

VITAE

NAME: **Roberto Colella**

RANK: Professor

DATE OF BIRTH: May 22, 1935

PLACE OF BIRTH: Milan, Italy

CITIZENSHIP: U. S. A.

POSITIONS: C.N.E.N. Fellow, Rome, 1960-1961.
(Comitato Nazionale per l'Energia Nucleare
= Italian Atomic Energy Commission).
Staff Research Scientist, Euratom Nuclear Research Center,
ISPRA - Italy, 1961-1967.
Postdoctoral Research Associate, Cornell University,
Ithaca, N.Y. 1967-1970.
Postdoctoral Research Associate, Catholic University of
America, Washington, D.C., 1970-1971.
Assistant Professor, Purdue University, 1971-1975.
Associate Professor, Purdue University, 1975-1977.
Professor, Purdue University, 1977-present.

Visiting Positions: (Since 1980)

Visiting Scientist, University of Genoa, Italy, July, 1980.

Visiting Scientist, Frascati National Laboratories,
Frascati, Italy, June 15th-July 15th, 1982.

Visiting Professor, University of Illinois,
Physics Department, Urbana, Illinois, Fall 1984-1985.

Visiting Professor, University of Rome II,
Roma-Tor Vergata, Italy, Spring and Summer 1984-1985.

Visiting Scientist, Frascati National Laboratories,
Frascati, Italy, June 1-June 30, 1986.

Visiting Professor, University of Trent, Department of Physics,
Trent, Italy, June 1-June 30, 1988.

Visiting Scientist, Sincrotrone Trieste, Padriciano (Trieste), Italy,
June 1 - June 30, 1989; June 6 - July 6, 1990; Sept. 1 - Sept. 30,
1991; June 6 - July 8, 1994; June 12 - July 20, 1996.

Visiting Professor, University of Paris-Sud, Orsay, France,
Department of Solid State Physics, and:

University of Paris VI, Pierre et Marie Curie,
 Department of Mineralogy and Crystallography,
 October 1, 1992 - July 31, 1993.

Visiting Scientist, Photon Factory, KEK, National Laboratory
 for High Energy Physics, Tsukuba, Japan, 2/1/95 - 4/30/95.

Visiting Scientist, European Synchrotron Radiation Facility, CNRS,
 Grenoble, France, 10/1/98 - 6/30/99; 6/1/00 - 7/15/00;
 6/5/03 - 7/4/03.

Visiting Scholar, Advanced Photon Source, Argonne National
 Laboratory, Argonne, Illinois, 3/10/03 - 4/25/03.

Visiting Professor, University of British Columbia, Department of
 Physics, Vancouver (Canada), 5/5/03 - 5/30/03.

Visiting Scientist, Cornell High Energy Synchrotron Source,
 CHESS, Ithaca N.Y., 6/1/04 - 7/9/04.

PROFESSIONAL
 COMMITTEES:

MRL Committee (9/1/78 - 6/30/84)

Commission of Journals, International Union of Crystallography:
 (9/1/80-8/31-90).

Spokesman for the “X-ray Physics Group,” an organization
 of users of the Advanced Photon Source (Argonne, Illinois).
 in charge of developing a beam line. (1990 - 2000).

HONORS:

North American Co-Editor of *Acta Crystallographica*, 1980-1990.
 Fellow of the American Physical Society.

Chairman of the first Gordon Conference on “X-Ray Physics”,
 New London, N.H., August 7-11, 1989.

Honorable Mention from the Gravity Research Foundation (1980).
 JSPS Fellow (2/1/95-4/30/95); JSPS = Japan Society for the
 Promotion of Science.

Member of the Organizing Committee of the “International
 School on X-ray and Neutron Dynamical Diffraction:
 Theory and Applications”. (Erice, Italy, April 1996).

Dr. Colella’s work on neutron interferometry and gravity,
 in collaboration with Overhauser, Werner, Eagen
 and Staudenmann, has received ample coverage in the
 U.S. and international press. See, for example:
Physics Today (August 1975, p. 17); *La Recherche*
 (France) **7**, n. 63, p. 66 and 60 (1976), and other
 journals. Popular descriptions of these experiments
 have been given in: *American Scientist*, **68**,
 70 (1980) and *Scientific American* (May 1980).
 They are mentioned in standard textbooks on Quantum
 Mechanics and Optics, such as: “Quantique, Rudiments”
 by J. M. Lévy-Leblond and F. Balibar (Inter
 Editions, Paris 1984), “The Investigation of the

Physical World,” by G. Toraldo di Francia (Cambridge University Press, 1981), “Modern Quantum Mechanics”, by J.J. Sakurai (Benjamin/Cummings, Menlo Park, CA, 1985), and “Introductory Nuclear Physics”, by K.S. Krane (John Wiley and Sons, 1988).

Cited in the 1977 Yearbook of the MacGraw Hill Encyclopedia of Science and Technology, under the entry: “Quantum Theory, Non Relativistic,” (by R. Colella).

Recent work on the Phase Problem in Diffraction has also attracted some attention. See, for example, the Editorial Comment published on *Nature*, (Vol. **329**, p. 201) and *Scientific American*,

“The Science and the Citizen”, (January 1988, p. 19)

Member (2001) of the Editorial Board of the Encyclopedia of Condensed Matter Physics, to be published by Elsevier.

Recipient of the McCoy Award (April 2002), the most prestigious research award bestowed by Purdue University, for ”significant contributions in the natural sciences”.

The citation reads: “To recognize your outstanding achievements in structural, electronic and vibrational properties of condensed matter, exploiting x-ray, electron and neutron diffraction techniques”.

RESEARCH AREA &
CURRENT RESEARCH
INTERESTS:

Diffraction Physics and Solid State.

- a) Interferometry
- b) Solution of the Phase Problem in
Crystallography by Multiple Bragg Scattering
- c) Charge Density Studies
- d) Quasicrystals
- e) Resonant Scattering
- f) Isotope Effect

PUBLICATIONS

1. "Effects of Alpha Particles Irradiation on the X-ray Intensities Diffracted by Germanium Crystals" (w/A. Merlini). Radiation Damage in Semiconductors, Paris, Dunod 1965, p. 87.
2. "Study of the X-ray Diffraction Profiles from a Silicon Single Crystal Irradiated with Alpha Particles (w/J. Burgeat). C.R. Acad. Sci., Paris **261**, 2872 (1965).
3. "Effects of Fast Neutron Irradiation and of Impurities on the X-ray Intensities Diffracted by Germanium and Silicon Crystals" (w/A. Merlini). Phys. Stat. Sol. **14**, 81 (1966).
4. "A Simple Automatic Device for X-ray Integrated Intensity Measurements on Samples Undergoing Irradiation (w/C. Koechler). J. Sci. Inst. **43**, 670 (1966).
5. "A Study of the 222 'Forbidden' Reflection in Germanium and Silicon (w/A. Merlini). Phys. Stat. Sol. **18**, 157 (1966).
6. "Increase of Electrical Resistivity Due to Long Range Order in $Cu_3Ni_3Zn_2$ " (w/W. Schüle). J. Inst. Metals **97**, 270 (1969).
7. "X-ray Determination of the Debye Temperature of Uranium Monocarbide" (w/D. Dragone and A. Merlini). Phys. Stat. Sol. **36**, 135 (1969).
8. "Effects of Alpha Irradiation on the X-ray Diffraction Profiles of Silicon Single Crystals" (w/J. Burgeat). J. Appl. Phys. **40**, 3505 (1969).
9. "X-ray Determination of Phonon Dispersion in Vanadium" (w/B. Batterman). Phys. Rev. **B1**, 3913 (1970).
10. "X-ray Investigation on Bond Charge Density in Gallium Arsenide". Phys. Rev. **B3**, 4308 (1971).
11. "N-beam Dynamical Diffraction of High Energy Electrons at Glancing Incidence: General Theory and Computational Methods". Acta Cryst. **A28**, 11 (1972).
12. "Comparison of Experimental and n-beam Calculated Intensities for Glancing Incidence HEED" (w/J. Menadue). Acta Cryst. **A28**, 16 (1972).
13. "Multiple Diffraction Effects in Neutron Single Crystal Diffractometry". Acta Cryst. **A28**, 218 (1972).
14. "Anomalous Transmissions of X-rays in Slightly Deformed Crystals". Phys. Rev. **B6**, 4857 (1972).
15. "Temperature Dependence of Intensities from Silicon with Glancing Incidence HEED" (w/ B. Batterman and J. Menadue). Acta Cryst. **A29**, 151 (1973).

