium
UV and X-Ray Spectroscopy of Astrophysical and
Laboratory Plasmas**

Science Organizing Committee

S. Kahn, Chairman
F. Bely-Dubau
M. Bitter
C. Canizares
J. Culhane
G. Doschek
A. Dupree
A. Gabriel
W. Goldstein
M. Huber
M. Key
K. Koshelev
R. Mewe
H. Moos
D. Sampson
J. Schmitt
H. Schnopper
J. Schwob
P. Smith
T. Watanabe

Local Organizing Committee

E. Silver, Chairman
S. Allen
R. Falcone
S. Labov
J. Lemen
R. Malina
D. Matthews
K. Strong
J. Timothy
J. Underwood
A. Walker

List of Participants

L. Acton	Lockheed Palo Alto Research Laboratory, Palo Alto, California, USA
D. Alexander	University of Glasgow, Glasgow, Scotland
B. Aschenbach	Max Planck Institute, Garching, Germany
G. Athay	High Altitude Observatory, Boulder, Colorado, USA
G. Beadie	Brown University, Providence, Rhode Island, USA
P. Beiersdorfer	Lawrence Livermore National Laboratory, Livermore, California, USA
I. Beigman	P.N. Lebedev Physical Institute, Leninsky, Moscow, Russia
R. Benjamin	The University of Texas, Austin, Texas, USA
R. Bentley	Mullard Space Science Laboratory, Dorking, Surrey, United Kingdom
P. Bergamini	Stanford University, Stanford, California, USA
T. Berger	Stanford University, Stanford, California, USA
J. Bixler	Lawrence Livermore National Laboratory, Livermore, California, USA
W. Blair	Johns Hopkins University, Baltimore, Maryland, USA
S. Bliman	Universit� Paris, Orsay, France
S. Bobashev	A.F. Ioffe Physicotechnical Institute, St. Petersburg, Russia
S. Bowyer	University of California, Berkeley, California, USA
L. Brewer	Lawrence Livermore National Laboratory, Livermore, California, USA
A. Brinkman	SRON-Utrecht, Utrecht, Netherlands
A. Brown	University of Colorado, Boulder, Colorado, USA
W. Brown	Lockheed Research Laboratory, Palo Alto, California, USA
R. Bruch	University of Nevada, Reno, Nevada, USA
C. Canizares	M.I.T., Cambridge, Massachusetts, USA
W. Cash	University of Colorado, Boulder, Colorado, USA
J. Castor	Lawrence Livermore National Laboratory, Livermore, California, USA
E. Chandler	Lawrence Livermore National Laboratory, Livermore, California, USA
M. Chen	Lawrence Livermore National Laboratory, Livermore, California, USA
K. Cheng	Lawrence Livermore National Laboratory, Livermore, California, USA
C. Cheng	U.S. Naval Research Laboratory, Washington, DC, USA
I. Coffey	JET Joint Undertaking, Abingdon, Oxon, England
M. Cornille	Observatoire de Paris, France
D. Cotton	University of California, Berkeley, California, USA
J. Culhane	Mullard Space Science Laboratory, Surrey, United Kingdom
C. Cunningham	Lawrence Livermore National Laboratory, Livermore, California, USA
S. Dalhed	Lawrence Livermore National Laboratory, Livermore, California, USA
J. Davila	NASA/Goddard Space Flight Center, Greenbelt, Maryland, USA
S. Deustua	Lawrence Livermore National Laboratory, Livermore, California, USA
D. Dewitt	Lawrence Livermore National Laboratory, Livermore, California, USA
D. Dietrich	Lawrence Livermore National Laboratory, Livermore, California, USA
J. Dubau	Observatoire de Paris, France
F. Bely-Dubau	Observatoire de la Cote d'Azur, France
J. Edelstein	University of California, Berkeley, California, USA
J. Edwards	Rutherford Appleton Laboratory, Chilton, United Kingdom
A. Faenov	Multicharged Ions Spectra Data Center, Moscow, Russia
P. Faucher	Observatoire de la Cote d'Azur, France
B. Feinberg	Lawrence Berkeley Laboratory, Berkeley, California, USA
U. Feldman	Naval Research Laboratory, Washington, DC, USA
D. Ferguson	W.J. Schafer Associates, Livermore, California, USA
M. Finkenthal	Hebrew University, Jerusalem, Israel
K. Flanagan	Harvard University, Cambridge, Massachusetts, USA
J. Fleischman	Columbia University, New York, New York, USA
M. Foord	Weizmann Institute, Rehovot, Israel
B. Monsignori-Fossi	Arcetri Astrophysical Observatory, Firenze, Italy
V. Foster	Queen's University, Belfast, Northern Ireland
D. Friart	Centre D'Etudes, France
P. Friedman	Columbia University, New York, New York, USA

