Curriculum Vitae

Eli Rotenberg

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Research Interests

The beauty of electronic structures of solids; relationship of electronic structure to geometry, symmetry, and dimensionality; dielectric response at various wavelengths, time scales; the role of many-body effects on the ground states of metals; semiconductors, metals, quasicrystals.

Education

PhD. Department of Physics, University of California at Berkeley, 1993. Thesis title: "*The Relationship Between Structure and Core-Level Shifts in Thin Epitaxial Films of CaF_2 and SrF_2 on Si(111),"* Advisor: Professor Marjorie A. Olmstead.

M.A. Department of Physics, University of California at Berkeley, 1989.

B.S. Applied and Engineering Physics, Cornell University, 1987.

Career History

1999- Staff Scientist(113.5) at the Advanced Light Source, Lawrence Berkeley National Laboratory

1996-98 Scientist (113.4) at the Advanced Light Source, Lawrence Berkeley National Lab

1993–96 Postdoctoral Fellow at Materials Science Institute, University of Oregon (supervisor: Prof. S. D. Kevan).

1987–93 Graduate Study and Research at U. C. Berkeley (supervisor: Prof. M. A. Olmstead), Los Alamos Natl. Lab, and LBNL

Awards

2001 Peter Mark Award, American Vacuum Society
2000 Best Poster Contribtion of Aperiodic 2000 Meeting, Nijmegen NL
1999 Best Contribution Award of ICQ7 (International Conf. on Quasicrystals, Stuttgart)
1999 Outstanding Performance Award, Lawrence Berkeley National Laboratory
1998, 1999 Dave Shirley Prize, Advanced Light Source Users' Executive Committee
1990,1991 Department of Education National Needs Fellowship.
1987 Paul Hartzmann Prize (undergraduate experimental physics at Cornell University).

Professional Societies

American Physical Society
American Vacuum Society
Materials Research Society

References

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Dr. Z. Hussain
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CURRICULUM VITAE

Highest-Impact Publications

8. *"The Relationship Between Structure and Core-Level Shifts in Thin Epitaxial Films of CaF_2 and SrF_2 on Si(111),"* PhD Thesis, University of California, 1993.

16. *"Local Field Effects on Photoemission of* C_{60}*,"* Eli Rotenberg, C. Enkvist, P. A. Brühwiler, A. J. Maxwell, and Nils Mårtensson, Physical Review **B54** (8) R5279-5282 (1996).

17. *"Resonant X-Ray Emission Spectroscopy of Molecular Oxygen,"* P. Glans, K. Gunnelin, P. Skytt, J. H. Guo, N. Wassdahl, J. Nordgren, H. Ågren, F. Kh. Gel'mukhanov, T. Warwick, and Eli Rotenberg, Physical Review Letters, **76**(14)2448-2451 (1996).

18. *"Ratio of Cross Sections for Double to Single Ionization of He by 85-400 eV Photons,"* R. Dörner, T. Vogt, V. Mergel, H. Khemliche, S. Kravis, C. L. Cocke, J. Ullrich, M. Unverzagt, L. Spielberger, M. Damrau, O. Jagutzki, I. Ali, B. Weaver, K. Ullmann, C. C. Hsu, M. Jung, E. P. Kanter, B. Sonntag, M. H. Prior, E. Rotenberg, J. Denlinger T. Warwick, S. T. Manson, and H. Schmidt-Böcking, Physical Review Letters, **76**(15)2654-2657 (1996).

27. *"Observation of Quantum Well Interference in Magnetic Nonostructures by Photoemission,"* R. K. Kawakami, E. Rotenberg, E. J. Escorcia-Aparicio, H. J. Choi, T. R. Cummins, J. G. Tobin, N. V. Smith, and Z. Q. Qiu, Physical Review Letters, **80**(8), 1754-1757 (1998).

29. *"Evolution of Fermi Level Crossings vs H Coverage on W(110),"* E. Rotenberg and S. D. Kevan, Physical Review Letters **80**(13), 2905-2908 (1998).