16. "Small Angle X-ray Scattering Study of Spinodal Decomposition in the $B_2O_3 - PbO - Al_2O_3$ System" (w/G. Srinivasan, P. Macedo, V. Volterra). *Phys. and Chem. of Glasses* **14**, 90 (1973).
17. "Multiple Diffraction of X-rays and the Phase Problem". *Computational Procedures and Comparison with Experiment*. *Acta Cryst.* **A30**, 413 (1974).
18. "Reply to Post's Comments on this paper". *Acta Cryst.* **A31**, 155 (1975).
19. "Experimental Test of Gravitationally Induced Quantum Interference" (w/A. Overhauser). *Phys. Rev. Lett.* **33**, 1237-1239 (1974).
20. "Valence Charge Density in Grey Tin: X-Ray Determination of the (222) "Forbidden" Reflection and its Temperature Dependence," *Phys. Rev. B* **11** , 793 (1975). (w/D. Bilderback.)
21. "Observation of Gravitationally Induced Quantum Interference," *Phys. Rev. Lett.* **34** , 1472-1474 (1975). (w/A. Overhauser and S. Werner.)
22. "X-Ray Diffraction Studies of Acoustoelectrically Amplified Phonon Beams," *Phys. Rev. Lett.* **35** , 230 (1975). (w/S. LeRoux and R. Bray.)
23. "Valence Charge Density in Indium Antimonide," *Phys. Rev. Lett.* **35** , 858-860 (1975). (w/D. Bilderback.)
24. "Observation of the Phase Shift of a Neutron Due to Precession in a Magnetic Field," *Phys. Rev. Lett.* **35** , 1053 (1975). (w/A. Overhauser, S. Werner, and C. Eagen.)
25. "X-Ray Determination of Valence-Electron Charge Density and Its Temperature Dependence in Indium Antimonide," *Phys. Rev.* **13** , 2479 (1976). (w/D. Bilderback.)
26. "Experimental Investigations of Bonding Charges in Diamond and Zinc- Blende Structures," *Physica Scripta* **15** , 143 (1977). (Based on an invited paper given at the Vth Sagamore Conference on Charge, Spin and Momentum Density.) Kiljava, Finland, August 16-20, (1976).
27. "X-Ray Diffraction Studies of Acoustoelectrically Amplified Phonons Using Anomalous Transmission." *Proceedings of the XIII International Conference on the Physics of Semiconductors* , Rome Italy, August 30- September 3, 1976. (w/S. D. LeRoux and R. Bray.)
28. "Effect of Acoustoelectric Phonons on Anomalous Transmission of X-Rays," *Phys. Rev. Lett.* **37** , 1056 (1976). (w/S. D. LeRoux and R. Bray.)
29. "Neutron Interferometry." *Proceedings of the Conference on Neutron Scattering* , Gatlinburg, Tennessee, 1976; Edited by R. M. Moon, p. 1060. (w/S. A. Werner, A. W. Overhauser, and C. F. Eagen.)
30. "Comparison of X-Ray and Neutron Diffuse Scattering Intensities in Niobium," *Phys. Rev. B* **15** , 1738 (1977). (w/S. Chang.)

31. "Quantum Theory, Non Relativistic." Title of an article published in the 1977 Yearbook of the McGraw-Hill Encyclopedia of Science and Technology. Article based on an experiment in which the phase of a neutron is shown to be affected by the presence of a gravitational field.
32. "Direct Observation of Charge Density Waves by Molecular Beam Diffraction," Phys. Rev. Lett. **42** , 1635 (1979). (w/G. Boato and P. Cantini.)
33. "Anomalies in the X-Ray Diffuse Scattering from Cr-Doped V_2O_3 at the High Temperature Metal-Insulator Transition," Solid State Comm. **31** , 359 (1979). (w/F. Sinclair.)
34. "Mössbauer Diffraction Experiments with LiF: A New Technique for Calibration," Nucl. Instr. and Methods **164** , 125 (1979). (w/J. Stevenson and J. Mullen.)
35. "Study of Acoustoelectric Phonons by X-Ray Diffraction," Paper accepted for oral presentation at the Third International Conference on Phonon Scattering in Condensed Matter, Providence, R. I., August 1979. (w/L. D. Chapman and R. Bray.)
36. "The Effect of the Earth's Rotation on the Quantum Mechanical Phase of the Neutron," Phys. Rev. Lett. **35** , 1053 (1979). (w/S. A. Werner and J. L. Staudenmann.)
37. "Gravitational and Rotational Effects on the Neutron Phase." *Proceedings of the 1st International Workshop on Neutron-Interferometry*, Grenoble, June 1978. (Published by Oxford University Press.) (w/S. A. Werner, J. L. Staudenmann, and A. W. Overhauser.)
38. "Neutrons, Gravity, and Quantum Mechanics." Invited article by "American Scientist" **68** , 70 (1980). (w/A. W. Overhauser.)
39. "Hall Coefficient and Reflectivity Evidence that TiS_2 is a Semiconductor," J. Phys. C: Solid State Phys. **12** , L521 (1979). (w/E. M. Logothetis, W. J. Kaiser, C. A. Kukkonen, S. P. Faile, and J. Gambold.)
40. "Gravity and Inertia in Quantum Mechanics," Phys. Rev. A **21** , 1419 (1980). (w/J. L. Staudenmann, S. A. Werner, and A. W. Overhauser.)
41. "Transport Properties and the Semiconducting Nature of TiS_2 ," Physica **99** B+C, 193 (1980). *Proceedings of the International Conference on Layered Materials and Intercalates*, Nijmegen, the Netherlands, August 28-31, 1979.
42. "Surface Charge Density Waves Observed by Atomic Beam Diffraction," Physica **99** B+C, 59 (1980); *Proceedings of the International Conference on Layered Materials and Intercalates* , Nijmegen, the Netherlands, August 28-31, 1979.(w/P. Cantini and G. Boato.)
43. "Comment on "The Number of Permitted Modes of Propagation in N-Beam Dynamical Diffraction of X-Rays," by S. L. Chang, Acta Cryst. A **36** , 827 (1980).

44. "Comment of paper "On the Theory of the Bragg Reflection in the Case of Multiple X-Ray Diffraction," Phys. Stat. Solidi (a) **60** , K91 (1980).
45. "Virtual Bragg Scattering: A Practical Solution to the Phase Problem in Diffraction," Phys. Rev. Lett. **46** , 1578 (1981). (w/L. D. Chapman and D. R. Yoder.)
46. "Effects of Charge Density Waves on Bragg Peak Intensities," Solid State Commun. **38** , 1175 (1981). (w/R. Moret.)
47. "Transport and Optical Properties of $Ti_{1-x}S_2$," Phys. Rev. B **24** , 1691 (1981). (w/C. A. Kukkonen, W. J. Kaiser, E. M. Logothetis, B. J. Blumenstock, P. A. Schroeder, S. P. Faile, and J. Gambold.)
48. "Multiple Diffraction of X-Rays." Paper solicited by Zeitschrift für Naturforschung to honor Professor Hildebrandt's sixtieth birthday. Z. Naturforsch. **37a** , 437 (1982).
49. "Valence Electron Density in Silicon and InSb Under High Pressure," Phys. Rev. Lett. **49** , 1438 (1982). (w/D. R. Yoder-Short and B. A. Weinstein.)
50. "X-Ray Diffraction Studies of Acoustoelectrically Amplified Phonons," Phys. Rev. B **27** , 2264 (1983). (w/D. L. Chapman and R. Bray.)
51. "Phonons: Theory and Experiment," by P. Brüesch. Book Review. Acta Cryst. A **39** , 599 (1983).
52. "X-Ray Evidence of Direct Generation of Non-Equilibrium Phonons in Quartz by Infrared Radiation," Phys. Rev. (Rapid Commun.) B **30** , 1094 (1984). (w/L. D. Chapman and S. M. Hsieh.)
53. "Proposal for a Free-Electron Laser in the X-Ray Region," Optics Communications **50** , 41 (1984). (w/A. Luccio-Brookhaven.)
54. "Experimental Evidence of Phase Excitations in Solids by X-Ray Diffraction," Phys. Rev. Lett. **52** , 652 (1984). (w/L. D. Chapman.)
55. "Is the End of the World a Scientific Reality?" Popular article about proton decay experiments. "Living city," **7** , 13 (1984); published by the Focolare Movement, P. O. Box 496, New York, N.Y., 10021.
56. "Electron Density Studies of KCl and LiF by γ -ray Diffractometry." Acta Cryst. A **41** , 171 (1985) (w/M. C. Schmidt and D. R. Yoder-Short.)
57. "Surface Effects of Charge Density Waves by Molecular Beam Diffraction." Solid State Communications, **53** , 77 (1985) (w/P. Cantini.)
58. "X-Ray Scattering Studies of Charge Density Waves in Tantalum Disulphide." Phys. Rev. B **32** , 2233 (1985) (w/L. D. Chapman.)
59. "Phase Determination of Forbidden Reflection in V_3Si by Virtual Bragg Scattering," Phys. Rev. Lett. **55** , 715 (1985) (w/M. C. Schmidt.)

60. "Phase Determination of the Forbidden Reflection (442) in Silicon and Germanium Using Multiple Bragg Scattering," *Acta Cryst.* **A41**, 451 (1985) (w/J. Tischler, Q. Shen).
61. "Anharmonicity and X-Ray Forbidden Reflections in V_3Si ," *Phys. Rev.* **B34**, 2872 (1986). (w/M. C. Schmidt)
62. "Current Status of Phase Determination by Means of Multiple Bragg Diffraction," *Acta Cryst.* **A42**, 533 (1986). (w/Q. Shen).
63. "X-Ray Diffraction" and "Applications to Solids." Two general articles for the "Dictionary of Physical Sciences" (in Italian). Published by: "Istituto della Enciclopedia Italiana," founded by Giovanni Treccani, Roma, 1986.
64. "Dimensional Effects of Debye-Waller Factors in Layered Crystals", *Solid State Commun.* **63**, 47 (1987). (w/S. M. Hsieh).
65. "Charge Density Waves and Phase Transitions in $1T - TaS_2$ ", *Solid State Commun.*, **63**, 237 (1987). (w/ S. M. Hsieh).
66. "Comment on Paper: On Determining the Sign of Structure Factors of "Forbidden Reflections", By H. J. Juretscheke and Z. Barnea. (*Physica Scripta*: **33**, 167 (1986))". *Physica Scripta* **35**, 96 (1987).
67. "Solution of Phase Problem for Crystallography at a Wavelength of 3.5 \AA ", *Nature*, **329**, 232 (1987). (w/Q. Shen). (See Editorial Comment on p. 201, *ibid.*)
68. "Phase Observation in an Organic Crystal (Benzil: $C_{14}H_{10}O_2$) Using Long Wavelength X-rays", *Acta Cryst.* **A44**, 17 (1988). (w/Q. Shen).
69. "The Phase Problem in Diffraction. Use of Multiple Bragg Scattering"; "Il Nuovo Saggiatore", bimonthly magazine published by the Italian Physical Society. (in Italian). Vol. **4**, n.1, p. 26 (1988).
70. "Multiple Diffraction of X-rays. Solution of the Phase Problem in Diffraction", text of an invited address delivered at a Memorial Symposium in honor of P. P. Ewald. International Conference of Crystallography, Perth, Australia, August 1987. Part of a memorial book in honor of P. P. Ewald, edited by N. Kato. Published in 1992 by Oxford University Press; page 71.
71. "Search for a "Forbidden" Reflection in Zinc", (w/Q. Shen). *Physica Scripta*, **18**, 172 (1988).
72. "Plane Wave Theory of Three Crystal Laue Interferometer". *Acta Cryst.* **A44**, 1055, (1988).
73. "Phason Velocities in TaS_2 by X-Ray Diffuse Scattering". (w/W. Minor, L. D. Chapman and S. N. Ehrlich). *Phys. Rev.* **B39**, 1360, (1989).

