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Appendix B
Workshop Program
Scientific Directions at the Advanced Light Source

March 23—25, 1998

Program Agenda

Sponsors

Department of Energy, Office of Basic Energy Sciences
Ernest Orlando Lawrence Berkeley National Laboratory, Advanced Light Source
University of California, Office of the President

Chair

Yves Petroff, Director-General, European Synchrotron Radiation Facility

Charge

The goal of this workshop is to identify the elements of the most compelling scientific program for the ALS and to make recommendations for a roadmap to implement that program.

MONDAY, March 23

7:30 Registration
Ernest Orlando Lawrence Berkeley National Laboratory Bldg. 50 Auditorium

7:45 Bus Service from the Shattuck Hotel

8:00 Bus Service from the Durant Hotel

8:30—12:30 Plenary Session, Bldg. 50 Auditorium — Chair: Yves Petroff

8:30 Welcome on Behalf of Berkeley Lab — Charles Shank

8:55 Welcome on Behalf of BES — Patricia Dehmer

9:20 Experience at a Third-Generation Source — Yves Petroff

10:00 View from the European Commission Round Table — Giorgio Margaritondo

10:15 Break

10:40 Broken Electrons Forming Pairs? — A Photoelectron's Story of High-T_c Superconductivity — Zhi-xun Shen

11:20 Role of the ALS in Addressing Microelectronics Technology Challenges — John Carruthers

12:00 Organization of the Workshop — Neville Smith

12:15 User Issues — Werner Meyer-Ilse

12:30 Lunch

2:00 Working Group Sessions (presentations & discussions) until 5:30

6:30 Dinner @ Le Cheval, 1007 Clay St., Oakland

TUESDAY, March 24

8:30 Working Group Sessions (discussions & recommendations)

12:30 Lunch

1:00 Short Plenary Session (progress reports) Bldg. 50 Auditorium

2:00 Working Group Sessions (report writing)

WEDNESDAY, March 25

8:30 Plenary Session (feedback from Working Groups), Bldg. 50 Auditorium

12:00 Working Lunch/User Forum — Werner Meyer-Ilse, Pier Oddone

2:00 Adjourn

Working Groups

(1) Complex Materials

Chair: Ward Plummer, University of Tennessee

Facilitator: Zhi-xun Shen, Stanford University

Technical Advisors: Zahid Hussain, Scott Kellar, and Erik Gullikson, Lawrence Berkeley National Laboratory

Technical Writer: Art Robinson, Lawrence Berkeley National Laboratory

Working-group members: Massimo Altarelli, European Synchrotron Radiation Facility (France); Thomas Callcott, University of Tennessee Knoxville; C.T. Chen, Synchrotron Radiation Research Center (Taiwan); Jun-Liang Chen, Synchrotron Radiation Research Center (Taiwan); Jonathan Denlinger, University of Michigan; Makoto Doi, Lawrence Berkeley National Laboratory; Wolfgang Eberhardt, Forschungszentrum Jülich; David Ederer, Tulane University; Kwang Yong Eun, Korea Institute of Science & Technology; Atsushi Fujimori, University of Tokyo, Japan; Eric Gullikson, Lawrence Berkeley National Laboratory; Michael Hochstrasser, Pennsylvania State University; Craig Horne, Lawrence Berkeley National Laboratory; Zahid Hussain, Lawrence Berkeley National Laboratory; Scott Kellar, Lawrence Berkeley National Laboratory; Miles Klein, University of Illinois Urbana-Campaign; Guy Lelay, CNRS Université de Provence (France); Hong-Ji Lin, Synchrotron Radiation Research Center (Taiwan); Ingolf Lindau, Stanford Synchrotron Radiation Laboratory; Martin Magnuson, Uppsala University (Sweden); Giorgio Margaritondo, IPA-EPFL (Lausanne, Switzerland); Nils Mårtensson, University of Lund (Sweden); Maurizio Matteucci, National Research Council (Italy); Joseph Nordgren, Uppsala University (Sweden); Se-Jung Oh, Pohang Light Source (Korea); Joe Orenstein, University of California Berkeley; Fulvio Parmigiani, Catholic University; Jim Patel, Lawrence Berkeley National Laboratory; Rupert Perera, Lawrence Berkeley National Laboratory; Phil Platzman, Lucent Technologies; Art Robinson, Lawrence Berkeley National Laboratory; George Sawatzky, University of Groningen (Netherlands); John Spence, Arizona State University; Yasuhisa Tezuka, Lawrence Berkeley National Laboratory; Ku-Ding Tsuei, Synchrotron Radiation Research Center; Xingjiang Zhou, Lawrence Berkeley National Laboratory.