D. Gallagher	University of Colorado, Boulder, Colorado, USA
J. Gauthier	Ecole Polytechnique, France
V. Gavrilov	Kurchatov Atomic Energy Institute, Russia
M. Giampapa	National Optical Astronomy Observatories, Tucson, Arizona, USA
W. Gladstone	University of California, Berkeley, California, USA
W. Goldstein	Lawrence Livermore National Laboratory, Livermore, California, USA
H. Gould	Lawrence Berkeley Laboratory, Berkeley, California, USA
B. Haisch	Lockheed Palo Alto Research Laboratory, Palo Alto, California, USA
W. Hallett	Oxford University, Oxford, United Kingdom
B. Hammel	Lawrence Livermore National Laboratory, Livermore, California, USA
L. Harra	Queen's University, Belfast, Ireland
S. Hawley	Lawrence Livermore National Laboratory, Livermore, California, USA
J. Henderson	Lawrence Livermore National Laboratory, Livermore, California, USA
M. Huber	ESA/ESTEC, Netherlands
C. Iglesias	Lawrence Livermore National Laboratory, Livermore, California, USA
S. Jaquemot	CEA Limeil-Valenton, Villeneuve St. Georges, France
E. Jenkins	Princeton University, Princeton, New Jersey, USA
T. Jernigan	NASA, Houston, Texas, USA
Y. Jung	NASA/Marshall Space Flight Center, Huntsville, Alabama, USA
J. Kaastra	SRON, Leiden, Netherlands
S. Kahn	University of California, Berkeley, California, USA
T. Kallman	NASA/Goddard Space Flight Center, Greenbelt, Maryland, USA
E. Rachlew-Kallne	Royal Institute of Technology, Stockholm, Sweden
Y. Karzhavin	University of Texas, Austin, Texas, USA
C. Keane	Lawrence Livermore National Laboratory, Livermore, California, USA
F. Keenan	Queen's University, Belfast, Northern Ireland
R. Kimble	NASA/Goddard Space Flight Center, Greenbelt, Maryland, USA
H. Kirby	Stanford University, Stanford, California, USA
M. Klapisch	Naval Research Laboratory, Washington, DC, USA
E. Knystautas	Universite de Laval, Quebec, Canada
K. Koshelev	Institute for Spectroscopy
Y. Ko	University of Maryland, Greenbelt, Maryland, USA
J. Kohl	Harvard-Smithsonian Center for Astrophysics, Cambridge, Massachusetts, USA
M. Koike	Lawrence Berkeley Laboratory, Berkeley, California, USA
R. Kreplin	Naval Research Laboratory, Washington, DC, USA
S. Labov	Lawrence Livermore National Laboratory, Livermore, California, USA
M. Laming	Naval Research Laboratory, Washington, DC, USA
M. Landini	Florence University, Firenze, Italy
J. Lang	Rutherford Appleton Laboratory, Chilton, Didcot, United Kingdom
J. Larsen	Cascade Applied Sciences, Inc., Boulder, Colorado, USA
D. Leahy	University of Calgary, Alberta, Canada
D. Lechrone	NASA/Goddard Space Flight Center, Greenbelt, Maryland, USA
Y. Lee	Lawrence Livermore National Laboratory, Livermore, California, USA
R. Lee	Lawrence Livermore National Laboratory, Livermore, California, USA
M. LeGros	Lawrence Livermore National Laboratory, Livermore, California, USA
J. Lemen	Lockheed Palo Alto Research Laboratory, Palo Alto, California, USA
D. Liedahl	Lawrence Livermore National Laboratory, Livermore, California, USA
E. Liston	Belvedere, California
R. London	Lawrence Livermore National Laboratory, Livermore, California, USA
R. Malina	University of California, Berkeley, California, USA
G. Manzo	IFCAI del CNR, Palermo, Italy
T. Markert	M.I.T., Cambridge, Massachusetts, USA
R. Marrs	Lawrence Livermore National Laboratory, Livermore, California, USA
H. Mason	Cambridge University, Cambridge, United Kingdom
C. Mauche	Lawrence Livermore National Laboratory, Livermore, California, USA
J. McDonald	Lawrence Livermore National Laboratory, Livermore, California, USA
E. McGuire	Sandia National Laboratory, Albuquerque, New Mexico, USA
C. Mears	Lawrence Livermore National Laboratory, Livermore, California, USA