74. "Thermal Attenuation of Satellite Reflections in Modulated Structures". *Phys. Rev.* **B39**, 1501, (1989).
75. "Relativity of Space and Time. Classical Relativity". Part one of a series of four. "Living City", **27**, n. 12, p. 24, (1988). Published by: Focolare Movement, P. O. Box 496, New York, N.Y. 10021.
76. "Relativity of Space and Time. The Collapse of Classical Physics". Part two of a series of four. "Living City", **28**, n. 1, p. 24, (1989). Published by: Focolare Movement, P. O. Box 496, New York, N.Y. 10021.
77. "Relativity of Space and Time. Einstein's Postulates of Special Relativity and their Consequences". Part three of a series of four. *Living City*, **28**, n. 2, p. 24, (1989). Published by: Focolare Movement, P. O. Box 496, New York, N.Y. 10021.
78. "Relativity of Space and Time. The New Concepts of Time, Mass and Energy". Part four of a series of four. *Living City*, **28**, n. 3, p. 24 (1989). Published by Focolare Movement, P. O. Box 496, New York, N. Y. 10021.
79. "Time Resolved X-Ray Diffraction Study of Laser Annealing in Silicon at Grazing Incidence." (w/J. R. Buschert, J. Z. Tischler, D. M. Mills and Q. Zhao). *Journal of Applied Physics*, **66**, 3523 (1989).
80. "X-Ray Diffraction Studies of Surface Structures". Part I and Part II. Invited review article. *Landolt-Börnstein, Volume III/24: "Physics of Solid Surfaces"* (1996). Edited by G. Chiarotti (Springer-Verlag). (pp. 312-341)
81. "Visibility of the Asymmetry Effect in Multiple Diffraction Experiments in Benzil. Wavelength Dependence". (w/Q. Shen). *Acta Cryst.* **A46**, 714 (1990).
82. "Truncation Rod Scattering: Analysis by Dynamical Theory of X-Ray Diffraction". *Phys. Rev. B* **43**, 13827 (1991).
83. "Photostriction Effect in Silicon Observed by Time-Resolved X-Ray Diffraction". (w/J. R. Buschert). *Solid State Commun.* **80**, 419 (1991).
84. "Phase Determination of X-ray Reflections in a Quasicrystal." (w/H. Lee and L. D. Chapman). *Acta Cryst. A* **49**, 600-605 (1993).
85. "Effect of Monochromatic Phonon Beams on Anomalous Transmission of X-rays." (w/F. N. Chukhovskii). *Phys. Rev.* **B47**, 484 (1993).
86. "Enantiomorphism and Multiple Beam X-Ray Diffraction". *Acta Cryst.*, **A50**, 55-57 (1994).
87. "Feasibility of Phase Determination in Quasicrystals and Microcrystals by Means of Multiple Bragg Scattering". (w/M. Bessière, H. Lee, T. Motsch, S. Lefèbvre, F. Dénoyer). *Zeitschrift für Kristallographie*, **209**, 390-394, (1994).

88. "Science and Faith: Can a Scientist Believe ?" Book chapter. Title of the book: "Divine Representations: Postmodernism and Spirituality". Edited by A.W. Astell. Paulist Press, 1994.
89. "Enantiomorphism and Multiple Beam Diffraction. Revised." *Acta Cryst. A* **51**, 438 (1995).
90. "Multiple Bragg Scattering and the Phase Problem in X-Ray Diffraction. I Perfect Crystals". *Comments Cond. Matt. Phys.*, **17**, 175 (1995).
91. "Multiple Bragg Scattering and the Phase Problem in X-Ray Diffraction. II Mosaic Crystals." *Comments Cond. Matt. Phys.*, **17**, 199 (1995).
92. "Multiple X-Ray Diffraction Studies of Decagonal Quasicrystals". (w/R. Eisenhower and B. Grushko). *Proceedings of the 5th Conference on Quasicrystals. Avignon (France), May 22 - 26 (1995)*. Edited by C. Janot and R. Mosseri. World Scientific Publishing Co., 1995.
93. "Multiple Bragg Diffraction in Quasicrystals: the Issue of Centrosymmetry in Al-Pd-Mn". (w/ H. Lee and Q. Shen). *Phys. Rev. B* **54**, 214-221, (1996).
94. "Multiple Bragg Scattering and the Phase Problem in X-Ray Diffraction. Perfect Crystals". Text of lecture delivered at the International School on X-Ray and Neutron Dynamical Diffraction. Erice, Italy, April 9-21, 1996. Published in "X-Ray and Neutron Dynamical Diffraction. Theory and Applications". Edited by A. Authier, S. Lagomarsino and B.K. Tanner. Plenum Press, New York, 1996.
95. "Multiple Bragg Scattering and the Phase Problem in X-Ray Diffraction. Mosaic Crystals". Text of lecture delivered at the International School on X-Ray and Neutron Dynamical Diffraction. Erice, Italy, April 9-21, 1996. Published in "X-Ray and Neutron Dynamical Diffraction. Theory and Applications". Edited by A. Authier, S. Lagomarsino and B.K. Tanner. Plenum Press, New York, 1996.
96. "X-Ray and Neutron Interferometry. Basic Principles and Applications". Text of lecture delivered at the International School on X-Ray and Neutron Dynamical Diffraction. Erice, Italy, April 9-21, 1996. Published in "X-Ray and Neutron Dynamical Diffraction. Theory and Applications". Edited by A. Authier, S. Lagomarsino and B.K. Tanner. Plenum Press, New York, 1996.
97. "Determination of the Stokes-Poincaré Parameters for a Synchrotron X-Ray Beam by Multiple Bragg Scattering" (w/ K. Hirano, T. Mori, S. Sasaki, A. Iida, Q. Shen). *Japanese Journal of Applied Physics*, **35**, 5550-5552, (1996).
98. "Dynamical Three-Beam Diffraction in a Quasicrystal" (w/ Y. Zhang, Q. Shen and S.W. Kycia). *Acta Cryst. A* **54**, 411-415 (1998).
99. "Multiple X-Ray Diffraction Studies of Decagonal Quasicrystals". (w/R. Eisenhower and B. Grushko). *Phys. Rev. B* **57**, 8218-8222 (1998).

100. "Exploring Reciprocal Space of a Quasicrystal by Means of an Imaging Plate". (w/M. Kopecky). *Journal of Applied Crystallography* **32**, 442-451 (1999).
101. "Dynamical Diffraction and X-ray Standing Waves from Atomic Planes Normal to a 2-fold Symmetry Axis of the Quasicrystal Al-Pd-Mn" (w/ T. Jach, Y. Zhang, M. de Boissieu, M. Boudard, A.I. Goldman, T.A. Lograsso, D.W. Delaney and S.W. Kycia). *Phys. Rev. Letters* **82**, 2904-2907 (1999).
102. "Bulk and Surface Evidence for the Long Range Spatial Modulation of X-Ray Absorption in the Al-Pd-Mn Quasicrystal at Bragg Incidence" (w/ G. Cappello, A. Dechelette, F. Schmithüsen, S. Decossas, J. Chevrier, F. Comin, V. Formoso, M. de Boissieu, T. Jach, T. Lograsso, C. Jenks and D. Delaney). Paper accepted in the Proceedings of the 7th International Conference on Quasicrystals, ICQ7, Stuttgart, Germany, September 20-24, 1999. Published in "Materials Science and Engineering", **294-296** (2000), pp. 863-866.
103. "Debye-Waller Factors in a Quasicrystal". (R. Colella, Y. Zhang, J.P. Sutter, S.N. Erlich and S.W. Kycia). *Phys. Rev. B*, **63**, 014202, 1-5, (2000).
104. "Multiple-beam X-ray Diffraction Near Exact Backscattering in Silicon". (J.P. Sutter, E.E. Alp, M.Y. Hu, P.L. Lee, H. Sinn, W. Sturhahn, T.S. Toellner, G. Bortel, and R. Colella). *Phys. Rev. B*, **63**, 094111, 1-12, (2001).
105. "Anomalous Transmission of X-rays in Quasicrystals". (J. Härtwig, S. Agliozzo, J. Baruchel, R. Colella, M. de Boissieu, J. Gastaldi, H. Klein, L. Mancini, and J. Wang). *J. Phys. D: Appl. Phys.* **34**, A103-A108, (2001).
106. "Resonant Scattering in Germanium". (T.L. Lee, R. Felici, K. Hirano, B. Cowie, J. Zegenhagen, and R. Colella). *Phys. Rev. B* **64**, 201316(R) (2001) (*4 pages*). Rapid Communication.
107. "Absolute Structure Factor-Measurements of an Al-Pd-Mn Quasicrystal". (Y. Zhang, R. Colella, S. Kycia, and A.I. Goldman). *Acta Cryst.* **A58**, 385-390, (2002).
108. "X-ray Diffuse Scattering in the Icosahedral Quasicrystal Al-Pd-Mn". (Y. Zhang, S.N. Ehrlich, R. Colella, M. Kopecky, and M. Widom). *Phys. Rev B* **66**, 104202, 1-7, (2002).
109. "The Effect of Isotopic Composition on the Lattice Parameter of Germanium Measured by X-ray Backscattering". (M.Y. Hu, H. Sinn, A. Alatas, W. Sturhahn, E.E. Alp, H.-C. Wille, Yu.V. Shvyd'ko, J.P. Sutter, J. Bandaru, E.E. Haller, V.I. Ozhogin, S. Rodriguez, R. Colella, E. Kartheuser, M.A. Villeret. *Phys. Rev. B* **67**, 113306, 1-4, (2003).