(2) Magnetism and Magnetic Materials

Chair: David Awschalom, University of California, Santa Barbara

Facilitators: Jo Stöhr, IBM Almaden Research Center, and Jeff Kortright, Lawrence Berkeley National Laboratory

Technical Advisors: Tony Young and Thomas Stammler, Lawrence Berkeley National Laboratory

Technical Writer: Deborah Dixon, Lawrence Berkeley National Laboratory

Working-group members: Juana Acrivos, San Jose State University; Uwe Arp, National Institute of Standards and Technology; Sam Bader, Argonne National Laboratory; C.T. Chen, Synchrotron Radiation Research Center (Taiwan); Cylon Da Silva, National Synchrotron Light Laboratory (Brazil); Deborah Dixon, Lawrence Berkeley National Laboratory; Charles Fadley, University of California, Davis; Hsueh-Hsing Hung, Synchrotron Radiation Research Center (Taiwan); Yves Idzerda, Naval Research Laboratory; Peter Johnson, Brookhaven National Laboratory; Akito Kakizaki, University of Tokyo (Japan); Sang-Koog Kim, Lawrence Berkeley National Laboratory;

Kannan Krishnan, Lawrence Berkeley National Laboratory; Ki Bong Lee, POSTECH (Korea); Steve Marks, Lawrence Berkeley National Laboratory; William Oosterhuis, U.S. Department of Energy; Stuart Parkin, IBM Almaden Research Center; Z.-Q. Qiu, University of California Berkeley; Bruno Reihl, Paul Scherrer Institut (Switzerland); Mike Scheinfein, Arizona State University; Ivan Schuller, University of California San Diego; Frank Schumann, Lawrence Berkeley National Laboratory; Hans-Christoph Siegmann, ETHZ (Switzerland); Thomas Stammler, Lawrence Berkeley National Laboratory; James Tobin, Lawrence Livermore National Laboratory; Christian Vettier, European Synchrotron Research Facility (France); Dieter Weller, IBM Almaden Research Center; Tony Young, Lawrence Berkeley National Laboratory.

(3) Polymers, Soft Matter, and Biomaterials

Chair: Tom Russell, University of Massachusetts, Amherst

Facilitators: Steve Kevan, University of Orgeon and Harald Ade, North Carolina State University

Technical Advisors: Tony Warwick and Simone Anders, Lawrence Berkeley National Laboratory

Technical Writer: Jane Cross

Working-group members: Ben Chu, State University of New York Stony Brook; George Cody, Carnegie Institution of Washington; Steve Gregory, The Dow Chemical Company; Adam Hitchcock, McMaster University; Malcolm Howells, Lawrence Berkeley National Laboratory; Chris Jacobsen, State University of New York Stony Brook; John Kerr, Lawrence Berkeley National Laboratory; Gary Mitchell, Dow Chemical Company; John Pople, Stanford Linear Accelerator Center; Cyrus Safinya, University of Califronia Santa Barbara; Gordon Vrdoljak, University of California Berkeley; Tony Warwick, Lawrence Berkeley National Laboratory; Joe Zasadzinski, University of California Santa Barbara.