39. *"Quantum Well States of the Cu/Co(100) System Probed by a Thin Ni Layer,"* R. K. Kawakami, E. Rotenberg, Hyuk J. Choi, Ernesto J. Escorcia-Aparicio, M. O. Bowen, J. H. Wolfe, E. Arenholz, Z. Zhang, N. V. Smith, and Z. Q. Qiu, Nature, **398** N6723:132-134 (1999).

40. *"Spin-Orbit Coupling Induced Surface Band Splitting in Li/W(110) and Li/Mo(110),"* Eli Rotenberg, J. W. Chung, and S. D. Kevan, Phys. Rev. Lett **82**, 4066 (1999).

41. *"Determination of the Magnetic Coupling in the Co/Cu./Co(100) System with Momentum-Resolved Quantum Well States,"* R. W. Kawakami, E. Rotenberg, E. J. Escorcia-Aparicio, Hyuk J. Choi, J. H. Wolfe, N. V. Smith, and Z. Q. Qiu, Physical Review Letters, **82**(20), 4098 (1999).

42. *"Instability and Charge Density Wave of Metallic Quantum Chains on a Silicon Surface,"* H. W. Yeom, S. Takeda, E. Rotenberg, I. Matsuda, K. Horikoshi, J. Schaefer, C. M. Lee, S. D. Kevan, T. Ohta, T. Nagao, and S. Hasegawa, Phys. Rev. Lett. **82**(24), 4898 (1999).

44. *"Direct Spectroscopic Observation of the Energy Gap Formation in the Spin Density Wave Phase Transition at the Cr(110) Surface,"* J. Schäfer, E. Rotenberg, and S. D. Kevan, Phys. Rev. Lett. **83**(10), 2069 (1999).

49. *"Photoelectron Diffraction Imaging for C_2H_2 and C_2H_4 Chemisorbed on Si(100) Reveals a New Bonding Configuration,"* S. H. Xu, M. Keeffe, Y. Yang, C. Chen, M. Yu, G. J. Lapeyre, E. Rotenberg, J. Denlinger, and J. T. Yates, Jr., Phys. Rev. Lett. **84**(5), 939 (2000).

52. *"Coupling Between Adsorbate Vibrations and an Electronic Surface State,"* E. Rotenberg, J. Schäfer, and S. D. Kevan, Phys. Rev. Lett. **84**(13), 2925 (2000).

54. *"Quasicrystal Valence Bands in Decagonal AlNiCo,"* E. Rotenberg, W. Theis, K. Horn and P.

Gille, Nature, **406**, 602 (2000).

58. *"Fermi contours and adsorbate phonon anomalies for Li/Mo(110) and Li/W(110),"* E. Rotenberg and S. D. Kevan , J. Vac. Soc. Technol. **A19**(4), in press (2001).

61. *"High-temperature Symmetry Breaking in the Electronic Band Structure of the Quasi-One-Dimensional Solid $NbSe_3$,"* J. Schaefer, E. Rotenberg, S. D. Kevan, P. Blaha, et al, Phys. Rev. Lett. **87**(19) 6403 (2001).

63. *"Differential Photoelectron Holography-A new approach for three-dimensional atomic imaging,"* S. Omori, Y.Nihei, E. Rotenberg, J. D. Denlinger, et al Phys. Rev. Letters, **88,** 055504(2002).

INVITED TALKS AND SEMINARS

"Surface Core-Level Shifts in CaF_2 and SrF_2 on Si(111): Expt. and Theory"
Xerox Palo Alto Research Center, January 1994.

"Angle-Resolved Photoemission at the Advanced Light Source,"
Special Seminar, Uppsala University Physics Department, October 29, 1996.
Weekly Seminar (Invited), Fritz-Haber Institute, Berlin, November 1, 1996.

"Applications of Synchrotron Radiation to Surface Studies of Metals,"
Weekly Seminar, Pohang Inst. of Science and Tech., Pohang, S. Korea, October , 1997.
Weekly Seminar, Yonsei University Physics Dept., Seoul, S. Korea, October, 1997.

"Bandmapping and Fermi Surfaces of Surface States"
ALS/CXRO Seminar, April 28, 1997.

"Many Body Effects at W(110) and Related Surfaces"
Brookhaven Natl Lab. Physics Division Weekly Seminar, February 2000.