List of Participants

xv

R. Mewe	SRON, Utrecht, Netherlands
J. Molitoris	Lawrence Livermore National Laboratory, Livermore, California, USA
W. Moos	Johns Hopkins University, Baltimore, Maryland, USA
G. Morris	Lawrence Livermore National Laboratory, Livermore, California, USA
H. Moseley	Goddard Space Flight Center, Greenbelt, Maryland, USA
T. Namioka	NASA/Goddard Space Flight Center, Greenbelt, Maryland, USA
J. Nash	Lawrence Livermore National Laboratory, Livermore, California, USA
J. Neff	Penn State University, University Park, Pennsylvania, USA
W. Neupert	NASA/Goddard Space Flight Center, Greenbelt, Maryland, USA
J. Nilsen	Lawrence Livermore National Laboratory, Livermore, California, USA
P. Nicolosi	University of Padova, Padova, Italy
E. Oks	Auburn University, Auburn, Alabama, USA
A. Osterheld	Lawrence Livermore National Laboratory, Livermore, California, USA
F. Paerels	University of California, Berkeley, California, USA
A. Panin	Brigham Young University, Provo, Utah, USA
W. Parkinson	Harvard Smithsonian Center for Astrophysics, Cambridge, Massachusetts, USA
N. Peacock	Culham Laboratory, Oxon, England
G. Peres	Observatorio Astronomico, Catania, Italy
T. Perry	Lawrence Livermore National Laboratory, Livermore, California, USA
M. Pertsova	Stanford University, Stanford, California, USA
R. Petre	NASA/Goddard Space Flight Center, Greenbelt, Maryland, USA
T. Pfafman	University of California, Berkeley, California, USA
K. Phillips	Rutherford Appleton Laboratory, Didcot, United Kingdom
L. Piro	Istituto di Astrofisica Spaziale, Frascati, Italy
A. Ramsey	Princeton Plasma Physics Laboratory, Princeton, New Jersey, USA
A. Rasmussen	Columbia University, New York, New York, USA
J. Raymond	Harvard-Smithsonian Center for Astrophysics, Cambridge, Massachusetts, USA
K. Reed	Lawrence Livermore National Laboratory, Livermore, California, USA
F. Rogers	Lawrence Livermore National Laboratory, Livermore, California, USA
S. Rose	Rutherford Appleton Laboratory, Didcot, Oxon, United Kingdom
M. Rosen	Lawrence Livermore National Laboratory, Livermore, California, USA
J. Ryan	University of New Hampshire, Durham, New Hampshire, USA
J. Saba	NASA/Goddard Space Flight Center, Greenbelt, USA
U. Safronova	Russian Academy of Science, Russia
D. Sampson	Pennsylvania State University, University Park, Pennsylvania, USA
S. Sarlin	University of Colorado, Boulder, Colorado, USA
D. Schiminovich	Columbia University, New York, New York, USA
D. Schneider	Lawrence Livermore National Laboratory, Livermore, California, USA
H. Schnopper	Danish Space Research Institute, Denmark
U. Schuhle	Max-Planck-Institute, Katlenburg-Lindau, FRG
R. Schwartz	NASA/Goddard Space Flight Center, Greenbelt, Maryland, USA
J. Schwob	The Hebrew University, Jerusalem, Israel
J. Scofield	Lawrence Livermore National Laboratory, Livermore, California, USA
H. Scott	Lawrence Livermore National Laboratory, Livermore, California, USA
J. Seely	Naval Research Laboratory, Washington, DC, USA
E. Silver	Lawrence Livermore National Laboratory, Livermore, California, USA
J. Silver	Oxford University, Oxford, England
D. Slater	Stanford University, Stanford, California, USA
O. Strand	Lawrence Livermore National Laboratory, Livermore, California, USA
J. Swenson	Lawrence Livermore National Laboratory, Livermore, California, USA
R. Thomas	NASA/Goddard Space Flight Center, Greenbelt, Maryland, USA
T. Thomson	Lawrence Livermore National Laboratory, Livermore, California, USA
G. Timothy	Stanford University, Stanford, California, USA
A. Tlamiha	Czechoslovak Academy of Sciences, Ondrejov, Czechoslovakia
J. Underwood	Lawrence Berkeley Laboratory, Berkeley, California, USA
A. Van Teeseling	Sterrekundig Instituut, Utrecht, Netherlands
P. Viedler	University of California, Berkeley, California, USA
P. Vitello	Lawrence Livermore National Laboratory, Livermore, California, USA

Cambridge University Press

0521548160 - UV and X-Ray Spectroscopy of Astrophysical and Laboratory Plasmas: Proceedings from the Tenth International Colloquium - Edited by Eric H. Silver and Steven M. Kahn