(4) Nanostructures and Special Opportunities in Semiconductors

Chair: Marvin Cohen, University of California, Berkeley

Facilitators: Daniel Chemla, University of California, Berkeley, and Franz Himpsel, University of Wisconsin–Madison

Technical Advisors: Simone Anders, Mike Martin, and Scott McHugo, Lawrence Berkeley National Laboratory

Technical Writer: Joe Chew, Lawrence Berkeley National Laboratory

Working-group members: Joel Ager, Lawrence Berkeley National Laboratory; Simone Anders, Lawrence Berkeley National Laboratory; David Attwood, Lawrence Berkeley National Laboratory; Ernst Bauer, Arizona State University; Raul Beguiristain, Lawrence Berkeley National Laboratory; Christoph Bostedt, Lawrence Berkeley National Laboratory; Glen Dahlbacka, Lawrence Berkeley National Laboratory; Uli Dahmen, Lawrence Berkeley National Laboratory; Wolfgang Eberhardt, Forshungszentrum Jülich (Germany); Edward Franco, ARACOR; Fabia Gozzo, Intel Corporation; Jason Guo, Stanford University; Eugene Haller, Lawrence Berkeley National Laboratory; Steven Irick, Lawrence Berkeley National Laboratory; Sungho Jeong, Lawrence Berkeley National Laboratory; Allen Johnson, SBS Consulting; Charles Kim, Lawrence Berkeley National Laboratory; Edward Lampo, Lawrence Berkeley National Laboratory; Steven G. Louie, University of California Berkeley; Thomas Lucatorto, National Institute of Standards and Technology; Jan Luening, IBM Almaden Research Center; Michael Martin, Lawrence Berkeley National Laboratory; Bruno Reihl, Paul Scherrer Institute (Switzerland); Wei Shan, Lawrence Berkeley National Laboratory; John Spence, Arizona State University; Jim Underwood, Lawrence Berkeley

National Laboratory; Tony van Buuren, Lawrence Livermore National Laboratory; Wladyslaw Walukiewicz, Lawrence Berkeley National Laboratory; Stan Williams, Hewlett-Packard Laboratories.

(5) New Directions in Surface and Interface Science

Chair: Gabor Somorjai, University of California, Berkeley

Facilitators: Chuck Fadley, University of California, Davis, and Michel Van Hove, Lawrence Berkeley National Laboratory

Technical Advisors: Clemens Heske and Eli Rotenberg, Lawrence Berkeley National Laboratory

Technical Writer: Gloria Lawler, Lawler Associates

Working-group members: Simon Bare, UOP Research; John Bargar, Stanford Linear Accelerator Center; Ernst Bauer, Arizona State University; Robert Cernik, CLRC Daresbury Laboratory (United Kingdom); Scott Chambers, Pacific Northwest National Laboratory; Bruce Gates, University of California Davis; Fabia Gozzo, Intel Corporation; John Gland, University of Michigan; Victor Henrich, Yale University; Clemens Heske, Lawrence Berkeley National Laboratory; Zahid Hussain, Lawrence Berkeley National Laboratory; Kirill Ivanov, Lawrence Berkeley National Laboratory; Guy Lelay, CNRS Université de Provence (France); Xianglei Mao, Lawrence Berkeley National Laboratory; Nils Mårtensson, Uppsala University, (Sweden); Dietrich Menzel, Technische Universität München (Germany); Anders Nilsson, Uppsala University (Sweden); Juerg Osterwalder, Universität Zurich-Irchel (Switzerland); Howard Padmore, Lawrence Berkeley National Laboratory; John Rehr, University of Washington; Phil Ross, Lawrence Berkeley National Laboratory; Eli Rotenberg, Lawrence Berkeley National Laboratory; Miquel Salmeron, Lawrence Berkeley National Laboratory; Ron Shen, University of California Berkeley; Patrick Soukiassian, CEA/Saclay (France); Lou Terminello, Lawrence Livermore National Laboratory; Baylor Triplett, Intel Corporaton; Peter Weightman, University of Liverpool (United Kingdom); Jory Yarmoff, University of California Riverside.