"Momentum Resolved Electronic States in i-AlPdMn quasicrystals"
American Chemical Society National Meeting, San Francisco, March 26, 2000

"Fermiology of metals from 1 to 6 dimensions"
8h Intl. Conf. on Electr. Spectr. and Structure (ICESS), Berkeley, CA August 11, 2000.

"Electronic Properties of self-organized, one-dimensional metal wires on Si(111)"
Fall 2000 Materials Research Society Meeting, Boston November 29, 2000.

"Dispersing Electronic States in d-AlNiCo and i-AlPdMn Quasicrystals"
American Physical Society National Meeting, Seattle, March 16, 2001

"Dispersion of Valence States in d-AlNiCo"
Quasicrystals 2001 Meeting, Sendai, Japan, September 27, 2001

"Surface preparation and Electronic Properties of d-AlNiCo"

Peter Mark Memorial Award Talk

American Vacuum Society, San Francisco, November 1, 2001

LECTURESHIPS

"The Band Structure of Solids by Angle-Resolved Photoemission"

Berkeley-Stanford Summer School in Synchrotron Radiation, July 10 2001.

COMPLETE PUBLICATION LIST

(©=Conference Proceeding, ®=Invited Review Article, ☆=E.R. contributed significantly)

Graduate Work

© 1. *"Atomic and Electronic Structure at Lattice Mismatched Semiconductor/Insulator Interfaces,"* M. A. Olmstead, J. D. Denlinger, E. Rotenberg, R. D. Bringans, J. R. Patel, E. Fontes, in 20th International Conference on the Physics of Semiconductors – Volume I, E. M. Anastassakis and J. D. Joannopoulos, eds. (World Scientific, 1990) 103-106.

2. *"Atomic-Size Effects on the Growth of SrF_2 and $(Ca,Sr)F_2$ on Si(111),"* J. D. Denlinger, E. Rotenberg, M. A. Olmstead, J. R. Patel, and E. Fontes, Phys. Rev. **B43** 7335, 1991.

☆ 3. *"Local Field Corrections to Surface and Interface Core-Level Shifts in Insulators,"* Eli Rotenberg and Marjorie A. Olmstead, Phys. Rev. **B46**, 12884-12887, 1992.

4. *"Variable Growth Modes of CaF_2 on Si(111) Determined by X-Ray Photoelectron Diffraction,"* J. D. Denlinger, Eli Rotenberg, U. Hessinger, M. Leskovar, and M. A. Olmstead, Applied Physics Letters, **62**(17) 2057, 1993.

☆© 5. *"Surface Core-Level Shifts in CaF_2–on–Si(111) Films: Experiment and Theory,"* Eli Rotenberg, J. D. Denlinger, Uwe Hessinger, M. Leskovar, and Marjorie A. Olmstead, J. Vac. Sci. Technol. **B6** (4) 1444, 1993.

6. *"CaF_2–Si(111) as a Model Ionic-Covalent System - Transition from Chemisorption to Epitaxy,"* G. C. L. Wong, D. Loretto, C. A. Lucas, Eli Rotenberg and Marjorie A. Olmstead, Physical Review **B48** (8) 5716, 1993.

☆© 7. *"Kinetic Control of CaF_2 on Si(111) Growth Morphology,"* J. D. Denlinger, Eli Rotenberg, Uwe Hessinger, M. Leskovar, and Marjorie A. Olmstead (MRS Proceedings, Spring 1993).

☆ 8. *"The Relationship Between Structure and Core-Level Shifts in Thin Epitaxial Films of CaF_2 and SrF_2 on Si(111),"* PhD Thesis, University of California, 1993.

☆© 9. *"Layer-by-Layer-Resolved Core-Level Shifts in CaF_2 and SrF_2 on Si(111) – Theory and Experiment,"* Eli Rotenberg, J. D. Denlinger, M. Leskovar, Uwe Hessinger, and Marjorie A. Olmstead, Physical Review **B50** (15) 11052, 1994.

10. "*Growth Kinetics of CaF_2/Si(111) Heteroepitaxy - an X-Ray Photoelectron Diffraction*

Study," J. D. Denlinger, E. Rotenberg, U. Hessinger, M. Leskovar, and M. A. Olmstead, Physical Review **B51** (8) 5352, 1995.