TALKS AT PROFESSIONAL MEETINGS, SEMINARS, ETC.: (Beginning in 1975)

1. "Observability of Gravitationally Induced Quantum Interference," University of Houston (Texas), Physics Department, February 1975, (1 hr.).
2. "Observation of Gravitationally Induced Quantum Interference by Neutron Interferometry," Euratom Joint Research Center, Ispra, Italy, June 1975, (1 hr.).
3. "X-Ray Diffraction Studies of Acoustoelectrically Amplified Phonon Beams," Max-Planck Institut, Grenoble, France, June 1975, (1 hr.).
4. "X-Ray Determination of Valence Electron Charge Density and its Temperature Dependence in Indium Antimonide," Institute Laue- Langevin, Grenoble, France, July 1975, (1 hr.).
5. "Observation of Gravitationally Induced Quantum Interference by Neutron Interferometry," Institute Laue-Langevin, Grenoble, France, July 1975, (1 hr.).
6. "Observation of Fundamental Quantum Mechanical Effects by Neutron Interferometry," Purdue University, Physics Department, October 1975, (1 hr.).
7. "Effect of Acoustoelectric Phonons on Anomalous Transmission of X-Rays," Purdue University, Physics Department, February 1976, (1 hr.).
8. "Effect of Acoustoelectric Phonons on Anomalous Transmission of X-Rays," University of Nebraska, Physics Department, Lincoln, Nebraska, April 1976, (1 hr.).
9. "Observation of Fundamental Quantum Mechanical Effects by Neutron Interferometry," University of Nebraska, Physics Department, Lincoln, Nebraska, April 1976, (1 hr.).
10. "Experimental Investigations of Bonding Charges in Diamond and Zinc-Blende Structures," Vth Sagamore Conference on Charge, Spin, and Momentum Density at Kiljava, Finland, August 1976, (1 hr.).
11. "Observation of Fundamental Quantum Mechanical Effects by Neutron Interferometry," University of Genova, Italy, Physics Institute, September 1976, (1 hr.).
12. "Experimental Investigations of Bonding Charges in Diamond and Zinc-Blende Structures," University of Genova, Italy, Physics Department, September 1976, (1 hr.).
13. "Experimental Investigations of Bonding Charges in Diamond and Zinc-Blende Structures," University of Missouri, Columbia, Missouri, Physics Department, March 1977, (1 hr.).
14. "Effect of Acoustoelectric Phonons on Anomalous Transmission of X-Rays," University of Missouri, Physics Department, Columbia, Missouri, March 1977, (1 hr.).
15. "Observation of Fundamental Quantum Mechanical Effects by Neutron Interferometry," University of Rome, Italy, Physics Institute, November 1977, (1 hr.).

16. "Experimental Investigations of Bonding Charges in Diamond and Zinc-Blende Structures," Frascati National Laboratories, Frascati, Italy, November 1977 (1 hr.).
17. "Effect of Acoustoelectric Phonons on X-Ray Diffraction," Euratom, Joint Research Center, Physics Division, Ispra, Italy, December 1977, (1 hr.).
18. "Observation of Fundamental Quantum Mechanical Effects by Neutron Interferometry," C.N.R. Solid State Laboratory, Rome, Italy, December 1977, (1 hr.).
19. "Experimental Investigations of Bonding Charges in Diamond and Zinc-Blende Structures," University of Pisa, Physics Institute, Italy, December 1977, (1 hr.).
20. "Observation of Fundamental Quantum Mechanical Effects by Neutron Interferometry," Kernforschungsanlage, Julich, West Germany, January 1978, (1 hr.).
21. "Observation of Fundamental Quantum Mechanical Effects by Neutron Interferometry," University of Liège, Physics Department, Belgium, January 1978, (1 hr.).
22. "Observation of Gravitationally Induced Quantum Interference and 2π Spin Precession by Neutron Interferometry," University of Dortmund, Physics Department, Dortmund, West Germany, April 18, 1978, (1 hr.).
23. "X-Ray Studies of Acousto-Electric Phonons," University of Dortmund, Physics Department, Dortmund, West Germany, April 19, 1978, (1 hr.).
24. "X-Ray Studies of Acousto-Electric Phonons," Max-Planck-Institut, Stuttgart, West Germany, April 21, 1978, (1 hr.).
25. "X-Ray Studies of Acousto-Electric Phonons," University of Rome, Physics Institute, Rome, Italy, April 28, 1978, (1 hr.).
26. "X-Ray Studies of Acousto-Electric Phonons," University of Messina, Physics Institute, Messina, Italy, May 2, 1978, (1 hr.).
27. "Observation of Gravitationally Induced Quantum Interference and 2π Spin Precession by Neutron Interferometry," University of Messina, Physics Institute, Messina, Italy, May 2, 1978, (1 hr.).
28. "Observation of Gravitationally Induced Quantum Interference and 2π Spin Precession by Neutron Interferometry," University of Palermo, Physics Institute, Palermo, Italy, May 3, 1978, (1 hr.).
29. "X-Ray Studies of Acousto-Electric Phonons," University of Palermo, Physics Institute, Palermo, Italy, May 4, 1978, (1 hr.).
30. "Observation of Gravitationally Induced Quantum Interference and 2π Spin Precession by Neutron Interferometry," Institut Laue-Langevin, invited paper at the 1st International Workshop on Neutron Interferometry, Grenoble, France, June 6, 1978, (1 hr.).

31. "Observation of Gravitationally Induced Quantum Interference and 2π Spin Precession by Neutron Interferometry," Laboratoire de Crystallographie, CNRS, Grenoble, France, June 9, 1978, (1 hr.).
32. "X-Ray Studies of Acousto-Electric Phonons," Laboratoire de Crystallographie, CNRS, Grenoble, France, June 16, 1978, (1 hr.).
33. "X-Ray Diffraction Studies of Valence Charge Densities in Grey Tin and Indium Antimonide," Laboratoire de Crystallographie, CNRS, Grenoble, France, June 23, 1978, (1 hr.).
34. "Observation of Gravitationally Induced Quantum Interference and 2π Spin Precession by Neutron Interferometry," McMaster University, Physics Department, Hamilton, Ontario, Canada, January 31, 1979, (1 hr.).
35. "Direct Observation of Charge Density Waves by Molecular Beam Diffraction," University of Waterloo, Chemistry Department, Waterloo, Ontario, Canada, February 1, 1979, (1 hr.).
36. "Direct Observation of Charge Density Waves by Molecular Beam Diffraction," Purdue University, Physics Department, February 2, 1979, (1 hr.).
37. "Magnetic Field Effects on Dynamical Diffraction of Neutrons by Perfect Crystals," Purdue University, Physics Department, February 5, 1979, (1 hr.).
38. "Effects of Charge Density Waves on Bragg Peak Intensities," Purdue University, Physics Department, February 8, 1980, (1 hr.).
39. "Effects of Charge Density Waves on Bragg Peak Intensities," University of Genoa, Physics Department, June 1980, (1 hr.).
40. "Effects of Charge Density Waves on Bragg Peak Intensities," University of Rome, Physics Department, June 1980, (1 hr.).
41. "Virtual Bragg Scattering: A Practical Solution to the Phase Problem," Purdue University, Physics Department, January 1981, (1 hr.).
42. "Virtual Bragg Scattering: A Practical Solution to the Phase Problem in Diffraction," Frascati National Laboratories, Frascati, Italy, June 1982, (1 hr.).
43. "X-Ray Diffraction Studies of Acousto-Electric Phonons," Frascati National Laboratories, Frascati, Italy, June 1982, (1 hr.).
44. "Valence Electron Density in Silicon and InSb Under High Pressure," Frascati National Laboratories, Frascati, Italy, June 1982, (1 hr.).
45. "Virtual Bragg Scattering: A Practical Solution of the Phase Problem in Diffraction," Institute of Structural Chemistry of the National Research Council, Monterotondo Stazione (Roma), Italy, July 1982 (1 hr.).