(6) Environmental and Earth Sciences

Chair: Gordon E. Brown, Jr., Stanford University

Facilitators: David Shuh and Geraldine Lamble, Lawrence Berkeley National Laboratory

Technical Advisors: Alastair MacDowell and Eddie Moler, Lawrence Berkeley National Laboratory

Technical Writer: John Hules, Lawrence Berkeley National Laboratory

Working-group members: Ilham Al Mahamid, Lawrence Berkeley National Laboratory; John Bargar, Stanford Linear Accelerator Center; Sally Benson, Lawrence Berkeley National Laboratory; Paul Bertsch, University of Georgia; Sharon Borglin, Lawrence Berkeley National Laboratory; Susan Carroll, Lawrence Livermore National Laboratory; Scott Chambers, Pacific Northwest National Laboratory; Sing-Foong Cheah, University of California Berkeley; Dave Clark, Los Alamos National Laboratory; George Cody, The Carnegie Institution; Steve Colson, Pacific Northwest National Laboratory; Harvey Doner, University of California Berkeley; Norman Edelstein, Lawrence Berkeley National Laboratory; Ben Feinberg, Lawrence Berkeley National Laboratory; Danield Grolimund; Roland Hirsch, U.S. Department of Energy; Chris Jacobsen, State University of New York Stony Brook; Keith Jackson, Lawrence Berkeley National Laboratory; Tom Kendelewicz, Stanford University; Eric Kneedler, University of Wisconsin Milwaukee; Gary Krebs, Lawrence Berkeley National Laboratory; Alastair MacDowell, Lawrence Berkeley National Laboratory; Robert Marianelli, U.S. Department of Energy; Eddie Moler, Lawrence Berkeley National Laboratory; Paulo Monteiro, University

of California, Berkeley; Satish Myneni, Lawrence Berkeley National Laboratory; George Redden, Stanford University; Donald Reed, Argonne National Laboratory; Joerg Rothe, Lawrence Berkeley National Laboratory; Hans Ruppert, Stanford University; Dale Sayers, North Carolina State University; Roland Schulze, Los Alamos National Laboratory; Paul Smith, U.S. Department of Energy; Lynda Soderholm, Argonne National Laboratory; Don Sparks, University of Delaware; Jeff Terry, Los Alamos National Laboratory; Albert Thompson, Lawrence Berkeley National Laboratory; Tetsu Tokunaga, Lawrence Berkeley National Laboratory; Brian Tonner, University of Wisconsin Milwaukee; Sam Traina, Ohio State University; N. Ulagappan, Lawrence Berkeley National Laboratory; Stephen Wasserman, Argonne National Laboratory; Glenn Waychunas, Lawrence Berkeley National Laboratory; Eric Ziegler, Lawrence Berkeley National Laboratory.

(7) Biosciences

Chair: Graham Fleming, University of California, Berkeley

(a) *Protein Crystallography*:

Facilitator: Thomas Earnest, Lawrence Berkeley National Laboratory

Technical Advisor: Carl Cork, Lawrence Berkeley National Laboratory

Technical Writer: Doug Vaughan, Lawrence Berkeley National Laboratory

Working-group members: Tom Alber, University of California Berkeley; Kristin Balder-Froid, Lawrence Berkeley National Laboratory; Rich Bott, Genencor International; John Byrd, Lawrence Berkeley National Laboratory; William Chang, ARACOR; Kenneth Downing, Lawrence Berkeley National Laboratory; Ulrich Genick, The Scripps Research Institute; Bob Glaeser, University of California Berkeley; Todd Hansen, Lawrence Berkeley National Laboratory; Michael Hart, Brookhaven National Laboratory; Keith Henderson, Lawrence Berkeley National Laboratory; Keith Hodgson, Stanford University, Li-Wei Hung, Lawrence Berkeley National Laboratory; Alan Jackson, Lawrence Berkeley National Laboratory; Sung-Hou Kim, University of California Berkeley; Thomas LeBrun, National Institute of Standards and Technology; Gerry McDermott, Lawrence Berkeley National Laboratory; Wladek Minor, University of Virginia; Keith Moffat, University of Chicago; Harry Noller, University of California Santa Cruz; Hans Parge, Agouron Pharmaceuticals, Inc.; Georgeanna Perdue, Lawrence Berkeley National Laboratory; David Robin, Lawrence Berkeley National Laboratory; Bernard Santarsiero, University of California Berkeley; Ray Stevens University of California Berkeley; Bob Stroud, University of California San Francisco; Edwin Westbrook, Argonne National Laboratory.