☆ 11. "*Altered Photoemission Satellites at CaF_2– and SrF_2–on–Si(111) Interfaces*," Eli Rotenberg, J. D. Denlinger, and Marjorie A. Olmstead, Physical Review **B53** (3) 1584, 1996.

Post-graduate publications

☆© 12. *"First Results from the Spectromicroscopy Beamline at the Advanced Light Source,"* J. D. Denlinger, E. Rotenberg, T. Warwick, G. Visser, et al. Review of Scientific Instrument **66**(2), 1342-1345.

☆© 13. *"Surface Core-level Photoelectron Diffraction of Surface Reconstructions,"* E. Rotenberg, J. D. Denlinger, S. D. Kevan, B. P. Tonner, in "Applications of Synchrotron Radiation Techniques to Materials Science II," Fall 1995 Proceedings, p. 145-150.

14. *"Resonant Excitation of X-Ray Fluorescence from C_{60},"* J. H. Guo, P. Glans, P. Skytt, N. Wassdahl, J. Nordgren, E. Rotenberg, et al, Physical Review **B52**(15), 10681-10684 (1995).

15. *"The Development of Electron Spectromicroscopy,"* Tonner, B.P., D. Dunham, T. Droubay, J. Kikuma, J. D. Denlinger, E. Rotenberg, T. Warwick, et al., Journal of Electron Spectroscopy and Related Phenomena, **75**, 309 (1995).

☆ 16. *"Local Field Effects on Photoemission of* C_{60}*,"* Eli Rotenberg, C. Enkvist, P. A. Brühwiler, A. J. Maxwell, and Nils Mårtensson, Physical Review **B54** (8) R5279-5282 (1996).

17. *"Resonant X-Ray Emission Spectroscopy of Molecular Oxygen,"* P. Glans, K. Gunnelin, P. Skytt, J. H. Guo, N. Wassdahl, J. Nordgren, H. Ågren, F. Kh. Gel'mukhanov, T. Warwick, and Eli Rotenberg, Physical Review Letters, **76**(14)2448-2451 (1996).

18. *"Ratio of Cross Sections for Double to Single Ionization of He by 85-400 eV Photons,"* R. Dörner, T. Vogt, V. Mergel, H. Khemliche, S. Kravis, C. L. Cocke, J. Ullrich, M. Unverzagt, L. Spielberger, M. Damrau, O. Jagutzki, I. Ali, B. Weaver, K. Ullmann, C. C. Hsu, M. Jung, E. P. Kanter, B. Sonntag, M. H. Prior, E. Rotenberg, J. Denlinger T. Warwick, S. T. Manson, and H. Schmidt-Böcking, Physical Review Letters, **76**(15)2654-2657 (1996).

☆© 19. *"Complete k-space Visualization of X-ray Photoelectron Diffraction,"* J. D. Denlinger, E. Rotenberg, S. D. Kevan, B. P. Tonner, in "Applications of Synchrotron Radiation Techniques to Materials Science III," Spring 1996 Proceedings, **437**, p. 3-7.

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© 21. *"Correlation of Magnetic Dichroism in X-ray Absorption and Photoelectron Emission Using Ultrathin Magnetic Alloy Films,"* J. G. Tobin, K. W. Goodman, G. J. Mankey, R. F. Willis, J. D. Denlinger, E. Rotenberg, and A. Warwick, in "Applications of Synchrotron Radiation Techniques to Materials Science III," Spring 1996 Proceedings, **437**, p. 61-5.

© 22. *"Magnetic X-Ray Dichroism in the Spectroscopy of Ultrathin Magnetic Alloy Films,"* J. G. Tobin, K. W. Goodman, G. J. Mankey, R. F. Willis, J. D. Denlinger, E. Rotenberg, et al. Journal of Vacuum Science and Technology **B14**(4), 3171-3175 (1996).

© 23. *"Magnetic X-ray Linear Dichroism in the Photoelectron Spectroscopy of Ultrathin Magnetic Alloy Films,"* J. G. Tobin, K. W. Goodman, G. J. Mankey, R. F. Willis, J. D. Denlinger, E. Rotenberg, and A. Warwick, [MMM Conference] Journal of Applied Physics **79**(8, pt. 2B) 5626-5628 (1996).