46. "Electron Charge Density Studies in Semiconductors and Alkali Halides," Seventh Sagamore Conference on Charge, Spin, and Momentum Densities, Nikko, Japan, August 25, 1982, (invited paper).
47. "Valence Electron Density in Silicon and InSb Under High Pressure," University of Missouri-Columbia, Physics Department, Columbia, Missouri, January 1983, (1 hr.).
48. "X-Ray Studies of Acoustoelectrically Amplified Phonons," Bell Laboratories, Murray Hill, New Jersey, February 1, 1983, (1 hr.).
49. "X-Ray Studies of Acoustoelectrically Amplified Phonons," University of Illinois, Physics Department, Urbana, Illinois, March 1983, (1 hr.).
50. "Current Status of Phase Determination in X-Ray Diffraction by Means of Multiple Bragg Scattering," Purdue University, Physics Department, April 27, 1984, (1 hr.).
51. "X-Ray Studies of Phase Excitations in Modulated Structures," University of Illinois, Physics Department, Urbana, Illinois, September 21, 1984, (1 hr.).
52. "Current Status of Phase Determination in X-Ray Diffraction by Means of Multiple Bragg Scattering," Fritz Haber Institute, Berlin, W. Germany, August 20, 1984, (1 hr.).
53. "Current Status of Phase Determination in X-Ray Diffraction by Means of Multiple Bragg Scattering". University of Illinois, Department of Materials Science and Engineering, Urbana, Illinois, October 1984. (1 hr.).
54. "X-Ray Studies of Phase Excitations in Modulated Structures," University of Rome II, Physics Department, Rome, Italy, February 20, 1985, (1 hr.).
55. "X-Ray Studies of Phase Excitations in Modulated Structures," Frascati Laboratories, Frascati, Italy, February 21, 1985, (1 hr.).
56. "Current Status of Phase Determination in X-Ray Diffraction by Means of Multiple Bragg Scattering," University of Trent, Physics Department, Trent, Italy, March 5, 1985, (1 hr.).
57. "X-Ray Studies of Phase Excitations in Modulated Structures," University of Trent, Physics Department, Trent, Italy, March 6, 1985, (1 hr.).
58. "X-Ray Studies of Phase Excitations in Modulated Structures," University of Genoa, Physics Department, Genoa, Italy, March 12, 1985, (1 hr.).
59. "Current Status of Phase Determination in X-Ray Diffraction by Means of Multiple Bragg Scattering," University of Genoa, Physics Department, Genoa, Italy, March 13, 1985, (1 hr.).
60. "Current Status of Phase Determination in X-Ray Diffraction by Means of Multiple Bragg Scattering," Scuola Normale Superiore, University of Pisa, Pisa, Italy, March 14, 1985, (1 hr.).

61. "Current Status of Phase Determination in X-Ray Diffraction by Means of Multiple Bragg Scattering," Frascati Laboratories. Workshop for use of synchrotron radiation, Frascati, Italy, May 2, 1985, (1 hr.).
62. "Current Status of Phase Determination in X-Ray Diffraction by Means of Multiple Bragg Scattering," C.N.R. Laboratory, Institute of Structural Chemistry, Monterotondo Stazione, Italy, May 9, 1985, (1 hr.).
63. "Current Status of Phase Determination in X-Ray Diffraction by Means of Multiple Bragg Scattering," University of Paris, Laboratoire de Minéralogie et Cristallographie, (Paris VI) Paris, France, May 15, 1985, (1 hr.).
64. "Current Status of Phase Determination in X-Ray Diffraction by Means of Multiple Bragg Scattering," Atominstytut der Österreichischen Universitäten, Wien, Austria, June 11, 1985, (1 hr.).
65. "X-Ray Studies of Phase Excitations in Modulated Structures," University of L'Aquila, Physics Department, L'Aquila, Italy, June 26, 1985, (1 hr.).
66. "Current Status of Phase Determination in X-Ray Diffraction by Means of Multiple Bragg Scattering," University of Parma, Physics Institute, July 1, 1985, (1 hr.).
67. "X-Ray Diffraction Studies of Surfaces," Institute of Structure of Matter (I.S.M.), Frascati, Italy, Frascati, Italy, June 3, 1985, (1 hr.).
68. "X-Ray Diffraction Studies of Surfaces," Purdue University, Physics Department (Journal Club), August 26, 1985, (1 hr.).
69. "Current Status of Phase Determination in X-Ray Diffraction by Means of Multiple Bragg Scattering," Iowa State University, Physics Department, January 23, 1986, (1 hr.).
70. "Current Status of Phase Determination in X-Ray Diffraction by Means of Multiple Bragg Scattering", LURE. Université de Paris Sud. Orsay, France, May 27, 1986, (1 hr.).
71. "X-Ray Studies of Phase Excitations in Modulated Structures", Laboratoire de Minéralogie et Cristallographie. Université Pierre et Marie Curie, Paris, France, May 26, 1986, (1 hr.).
72. "X-Ray Studies of Phase Excitations in Modulated Structures" , Laboratoire de Physique du Solide, Université de Paris Sud, Orsay, France, May 27, 1986, (1 hr.).
73. "Current Status of Phase Determination in X-Ray Diffraction by Means of Multiple Bragg Scattering", University of Rome II, Physics Department, Rome-Tor Vergata, June 16, 1986. (1 hr.).

74. "Current Status of Phase Determination in X-Ray Diffraction by Means of Multiple Bragg Scattering", Q. Shen and R. Colella. Invited paper at the Fall Meeting of the Metallurgical Society, Orlando, Florida, October 1986. Presented by R. Colella, (1/2 hr.).
75. "Multiple Diffraction of X-Rays. Solution of the Phase Problem". International Conference of Crystallography. Invited address delivered at a Memorial Symposium in honor of Paul P. Ewald, Perth, Australia, August 1987, (1/2 hr.).
76. "Multiple Diffraction of X-Rays. Solution of the Phase Problem." Purdue University, Physics Colloquium, August 27, 1987, (1 hr.).
77. "Multiple Diffraction of X-Rays. Solution of the Phase Problem." University of Illinois, Physics Department, Condensed Matter Seminar, Urbana, Illinois, September 4, 1987, (1 hr.).
78. "Solution of the Phase Problem for Crystallography at a Wavelength of 3.5 Å." Q. Shen and R. Colella, Brookhaven National Laboratory, National Synchrotron Light Source Users Meeting. Invited Oral Contribution. Presented by R. Colella. September 22, 1987, (20 min.).
79. "X-Ray Studies of Phase Excitations in Modulated Structures". University of Trent, Physics Department. Trent, Italy. June 13, 1988. (1 hr.)
80. "Multiple Diffraction of X-Rays. Solution of the Phase Problem." European Synchrotron Radiation Facility (ESRF). Grenoble. France. June 16, 1988. (1 hr.)
81. "Multiple Diffraction of X-Rays. Solution of the Phase Problem". University of Trent, Physics Department. Trent, Italy. June 20, 1988. (1 hr.)
82. "Multiple Diffraction of X-Rays. Solution of the Phase Problem". Sincrotrone Trieste Laboratories. Trieste, Italy. June 27, 1988. (1 hr.)
83. "The Phase Problem in X-Ray Diffraction. A Proposal for its Solution". Goshen College, Physics Department, (Turner Laboratory Colloquium). November 28, 1988 (1 hr.).
84. "Solution of the Phase Problem in Diffraction by Multiple Bragg Scattering". Adriatico Research Conference, Trieste, Miramare, (Italy), June 19, 1989.
85. "N-Beam Diffraction and the Phase Problem. Applications to Protein Crystallography." Gordon Conference on "X-Ray Physics", New London, N.H., August 8, 1989. (1/2 hr.).
86. "A New Tool for X-Ray Studies of Surfaces: Truncation Rod Scattering". Sincrotrone Trieste. Trieste, Italy. June 18, 1990. (1 hr.).
87. "A New Tool for X-Ray Studies of Surfaces: Truncation Rod Scattering. (IInd part). Sincrotrone Trieste. Trieste, Italy. June 20, 1990. (1 hr.).

88. "The Bragg Case of Diffraction. X-Ray Standing Waves at Crystal Surfaces". Sincrotrone Trieste. Trieste, Italy. June 22, 1990.
89. "X-Ray Standing Waves. A New Technique for Surface Analysis". Sincrotrone Trieste. Trieste, Italy. June 28, 1990.
90. "Solution of the Phase Problem Using Multiple Bragg Scattering in a Protein Crystal. A Feasibility Study". Invited paper at the XV International Congress of Crystallography. Bordeaux, France, July 25, 1990.
91. "Truncation Rod Scattering. A Diffractionist's Viewpoint". National Synchrotron Light Source. Brookhaven National Laboratory. Upton, N.Y.. September 21, 1990, (1/2 hr.)
92. "Truncation Rod Scattering. A Diffractionist's Viewpoint". Cornell High Energy Synchrotron Source. Cornell University. Ithaca, N. Y.. December 7, 1990. (1 hr.)
93. "Phase Determination of X-ray Reflections in a Quasicrystal." Sincrotrone Trieste. Trieste, Italy. September 20, 1991. (1 hr.).
94. "Truncation Rod Scattering. A Diffractionist's Point of View." University of Paris VI. Faculté de Minéralogie et Cristallographie. October 22, 1991. (1 hr.)
95. "Phase Determination of X-ray Reflections in a Quasicrystal." University of Paris-Sud. Laboratoire de Physique du Solide. Orsay, France. October 23, 1991. (1 hr.)
96. "Phase Determination of X-ray Reflections in a Quasicrystal." University of Paris VI. Faculté de Minéralogie et Cristallographie. December 17, 1991. (1 hr.).
97. "Phase Determination of X-ray Reflections in a Quasicrystal by Multiple Bragg Scattering." Université de Nancy I, Laboratoire de Minéralogie et Cristallographie, Nancy, France, January 16, 1992. (1 hr.)
98. "Phase Determination of X-ray Reflections in a Quasicrystal by Multiple Bragg Scattering." L.U.R.E. (Synchrotron Radiation Laboratory), Orsay, France, January 20, 1992. (1 hr.).
99. "Phase Determination of X-ray Reflections in a Quasicrystal by Multiple Bragg Scattering." ESRF (European Synchrotron Radiation Facility), Grenoble, France, January 30, 1992. (1 hr.).
100. "Phase Determination of X-ray Reflections in a Quasicrystal." University of Genoa, Genoa, Italy. May 26, 1992 (1 hr.).
101. "Phase Determination of X-ray Reflections in a Quasicrystal." Scuola Normale Superiore. Pisa, Italy. May 29, 1992. (1 hr.).
102. "Phase Determination of X-ray Reflections in a Quasicrystal by Multiple Bragg Scattering." 1st European Symposium on X-ray Topography and High Resolution Diffraction, Marseille, France, July 8, 1992. (30 min.).