Frontmatter/Prelims

[More information](#)

xvi

List of Participants

K. Waljeski	NCR/ Naval Research Laboratory, Washington, DC, USA
A. Walker	Stanford University, Stanford, California, USA
F. Walter	State University of New York, Stony Brook, New York, USA
A. Wan	Lawrence Livermore National Laboratory Livermore, California, USA
Z. Wang	University of Nevada, Reno, Nevada, USA
Z. Wang	Nanjing University, Najing, Republic of China
B. Wargelin	University of California, Berkeley, California, USA
T. Watanabe	National Astronomical Observatory, Mitaka, Japan
K. Widing	U.S. Naval Research Lab, Washington, DC, USA
P. Winkler	University of Nevada, Reno, Nevada, USA
K. Wong	Lawrence Livermore National Laboratory, Livermore, California, USA
J. Wyart	Centre Universitaire, France
Y. Yan	University of Nevada, Reno, Nevada, USA
P. Young	Lawrence Livermore National Laboratory, Livermore, California, USA
D. Zarro	NASA/Goddard Space Flight Center, Greenbelt, Maryland, USA
H. Zhan	University of Nevada, Reno, Nevada, USA
Y. Zhang	University of Nevada, Reno, Nevada, USA
K. Ziock	Lawrence Livermore National Laboratory, Livermore, California, USA
A. Zigler	Hebrew University of Jerusalem, Jerusalem, Israel
A. Zwicker	Johns Hopkins University, Baltimore, Maryland, USA

Cambridge University Press

0521548160 - UV and X-Ray Spectroscopy of Astrophysical and Laboratory Plasmas: Proceedings from the Tenth International Colloquium - Edited by Eric H. Silver and Steven M. Kahn

Frontmatter/Prelims

[More information](#)

PREFACE

The papers published with these Proceedings were presented in Berkeley at the tenth in a series of regular colloquia devoted to the interdisciplinary topic of ultraviolet and X-ray spectroscopy of laboratory and astrophysical plasmas. These conferences, which have been held roughly once every three years at various locations around the world, have provided a unique forum for astrophysicists, solar physicists, laboratory plasma experimentalists, and theoretical atomic and molecular physicists to collectively explore fundamental issues in short wavelength spectroscopy that are common to these diverse disciplines. Like its predecessors, the Berkeley conference was very well-attended; we had over 200 participants, far in excess of our initial expectations.

The colloquium came at an especially active time for this field. In particular, several prominent ultraviolet and X-ray satellite experiments had been launched within the year just prior to the meeting that collectively provided a wealth of new ultraviolet and X-ray spectroscopic data on cosmic sources, covering virtually all classes of astronomical systems. Various speakers presented some of the first results from the high resolution spectrograph on the *Hubble Space Telescope*, the high sensitivity far ultraviolet and X-ray spectrometers of the *ASTRO 1 Observatory*, the imaging X-ray spectrometer on the *ROSAT Observatory*, and the high resolution solar X-ray spectrometer on *Yohkoh*. We also heard of substantial progress in laboratory plasma research. The development of ion trap devices had brought about a revolution in laboratory investigations of atomic processes in highly charged atoms. X-ray laser experiments had not only yielded considerable insight into electron ion interactions in hot dense plasmas, but also demonstrated the tremendous versatility of laser plasmas as laboratory X-ray sources. Such measurements also motivated and led to refinements in the development of large-scale atomic and molecular codes. On the instrumental side, the design and development of the next series of very powerful short wavelength observatories had generated a large number of technological innovations in both dispersive and nondispersive spectroscopic instrumentation.

In addition to its scientific success, the conference proved to be a very pleasant affair. We were blessed with exceptional weather (even for Berkeley!), and the two major social events, the reception at the Santa Fe Bar and Grill and the banquet at the Exploratorium in San Francisco, were well-attended and very lively. In addition to the other members of the organizing committees, we are especially indebted to Marjorie Randell-Silver, Beth Saucier, Gloria Staude, Jan Wallace, Kerry O'Connor, Caryl Esteves, Susan Green, and Robin Weissberger for extensive help with the arrangements and for smooth operation of the meeting.

Finally, we would like to thank the National Aeronautics and Space Administration, the California Space Institute, the Lawrence Livermore National Laboratory, the University of California at Berkeley, the Lawrence Berkeley Laboratory, Stanford University, and the Lockheed Corporation for their financial support of the meeting. These funds were especially useful in enabling us to provide assistance in meeting travel expenses for selected attendees, particularly students and those from less well-endowed institutions. A widespread geographic distribution among conference participants was one of the goals of the organizing committees, and we believed that it was at least partially responsible for the intellectual vitality of the colloquium.

Steven M. Kahn
Eric H. Silver
Berkeley, California
July, 1992