☆ 24. *"Difffraction and Holography with Photoelectrons and Fluorescent X-rays,"* C. S. Fadley, Y. Chen, R. E. Couch, H. Daimon, E. Rotneberg, et al., Progress in Surface Science, **54**(3-4), 341-386 (1997).

© 25. *"Generalized Description of Magnetic X-ray Circular Dichroism in Fe 3p Photoelectron Emission,"*J. G. Tobin, K. W. Goodman, F. O. Schumann, R. F. Willis, J. D. Denlinger, E. Rotenberg, et al. Journal of Vacuum Science and Technology **A15**(3 Pt. 2) 1766-1769 (1997).

© 26. *"Comparison of Magnetic Linear Dichroism in 4f Photoemission and 4d-4f Photoemission from Gd on Y(0001),"* W. J. Gammon, S. R. Mishra, D. P. Pappas, K. W. Goodman, J. G. Tobin, J. D. Denlinger, E. Rotenberg, et al. Journal of Vacuum Science and Technology **A15**(3 Pt. 2) 1755-1758 (1997).

☆ 27. *"Observation of Quantum Well Interference in Magnetic Nonostructures by Photoemission,"* R. K. Kawakami, E. Rotenberg, E. J. Escorcia-Aparicio, H. J. Choi, T. R. Cummins, J. G. Tobin, N. V. Smith, and Z. Q. Qiu, Physical Review Letters, **80**(8), 1754-1757 (1998).

28. *"Direct Extraction of Exchange Splittings from Magnetic X-ray Dichroism in Photoelectron Spectroscopy,"* J. G. Tobin, K. W. Goodman, F. O. Schumann, R. F. Willis, J. D. Denlinger, E. Rotenberg, et al., Surface Science **395**(2-3), L227-235 (1998).

☆ 29. *"Evolution of Fermi Level Crossings vs H Coverage on W(110)*," Physical Review Letters **80**(13), 2905-2908 (1998).

30. *"High Resolution Photoemission Spectroscopy Using Synchrotron Radiation Study of the SiO_2/β-SiC(100)3x2 Interface Composition,"* D. Dunham, P. Soukassian, J. D. Denlinger, B. P. Tonner, and E. Rotenberg, in Silicon Carbide, III-Nitrides, and Related Materials, G. Pensl, H. Morkoc, B. Monemar, and E. Janzen editors (Trans Tech Publications, Switzerland) pp 391-394.

31. *"Development of Scanning X-ray Microscopes for Materials Science Spectromicroscopy at the Advanced Light Source,"* T. Warwick, H. Ade, S. Cerasari, J. Denlinger, K. Franck, A. Garcia, S. Hayakawa, A. Hitchcock, J. Kikuma, S. Klingler, J. Kortright, G. Morrison, M. Moronne, E. Rightor, E. Rotenberg, S. Seal, H-J. Shin, W. F. Steele, and B. P. Tonner, J. Synchrotron Radiation (Proceedings SRI 97, Himeji, Japan, August 1997.), **69** (8), 2964 (1998).

32. *"Vibrationally Resolved O 1s core-excitation spectra of CO and NO,"* R. Püttner, I. Dominguez, T. J. Morgan, C. Cisneros, R. F Fink, E. Rotenberg, T. Warick, M. Domke, G. Kaindl, and A. S. Schlachter, *J. Chem Phys*, in press.

© 33. *"Effects of Symmetry on Circular and Linear Magnetic Dichroism in Angle-Resolved Photoemission Spectra of Gd/Y(0001) amd Fe-Ni/Cu(001)"* K. W. Goodman, J. G. Tobin, F. O. Schumann, R. F. Willis, J. W. Gammon, D. P. Pappas, J. B. Kortright, J. D. Denlinger, E.

Rotenberg, A. Warwick, and N. V. Smith, Mat. Res. Soc. Symp. Proc. **475**, 493 (1997).

34. *"A Scanning Transmission X-ray Microscope for Materials Science,"* T. Warwick, K. Franck, J. B. Kortright, G. Meigs and others, Rev. Sci. Instrum. **69**(8) 2964 (1998).