103. "Phase Determination of X-ray Reflections in a Quasicrystal by Multiple Bragg Scattering." Purdue University, Physics Department, September 11, 1992. (1 hr.).
104. "Phase Determination of X-ray Reflections in a Quasicrystal." Brookhaven National Laboratory, National Synchrotron Light Source, October 2, 1992. (20 min.).
105. "Science and Faith. Is it Possible for a Scientist to Believe?". Conference on "Lay Spirituality for the Postmodern Era." International Schoenstatt Center, Waukesha, Wisconsin. October 23-25, 1992. (20 min.).
106. "Science and Faith. Is it Possible for a Scientist to Believe?". Goshen College, Science Department, Goshen, IN, March 1, 1993. (1 hr.).
107. "Truncation Rod Scattering; a Diffractionist's Point of View." European Synchrotron Radiation Facility. Grenoble, France, June 15, 1993. (1 hr.).
108. "Multiple Bragg Scattering in Quasicrystals. Is Al-Pd-Mn Centrosymmetric ?". Cornell High Energy Synchrotron Source (CHESS). Ithaca, N.Y., September 17, 1993. (1 hr.).
109. "Multiple Bragg Scattering in Quasicrystals. Is Al-Pd-Mn Centrosymmetric ?". Oral presentation given at the 41st Annual Midwest Solid State Conference, Columbia, MO, September 24, 1993. (15 min.).
110. "Phase Determination of X-Ray Reflections in a Quasicrystal". University of Hawaii, Honolulu. Physics Colloquium. January 26, 1995. (1 hr.).
111. "Multiple Bragg Scattering and the Phase Problem. Applications to Quasicrystals". Tokyo Institute of Technology, Research Laboratory of Engineering Materials, Tokyo (Japan), Nagatsuta Campus. March 10, 1995. (1 hr.).
112. "Multiple Bragg Scattering of X-Rays and the Phase Problem. Applications to Quasicrystals". Tohoku University, Institute for Materials Research. Sendai (Japan). March 20, 1995. (1hr.).
113. "Multiple Bragg Scattering and the Phase Problem. Applications to Quasicrystals". University of Nagoya, Department of Applied Physics, Nagoya (Japan). April 3, 1995. (1hr.).
114. "Multiple Bragg Scattering and the Phase Problem. Applications to Quasicrystals". KEK, High Energy Physics Laboratory, Photon Factory, Tsukuba (Japan). April 10, 1995. (1 hr.).
115. "Multiple Bragg Scattering and the Phase Problem. Applications to Quasicrystals". Himeji Institute of Technology. Physics Department. Himeji, (Japan). April 18, 1995. (1 hr.).
116. "Multiple Bragg Scattering in Quasicrystals. Is Al-Pd-Mn Centrosymmetric ?" Invited paper at the Meeting of the Korean Physical Society. Seoul (Korea). April 21, 1995. (30 min.).

117. "Multiple Bragg Scattering in Quasicrystals. Is Al-Pd-Mn Centrosymmetric ?" Pohang University of Science and Technology. Pohang Accelerator Laboratory. Pohang (Korea). April 24, 1995. (1 hr.).
118. "Multiple Bragg Scattering in Quasicrystals. Is Al-Pd-Mn Centrosymmetric ?" Yonsei University. Physics Department. Seoul (Korea). April 25, 1995. (1hr.).
119. "Multiple Bragg Diffraction and the Phase Problem. Applications to Quasicrystals". Scuola Normale Superiore, Physics Department, Pisa (Italy). May 16, 1995. (1 hr.).
120. "Science and Faith. Is it Possible for a Scientist to Believe ?" University of Pisa, Pisa (Italy). May 16, 1995. (1 hr.).
121. "Multiple Bragg Scattering and the Phase Problem in X-Ray Diffraction. Perfect Crystals". Lecture delivered at the International School on X-Ray and Neutron Dynamical Diffraction. Erice, Italy, April 9-21, 1996. (1 hr.).
122. "Multiple Bragg Scattering and the Phase Problem in X-Ray Diffraction. Mosaic Crystals". Lecture delivered at the International School on X-Ray and Neutron Dynamical Diffraction. Erice, Italy, April 9-21, 1996. (1 hr.).
123. "X-Ray and Neutron Interferometry. Basic Principles and Applications". Lecture delivered at the International School on X-Ray and Neutron Dynamical Diffraction. Erice, Italy, April 9-21, 1996. (1 hr.).
124. "Multiple Bragg Diffraction in Quasicrystals. Is Al-Pd-Mn Centrosymmetric ?". Invited Paper, First International Conference on Synchrotron Radiation in Materials Science, Chicago, IL, 7/29 - 8/2, 1996. (30 min.).
125. "Exploring the Reciprocal Space of a Quasicrystal by Means of an Imaging Plate". National Synchrotron Light Source, Brookhaven National Laboratory, October 25, 1996. (30 min.).
126. "The Mystery of Quasicrystals". The Dean's Freshmen Honors Seminar, Purdue University, February 10, 1997. (1 hr.).
127. "Dynamical Three-beam Diffraction in a Quasicrystal; Use of Circular Polarization". Photon Factory, Tsukuba, Japan, June 11, 1997. (1 hr.).
128. "Solving the Phase Problem Using Dynamical Three-beam Diffraction in a Quasicrystal". Invited paper at the Users Meeting of the Cornell High Energy Synchrotron Source (CHESS). Cornell University, Ithaca, New York, June 16, 1997. (30 min.).
129. "Dynamical Three-Beam Diffraction in a Quasicrystal". Invited paper presented at the summer meeting of the American Crystallographic Association, (ACA), St. Louis, Missouri, July 21, 1997 (25 min.).
130. "Multiple Bragg Scattering and the Phase Problem". Invited paper presented at Cornell University, on the occasion of Prof. B.W. Batterman's retirement as Director of CHESS (Cornell High Energy Synchrotron Source). August 26, 1997. (25 min.).

131. "Multiple Bragg Scattering and the Phase Problem. Applications to Quasicrystals". Physics Colloquium, University of Missouri, Physics Department, Columbia, Missouri. November 24, 1997. (1 hr.).
132. "Multiple Bragg Scattering and the Phase Problem. Applications to Quasicrystals". Condensed Matter Seminar, Carnegie Mellon University, Physics Department, Pittsburgh, PA, March 12, 1998. (1 hr).
133. "X-Ray Diffuse Scattering and Lattice Dynamics". Meeting of the Synchrotron Radiation Instrumentation Collaborative Access Team (SRI CAT) at Argonne National Laboratory. May 4-5, 1998. (1 hr).
134. "The Mystery of Quasicrystals", Purdue University, Calumet Campus, Science Department, September 10, 1998. (1 hr).
135. "Exploring Reciprocal Space of a Quasicrystal by Means of an Imaging Plate". European Synchrotron Radiation Facility (ESRF), Grenoble, France. November 3, 1998. (1 hr).
136. "Multiple Bragg Scattering and the Phase Problem. Applications to Quasicrystals". CNRS Laboratories, Grenoble, France. January 7, 1999. (1 hr).
137. "Multiple Bragg Scattering and the Phase Problem. Applications to Quasicrystals". Istituto di Elettronica dello Stato Solido (CNR), Rome, Italy. March 12, 1999, (1 hr.).
138. "Multiple Bragg Scattering and the Phase Problem. Applications to Quasicrystals". University of Lausanne. Physics Department. Lausanne, Switzerland, May 6, 1999, (1 hr.).
139. "Exploring Reciprocal Space of a Quasicrystal". Purdue University, Physics Department, Condensed Matter Seminar. October 22, 1999. (1 hr.).
140. "Multiple Bragg Scattering and the Phase Problem. Applications to Quasicrystals.". Max-Planck-Institut für Metallforschung. Stuttgart, Germany. May 11, 1999, (1hr.).
141. "Phase Determination of Resonant Scattering in Germanium", National Synchrotron Light Source, NSLS, Brookhaven National Laboratory, November 19, 1999 (25 min.).
142. "Les Premiers Jours de la Dynamique de Reseau" (The Early Days of Lattice Dynamics). University of Paris VI, Paris, France. October 29, 1999. Invited talk given at a symposium honoring the 75th birthday of Prof. Hubert Curien, Professor of Mineralogy and Crystallography, and former Minister of Science and Technology in France. (20 min.).
143. "Multiple Bragg Scattering and the Phase Problem. Applications to Quasicrystals and to Resonant Scattering". University of Rome "La Sapienza", Physics Department, Rome, Italy. May 29, 2000. (1 hr.).