(b) *Soft X-Ray Microscopy:*

Facilitator: Werner Meyer-Ilse, Lawrence Berkeley National Laboratory

Technical Advisor: Carolyn Larabell, Lawrence Berkeley National Laboratory

Technical Writer: Kathryn Devereaux, Lawrence Berkeley National Laboratory

Working-group members: Rod Balhorn, Lawrence Livermore National Laboratory; Jim Barltholomew, Lawrence Berkeley National Laboratory; Mina Bissell, Lawrence Berkeley National Laboratory; Billie Lea Cox, Lawrence Berkeley National Laboratory; Gregory Denbeaux, Lawrence Berkeley National Laboratory; Eric Gilbert, University of California Berkeley; Malcolm Howells, Lawrence Berkeley National Laboratory; Chris Jacobsen, Brookhaven National Laboratory; Janos Kirz, State University of New York Stony Brook; Alexei Kuzokhtiu, Lebedev Physical Institute (Russia); Carolyn Larabell, Lawrence Berkeley National Laboratory; Sophie Lelièvre, Lawrence

Berkeley National Laboratory; Cathie Magowan, Lawrence Berkeley National Laboratory; Wayne McKinney, Lawrence Berkeley National Laboratory; Mario Moronne, Lawrence Berkeley National Laboratory; Ajit Nair, Lawrence Berkeley National Laboratory; Brian Rowning, Lawrence Berkeley National Laboratory; Günter Schmahl, Universität Göttingen (Germany); Gordon Vrdoljak, University of California Berkeley; Winbing Yun, Argonne National Laboratory.

(c) *Biological and Chemical X-Ray Spectroscopy:*

Facilitator: Steve Cramer, University of California, Davis

Technical Writer: Dave Gilbert, Lawrence Berkeley National Laboratory

Working-group members: Uwe Bergmann, Lawrence Berkeley National Laboratory; Heinz Frei, Lawrence Berkeley National Laboratory; Melissa Grush, University of Tennessee; Keith Hodgson, Stanford University; Brian Kincaid, Lawrence Berkeley National Laboratory; Melvin Klein, Lawrence Berkeley National Laboratory; James Penner-Hahn, University of Michigan; Charles Tarrio, National Institute of Standards and Technology; Vittal Yachandra, Lawrence Berkeley National Laboratory.

(8) AMO Physics

Chairs: Chris Greene, University of Colorado

Facilitators: Nora Berrah, Western Michigan University

Technical Advisors: John Bozek, Lawrence Berkeley National Laboratory

Technical Writer: Paul Preuss, Lawrence Berkeley National Laboratory

Working-group members: John Bozek, Lawrence Berkeley National Laboratory; Harald Braeuning, Lawrence Berkeley National Laboratory; Ivan Dominguez, Lawrence Berkeley National Laboratory; Harvey Gould, Lawrence Berkeley National Laboratory; Kerstin Gunnelin, Uppsala University (Sweden); David Hansen, University of Nevada Las Vegas; Philip Heimann, Lawrence Berkeley National Laboratory; Oliver Hemmers, University of Nevada Las Vegas; Duane Jaecks, University of Nebraska; Peter Langhoff, Indiana University; Dennis Lindle, University of Nevada Las Vegas; Michael Lubell, The American Physical Society; Dexter Massoletti, Lawrence Berkeley National Laboratory; Hiroshi Nishimura, Lawrence Berkeley National Laboratory; Ron Phaneuf, University of Nevada Reno; Maria Novella Piancastelli, II University of Rome "Tor Vergata" (Italy); Stephen Pratt, Argonne National Laboratory; Michael Prior, Lawrence Berkeley National Laboratory; Jan-Erik Rubensson, Uppsala University (Sweden); Fred Schlachter, Lawrence Berkeley National Laboratory; Ross Schlueter, Lawrence Berkeley National Laboratory; Volker Schmidt, University of Freiburg (Germany); György Snell, Lawrence Berkeley National Laboratory; Bernd Sonntag, Universität Hamburg (Germany); Wayne Stolte, Lawrence Berkeley National Laboratory; Darrah Thomas, Oregon State University; Honghong Wang, Lawrence Berkeley National Laboratory; Francois Wuilleumier, Université Paris-Sud (France); Linda Young, Argonne National Laboratory.