☆ 35. *"Structure Determination of the (√3×√3)R30° Boron Phase on the Si(111) Surface Using Photoelectron Diffraction,"* P. Baumgärtel, J. J. Paggel, M. Hasselblatt, K. Horn, V. Fernandez, O. Schaff, J. H. Weaver and A. M. Bradshaw, D. P. Woodruff, E. Rotenberg, and J. D. Denlinger, Physical Review B**59**, 13014 (1999).

36. *"Development of Scanning X-ray Microscopes for Materials Science Spectromicroscopy at the Advanced Light Source,"* J. Synchrotron Radiation, **5**, 1090 (1998).

☆ 37. *"Holographic Atomic Images from Surface and Bulk W(110) Photoelectron Diffraction Data,"* P. M. Len, J. D. Denlinger, E. Rotenberg, S. D. Kevan, B. P. Tonner, and others, Phys. Rev. B **59**(8)5857 (1999).

38. *"Vibrationally Resolved O 1s Core-Excitation Spectra of CO and NO,"* R. Püttner, I. Dominguez, T. J. Morgan, C. Cisneros, R. F. Fink, E. Rotenberg, T. Warwick, M. Domke, G. Kaindl, and A. S. Schlachter, Phys. Rev. A**59**, 3415 (1999).

☆ 39. *"Quantum Well States of the Cu/Co(100) System Probed by a Thin Ni Layer,"* R. K. Kawakami, E. Rotenberg, Hyuk J. Choi, Ernesto J. Escorcia-Aparicio, M. O. Bowen, J. H. Wolfe, E. Arenholz, Z. Zhang, N. V. Smith, and Z. Q. Qiu, Nature, **398** N6723:132-134 (1999).

☆ 40. *"Spin-Orbit Coupling Induced Surface Band Splitting in Li/W(110) and Li/Mo(110),"* Eli Rotenberg, J. W. Chung, and S. D. Kevan, Phys. Rev. Lett **82**, 4066 (1999).

☆ 41. *"Determination of the Magnetic Coupling in the Co/Cu./Co(100) System with Momentum-Resolved Quantum Well States,"* R. W. Kawakami, E. Rotenberg, E. J. Escorcia-Aparicio, Hyuk J. Choi, J. H. Wolfe, N. V. Smith, and Z. Q. Qiu, Physical Review Letters, **82**(20), 4098 (1999).

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43. *"Fermi Surface Study of Pseudomorphic $Fe_{1-x}Ni_x$ and $Co_{1-x}Ni_x$ Thin Films on Cu(100),"* M. Hochstrasser, F. O. Schumann, R. F. Willis, T. Cummins, G. D. Waddill, S. R. Mishra, J. G. Tobin, and E. Rotenberg, J. Vac. Sci. Technol. A**17**(4),1322 (1999).

☆ 44. *"Direct Spectroscopic Observation of the Energy Gap Formation in the Spin Density Wave Phase Transition at the Cr(110) Surface,"* J. Schäfer, E. Rotenberg, and S. D. Kevan, Phys. Rev. Lett. **83**(10), 2069 (1999).

45. *"Structural Precursor to Adsorbate-Induced Reconstruction: C on Ni(100),"* R. Terborg, J. T. hoeft, M. Polcik, R. Lindsay, O. Schaff, A. M. Bradshaw, R. Toomes, N. A. Booth, D. P. Woodruff, E. Rotenberg and J. Denlinger Phys. Rev. **B60**(15)10715 (1999).

46. *"High-resolution photoemission study of acetylene adsorption and reaction with the Si(100)-2×1 surface,"* S. H. Xu, Y. Yang, M. Keeffe, G. J. Lapeyre, and E. Rotenberg, Phys.

Rev. **B60**(16),11586 (1999).

47. *"Photoemission Study of Ferm i Surfaces of Pseudomorphic Co, Ni, and Co_xNi_{1-x} Films on Cu(100),"* M. Hochstrasser, N. Gilman, R. F. Willis, F. O. Schumann, J. G. Tobin, and E. Rotenberg, Phys. Rev. **B60**(24), 17030 (1999).