144. "Multiple Bragg Scattering and the Phase Problem. Applications to Quasicrystals and to Resonant Scattering". Solid State Physics Laboratory, Materials Science Centre, University of Groningen, Groningen (Holland). June 19, 2000. (1 hr.).
145. "Multiple Bragg Scattering and the Phase Problem. Applications to Quasicrystals and to Resonant Scattering". Illinois Institute of Technology, Chicago, Illinois, October 26, 2000. (1 hr.).
146. "Multiple Bragg Scattering and the Phase Problem. Applications to Quasicrystals and to Resonant Scattering". Purdue University, Condensed Matter Seminar. Febr. 16, 2001. (1 hr.)
147. "Multiple Bragg Scattering and the Phase Problem. Applications to Quasicrystals and to Resonant Scattering". University of Michigan, Physics Department. Ann Arbor, Michigan. May 21, 2001. (1 hr.).
148. "Multiple Bragg Scattering and the Phase Problem. Applications to Quasicrystals and to Resonant Scattering". Invited Paper presented at the Users Meeting of CHESS, the Cornell High Energy Synchrotron Source. Cornell University. Ithaca, N.Y., June 12, 2001. (30 min.).
149. "The Effect of Isotopic Composition on the Lattice Parameter of a Crystal". Purdue University, Physics Department, Condensed Matter seminar, presented by Sergio Rodriguez and Roberto Colella. September 7, 2001. (1 hr.)
150. "The Effect of Isotopic Composition on the Lattice Parameter of a Crystal". Presented by Sergio Rodriguez and Roberto Colella at the Advanced Photon Source, Argonne National Laboratory, September 20, 2001. (1 hr.)
151. "Multiple Bragg Scattering and the Phase Problem. Applications to Quasicrystals and to Resonant Scattering". University of British Columbia, Physics Department, Vancouver, Canada, May 13, 2002. (1 hr.)
152. "Multiple Bragg Scattering and the Phase Problem. Applications to Quasicrystals and to Resonant Scattering". Purdue University, The McCoy Distinguished Lecture, November 19, 2002. (1 hr.).
153. "Multiple Bragg Scattering and the Phase Problem. Applications to Quasicrystals and to Resonant Scattering". Indiana University and Purdue University at Indianapolis (IUPUI). February 20, 2003. (1 hr.).
154. "Multiple Bragg Scattering and the Phase Problem. Applications to Quasicrystals and to Resonant Scattering". Advanced Photon Source, Argonne National Laboratory, Argonne, Illinois, March 27, 2003. (1 hr.).
155. "Multiple Bragg Scattering and the Phase Problem. Applications to Quasicrystals and to Resonant Scattering". Elettra Synchrotron Source, Trieste, Italy. June 16, 2003. (1 hr.).

156. “High Precision Measurements with X-rays”, Advanced Photon Source (APS), workshop on Exact Backscattering Beamline (EBB). Argonne National Laboratory, Argonne, IL, September 16, 2003. (20 min.)
157. “Effects of Isotopic Composition on the Lattice Parameter of a Crystal”, Journal Club, Cornell High Energy Synchrotron Source (CHESS), Ithaca N.Y., July 9, 2004. (40 min.)

Short Talks, Poster Presentations (Beginning January 1, 1975):

1. "X-Ray Determination of Valence Electron Charge Density and its Temperature Dependence in Indium Antimonide," APS Meeting, Denver, Colorado, March 1975, (10 min.). (w/D. H. Bilderback.)
2. "X-Ray Determination of Valence Electron Charge Density and its Temperature Dependence in Indium Antimonide," Tenth International Conference of Crystallography, Amsterdam, Holland, August, 1975. (poster). (w/D. H. Bilderback and presented by Bilderback).
3. "X-Ray Diffraction Studies of Acoustoelectrically Amplified Phonon Beams," APS Meeting, Denver, Colorado, March 1975, (10 min.). (w/D. LeRoux, and R. Bray; presented by LeRoux.)
4. "Design of a Neutron Interferometer for Observing Gravitationally Induced Quantum Interference," Tenth International Conference of Crystallography, Amsterdam, Holland, August 1975, (30 min.). w/A. W. Overhauser and S. A. Werner; Colella presenting.)
5. "Effect of Acoustoelectric Phonons on Anomalous Transmission of X-Rays," APS Meeting, Atlanta, Georgia, March 1976, (10 min.). w/S. D. LeRoux and R. Bray; presented by Colella.)
6. "Effect of Acoustoelectric Phonons on Anomalous Transmission of X-Rays," XIIIth International Conference on the Physics of Semiconductors, Rome, Italy, August 1976, (10 min.). (w/S. D. LeRoux and R. Bray; presented by Colella.)
7. "Comparison of X-Ray and Neutron Diffuse Scattering Intensities in Niobium," APS Meeting, San Diego, California, March 1977, 10 min.). (w/S. S. Chang; presented by Colella.)
8. "Study of Acoustoelectric Phonons by X-Ray Diffraction," 11th International Conference of Crystallography, Warsaw, Poland, August 3-12, 1978, (poster). (w/L. D. Chapman and R. Bray; presented by Colella.)
9. "Study of Acoustoelectric Phonons by X-Ray Diffraction," Midwestern Solid State Conference, Argonne, Illinois, October 7-8, 1978, (poster). (w/L. D. Chapman and L. Bray; presented by Colella.)
10. "Anomalies in the X-Ray Diffuse Scattering from Cr-Doped V_2O_3 in Proximity of the High Temperature Metal Insulator (M-I) Transition," APS Meeting, Chicago, Illinois, March 19-23, 1979, (10 min.). (w/F. Sinclair; presented by Sinclair.)
11. "Direct Observation of Charge Density Waves by Molecular Beam Diffraction," APS Meeting, Chicago, Illinois, March 19-23, 1979, (10 min.). (w/G. Boato and P. Cantini; presented by Colella.)
12. "Electrical Transport and Reflectivity of $Ti_{1+x}S_2$," APS Meeting, Chicago, Illinois, March 19-23, 1979, (10 min.). (w/E. M. Logothetis, W. J. Kaiser, C. A. Kukkonen, S. P. Faile, and J. Gambold; presented by E. M. Logothetis.)

13. "Studies of Acoustoelectrically Amplified Phonons in InSb by Anomalous Transmission of X-Rays," Paper accepted for oral presentation at the Third International Conference on Phonon Scattering in Condensed Matter, Providence, R. I., August 28-31, 1979, (10 min.). (w/L. D. Chapman and R. Bray; presented by L. D. Chapman.)
14. "Effects of Charge Density Waves on Bragg Peak Intensities," Midwestern Solid State Conference, Ames, Iowa, October 25-27, 1979, (poster presentation). (w/R. Moret.)
15. "Effects of Charge Density Waves on Bragg Peak Intensities," APS Meeting, March 1981, Phoenix, Arizona. (w/R. Moret; presented by Colella.)
16. "Electron Density in Sodium Fluoride by γ -Ray Diffractometry," APS Meeting, March 1981, Phoenix, Arizona. (w/D. R. Yoder; presented by Yoder.)
17. "Virtual Bragg Scattering: A Practical Solution to the Phase Problem." Poster presentation at the International Congress of Crystallography, Ottawa, Canada, August 1981. (w/L. D. Chapman and D. R. Yoder; presented by Colella.)
18. "Electron Density in Sodium Fluoride." Poster presentation at the International Congress of Crystallography, Ottawa, Canada, August 1981. (w/D. R. Yoder; presented by Colella.)
19. "Study of Acoustoelectric Phonons by Anomalous Transmission of X-Rays." Poster presentation at the International Congress of Crystallography, Ottawa, Canada, August 1981. (w/L. D. Chapman and R. Bray; presented by Chapman.)
20. "Valence Electron Density in Silicon and InSb Under High Pressure." American Physical Society, Dallas, Texas, March 8-12, 1982. (w/D. R. Yoder, R. Colella, and B. A. Weinstein; presented by D. R. Yoder.)
21. "Experimental Evidence for Phase Excitations in Solids by X-Ray Diffraction." APS Meeting, Detroit, Michigan, March 1984. (w/L. D. Chapman; presented by L. D. Chapman.)
22. "Charge Density Studies in LiF and KCl by γ -Ray Diffractometry." APS Meeting, Detroit, Michigan, March 1984. (w/M. C. Schmidt; presented by M. C. Schmidt.)
23. "X-Ray Evidence of Direct Generation of Non-Equilibrium Phonons in Quartz by Infrared Radiation." APS Meeting, Detroit, Michigan, March 1984. (w/L. D. Chapman, S. M. Hsieh; presented by Colella.)
24. "X-Ray Evidence of Direct Generation of non-Equilibrium Phonons in Quartz by Infrared Radiation." Poster presentation at the 13th International Congress of Crystallography, Hamburg, W. Germany, August 1984. (w/L. D. Chapman and S. M. Hsieh.)
25. "Experimental Evidence of Phase Excitations in Solids by X-Ray Diffraction." Poster presentation at the 13th International Congress of Crystallography, Hamburg, W. Germany, August 1984. (w/L. D. Chapman.)