(9) Chemical Dynamics

Chairs: Paul Houston, Cornell University

Facilitators: Arthur Suits, Lawrence Berkeley National Laboratory

Technical Advisors: John Bozek, Lawrence Berkeley National Laboratory

Technical Writer: Annetter Greiner, Lawrence Berkeley National Laboratory

Working group members: William Jackson, University of California Davis; Carl Lineberger,

University of Colorado; Irene Nenner, Centre d'Etudes de Saclay (France); Dan Neumark, University of California Berkeley; Cheuk-Yiu Ng, Iowa State University; Ralph Page, Lawrence Livermore National Laboratory; Erwin Poliakoff, Lousiana State University.

(10) Members at Large

Klaus Berkner, Lawrence Berkeley National Laboratory; Pavel V. Bogdanov, Lawrence Berkeley National Laboratory; Steve Burne, Northwestern Polytechnic University; John Carruthers, Intel Corporation; Mike Chartock, Lawrence Berkeley National Laboratory; Patricia Dehmer, U.S. Department of Energy; Donglai Feng, Stanford University; Dijing Huang; Zahid Husan, Stanford University; Inuk Kang, Lawrence Berkeley National Laboratory; Ron Kolb, Lawrence Berkeley National Laboratory; Choong Man Lee, Lawrence Berkeley National Laboratory; Rulon Linford, University of California Office of the President; George Meitzner, Edge Analytical Inc.; Albert Narath, Lockheed Martin Corporation; Pier Oddone, Lawrence Berkeley National Laboratory; Yves Petroff, European Synchrotron Radiation Facility; Gerd Reichardt, BESSY (Germany); Conny Sathe, Uppsala University (Sweden); Charles Shank, Lawrence Berkeley National Laboratory; Christine Smith, University of California Office of the President; Neville Smith, Lawrence Berkeley National Laboratory; Iran Thomas, U. S. Department of Energy; Robby Vogt; Zhengyu Wang, Stanford University; Sun Weizhong, University of California Berkeley; Mervyn Wong, Northwest Polytechnic University; Keichi Yokoyama, University of California Berkeley; Xingjian Zhou, Lawrence Berkeley National Laboratory.

Local Organizing Group (partial list)

Neville Smith, Advanced Light Source, Lawrence Berkeley National Laboratory (Chair)

David Attwood, Center for X-Ray Optics, Lawrence Berkeley National Laboratory

Mina Bissell, Life Sciences Division, Lawrence Berkeley National Laboratory

Daniel Chemla, Department of Physics, University of California, Berkeley

Charles Fadley, Department of Physics, University of California, Davis

Zahid Hussain, Advanced Light Source, Lawrence Berkeley National Laboratory

Brian Kincaid, Advanced Light Source, Lawrence Berkeley National Laboratory

Phil Ross, Materials Sciences Division, Lawrence Berkeley National Laboratory

Fred Schlachter, Advanced Light Source, Lawrence Berkeley National Laboratory

David Shuh, Chemical Sciences Division, Lawrence Berkeley National Laboratory

Joachim Stöhr, IBM Almaden Research Center (representing the ALS Scientific Advisory Committee)

Louis Terminello, Lawrence Livermore National Laboratory (representing the ALS Users' Executive Committee)

Werner Meyer-Ilse, Center for X-Ray Optics, Lawrence Berkeley National Laboratory (representing the ALS Users' Executive Committee)