48. *"Magnetic Interlayer Coupling Between Co films across Cu/$Ni_{30}Cu_{70}$/Cu(100) double quantum wells,"* Z. D. Zhang, H. J. Choi, R. K. Kawakami, E. J. Escorcia-Aparicio, M. O. Bowen, J. H. Wolfe, E. Rotenberg, N. V. Smith, and Z. Q. Qiu, Phys. Rev. **B61**(1), 76 (2000).

49. *"Photoelectron Diffraction Imaging for C_2H_2 and C_2H_4 Chemisorbed on Si(100) Reveals a New Bonding Configuration,"* S. H. Xu, M. Keeffe, Y. Yang, C. Chen, M. Yu, G. J. Lapeyre, E. Rotenberg, J. Denlinger, and J. T. Yates, Jr., Phys. Rev. Lett. **84**(5), 939 (2000).

50. *"The Coverage Dependence of the Local Structure of C on Ni(100):A Structural Precursor to Adsorbate-Induced Reconstruction,"* R. Terborg, J. T. Hoeft, M. Polcik, R. Lindsay, O. Schaff, A. M. Bradshaw, R. L. Toomes, N. A. Booth, D. P. Woodruff, E. Rotenberg, and J. Denlinger, Surf. Sci **446**,301 (2000).

☆© 51. *"Energy Gap of the Spin Density Wave at the Cr(110) Surface,"* J. Schäfer, E. Rotenberg, S. D. Kevan, and P. Blaha, Surf. Sci **454-456**, 885 (2000).

☆ 52. *"Coupling Between Adsorbate Vibrations and an Electronic Surface State,"* E. Rotenberg, J. Schäfer, and S. D. Kevan, Phys. Rev. Lett. **84**(13), 2925 (2000).

☆ 53. *"Observation of the Two-Hole Satellite in Cr and Fe Metal by Resonant Photoemission at the 2p Adsorption Energy,"* S. Hüfner, S. H. Yang, B. S. Mun, C. S. Fadley, J. Schäfer, E. Rotenberg, and S. D. Kevan, Phys. Rev. **B61**(19), 12582 (2000).

☆ 54. *"Quasicrystal Valence Bands in Decagonal AlNiCo,"* E. Rotenberg, W. Theis, K. Horn and P. Gille, Nature, **406**, 602 (2000).

☆ 55. *"Effect of Interfacial Roughness on the Phase of Quantum Well States in Cu/Co(001) and Cu/Ni(001) Systems,"* H. J. Choi, E. Rotenberg, R. K. Kawakami, U. Bovensiepen, J. H. Wolfe, N. V. Smith, and Z. Q. Qiu, Phys. Rev. **B62**(10), 6561(2000).

56. *"The structure of oxygen on Cu(100) at low and high coverages,"* M. Kittel, M. Polcik, R. Terborg, J.-T. Hoeft, P. Baumgärtel, A. M. Bradshaw, R. L. Toomes, J. -H. Kang, D. P. Woodruff, M. Pascal, C. L. A. Lamont and E. Rotenberg, Surface Science **470**(3), 311 (2001).

☆ 57. *"3d and 4d resonant photoemission in Pr and Nd metal,"* S. Hufner, F. Schumann, E. Rotenberg, J. Tobin, S.-H. Yang, B. S. Mun, S. Morton, J. Schäfer, and D. Ehm , Phys. Rev. **B63**(08), 085106 (2001).

☆ 58. *"Fermi contours and adsorbate phonon anomalies for Li/Mo(110) and Li/W(110),"* E. Rotenberg and S. D. Kevan , J. Vac. Soc. Technol. **A19**(4), in press (2001).

☆ 59. *"Imaging of Cu(001) atoms by a new differential approach to photoelectron holography,"* S. Omori , Y. Nihei , E. Rotenberg , J.D. Denlinger , S.D. Kevan , B.P. Tonner ,M.A. Van Hove , C.S. Fadley, J. Electr. Spectr. Rel. Phenom. **114**, 455 (2001).

☆® 60. *"Many-body Effects at Surfaces,"* S. D. Kevan and E, Rotenberg, J. Electr. Spectr. Rel.

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