26. "Phase Determination of Forbidden X-Ray Reflections in V_3Si by Virtual Bragg Scattering." American Physical Society, March Meeting, Baltimore, MD, 1985. (w/M. C. Schmidt).
27. "Charge Density Waves and Phase Transitions in $1T - TaS_2$," American Physical Society, March Meeting, Las Vegas, Nevada, 1986. (w/S. M. Hsieh).
28. "Anharmonicity and X-Ray Forbidden Reflections in V_3Si ," American Physical Society, March Meeting, Las Vegas, Nevada, 1986. (w/M. C. Schmidt).
29. "Dimensional Effects of Debye-Waller Factors in Layered Crystals," American Physical Society, March Meeting, Las Vegas, Nevada, 1986. (w/S. M. Hsieh).
30. "Phase Observation in an Organic Crystal (benzil) Using Long Wavelength X-Rays", Q. Shen and R. Colella, American Physical Society, New York, N.Y., (10 min.). March 1987. Presented by Q. Shen.
31. "Phason Dispersion Curves in Tantalum Disulphide by X-Ray Scattering", V. Minor and R. Colella, American Physical Society, New York, N.Y., (10 min.). March 1987. Presented by V. Minor.
32. "Phason Dispersion Curves in Tantalum Disulphide by X-Ray Scattering", V. Minor and R. Colella. Brookhaven National Laboratory. National Synchrotron Light Source Users Meeting. September 22, 1987. Poster presented by V. Minor.
33. "Time Resolved X-Ray Diffraction Study of Laser Annealing in Silicon at Grazing Incidence", J. Buschert, Q. Zhao, R. Colella, J. Z. Tischler and D. Mills, American Physical Society, S. Louis, Mo. (10 min.). March 1989. Presented by J. Buschert.
34. "Solution of the Phase Problem Using Multiple Bragg Scattering in a Protein Crystal. A Feasibility Study", R. Colella and Q. Shen, American Physical Society, S. Louis, Mo., (10 min.). March 1989. Presented by R. Colella.
35. "Solution of the Phase Problem Using Multiple Bragg Scattering in a Protein Crystal". Brookhaven National Laboratory, National Light Source Users Meeting, May 18 - 19, 1989. Poster presented by Roberto Colella.
36. "Experimental Observation of the Photostriction Effect in Silicon". Poster presented by John Buschert, graduate student, at the Gordon Conference on "X-Ray Physics", New London, N.H., August 7-11, 1989.
37. "Photostriction Effect in Silicon Observed with Time-Resolved X-Ray Diffraction". J. R. Buschert and R. Colella. American Physical Society, Anaheim, Ca. (10 min.), March 1990. Presented by J. R. Buschert.
38. "Truncation Rod Scattering. A Diffractionist's Viewpoint". R. Colella. American Physical Society, Anaheim, Ca., (10 min.), March 1990. Presented by R. Colella.

39. "Photostriction Effect in Silicon Observed with Time-Resolved X-Ray Diffraction". J. R. Buschert and R. Colella. Poster presented by R. Colella at the XV International Conference of Crystallography, Bordeaux, France, July 1990.
40. "Observation of Satellite Reflections in Potassium by High Energy Synchrotron X-Rays", by Q. Zhao, Q. Shen, S. Durbin and R. Colella. Poster presented by R. Colella and S. Durbin at the International Satellite Conference of the XV International Conference of Crystallography, "Complementary Applications of Diffraction by Neutrons and by X-Ray Synchrotron Radiation", Alpe d'Huez, Grenoble, France, July 1990.
41. "X-Ray Satellites in Potassium". Q. Zhao, S. Durbin, R. Colella (Purdue Univ.) and Q. Shen (Cornell Univ.). Presented by S. Durbin. March Meeting of the American Physical Society. Cincinnati, OH. March 22, 1991.
42. "Observation of Phase Effects in the Renninger Plot of a Quasicrystal". H. Lee, R. Colella and L. D. Chapman. Presented by H. Lee. March Meeting of the American Physical Society. Cincinnati, OH. March 22, 1991.
43. "Observation of Phase Effects in the Renninger Plot of a Quasicrystal". H. Lee, R. Colella and L. D. Chapman. International Conference on Synchrotron Radiation in Crystallography. Poster presented by R. Colella. Trieste, Italy, September 2-3, 1991.
44. "Observation of Phase Effects in the Renninger Plot of a Quasicrystal". H. Lee, R. Colella and L. D. Chapman. Colloque Français Quasicrystal. Meudon-Bellevue, April 2-3, 1992. Poster presented by R. Colella.
45. "Multiple Bragg Scattering in Quasicrystals. Is Al-Pd-Mn Centrosymmetric?" H. Lee, R. Colella and M. de Boissieu. March Meeting of the American Physical Society, March 22-26, 1993, Seattle, Washington. Paper presented by R. Colella.
46. "Effect of Monochromatic Phonon Beams on Anomalous Transmission of X-rays". F. N. Chukhovskii and R. Colella, March Meeting of the American Physical Society, March 22-26, 1993, Seattle, Washington. Paper presented by R. Colella.
47. "Feasibility of Phase Determination in Quasicrystals and Microcrystals by Means of Multiple Bragg Scattering". M. Bessière, H. Lee, T. Motsch, S. Lefèbvre, F. Dénoyer and R. Colella. Annual Meeting of the French Study Group on Quasicrystals. Grenoble, France. June 2-4, 1993. Poster presented by R. Colella.
48. "Multiple Bragg Scattering and the Phase Problem in Quasicrystals and Microcrystals". R. Colella. Annual Meeting of the French Study Group on Quasicrystals. Grenoble, France, June 2-4, 1993. Poster presented by R. Colella.
49. "Use of Circularly Polarized X-Rays for Diffraction Studies in Quasicrystals", by R. Eisenhower, R. Colella and Q. Shen. Presented by R. Eisenhower, American Physical Society, Pittsburgh, Pa., March 24, 1994.

50. "Multiple X-Ray Diffraction Studies of Decagonal Quasicrystals", by R. Eisenhower, R. Colella and B. Grushko. Presented by R. Eisenhower. American Physical Society, San Jose, California, March 23, 1995.
51. "Multiple X-Ray Diffraction Studies of Decagonal Quasicrystals", by R. Eisenhower, R. Colella and B. Grushko. Poster presentation by R. Colella. 5th International Conference on Quasicrystals, Avignon, France, May 22, 1995.
52. "Multiple X-Ray Diffraction Studies of Decagonal Quasicrystals", by R. Eisenhower, R. Colella and B. Grushko. Poster presentation by R. Eisenhower. Gordon Conference on X-Ray Physics. Plymouth, N.H., July 31 - August 4, 1995.
53. "Absolute Structure Factor Measurements of Al-Pd-Mn Quasicrystal", by Y. Zhang, R. Colella, S. Kycia and A.I. Goldman. Poster presentation by Y. Zhang. Gordon Conference on X-Ray Physics. Plymouth, N.H., July 31 - August 4, 1995.
54. "Dynamical X-Ray Diffraction in Icosahedral Al-Pd-Mn Quasicrystal", by Y. Zhang, R. Colella, S.W. Kycia and A.I. Goldman. March Meeting of the American Physical Society, St. Louis, MO, March 22, 1996.
55. "Multiple Diffraction Studies of Decagonal Quasicrystals", by R. Eisenhower, R. Colella and B. Grushko. March Meeting of the American Physical Society, St. Louis, MO, March 22, 1996.
56. "Dynamical Diffraction and X-Ray Standing Waves from 2-Fold Reflections in the Quasicrystal Al-Pd-Mn", by T. Jach, S.M. Thurgate, Y. Zhang, R. Colella, S.W. Kycia, A.I. Goldman, M. de Boissieu and M. Boudard. March Meeting of the American Physical Society, St. Louis, MO, March 22, 1996.
57. "Dynamical Diffraction and X-Ray Standing Waves from 2-Fold Reflections in the Quasicrystal Al-Pd-Mn", by T. Jach, S.M. Thurgate, Y. Zhang, R. Colella, S.W. Kycia, A.I. Goldman, M. de Boissieu and M. Boudard. Poster presentation at the XVII International Congress of Crystallography, Seattle, U.S.A., August 8-17, 1996.
58. "Dynamical X-Ray Diffraction in Icosahedral Al-Pd-Mn Quasicrystal", by R. Colella, Y. Zhang, S.W. Kycia and A.I. Goldman. Paper chosen for oral presentation at the XVII International Congress of Crystallography, Seattle, U.S.A., August 8-17, 1996.
59. "The Issue of Centrosymmetry in Al-Pd-Mn Quasicrystal. Use of Multibeam Dynamical Diffraction", by R. Colella, Y. Zhang, Q. Shen and S.W. Kycia. March Meeting of the American Physical Society, Kansas City, MO, March 18, 1997.
60. "The Issue of Centrosymmetry in Al-Pd-Mn Quasicrystal. Use of Multibeam Dynamical Diffraction", by Q. Shen, S.W. Kycia, Y. Zhang and R. Colella. Poster presentation at the VI International Conference on Quasicrystals, Tokyo, Japan, 26-30 May, 1997.
61. "Dynamical Diffraction and X-Ray Standing Waves from 2-Fold Reflections in the Quasicrystal Al-Pd-Mn", by T. Jach, Y. Zhang, R. Colella, S. Kycia, A.I. Goldman,

- M. de Boissieu and M. Boudard. Poster presentation at the VI International Conference on Quasicrystals, Tokyo, Japan, 26-30 May, 1997.
62. "Dynamical Three-Beam Diffraction in a Quasicrystal", by Q. Shen, S.W. Kycia, Y. Zhang and R. Colella. Poster presented at the Vth Gordon Conference on X-Ray Physics, Plymouth, New Hampshire, August 3-8, 1997.
 63. "Debye-Waller Factors in a Quasicrystal". Paper presented at the annual meeting of the X-Ray Physics Group, Advanced Photon Source, Argonne National Laboratory, Argonne IL, December 1, 1997 (25 min.).
 64. "Debye-Waller Factors in a Quasicrystal", by R. Colella, Y. Zhang, J.P. Sutter, S.N. Ehrlich. March Meeting of the American Physical Society, Los Angeles, CA, March 18, 1998.
 65. "X-Ray Standing Wave Investigations of Centrosymmetry in the Quasicrystal Al-Pd-Mn", by T. Jach, Y. Zhang, R. Colella, M. de Boissieu, M. Boudard, A.I. Goldman, T.A. Lograsso, D.W. Delaney. March Meeting of the American Physical Society, Los Angeles, CA, March 18, 1998.
 66. "Many-beam X-ray Diffraction from Silicon at Exact Backscattering", by J.P. Sutter, E.E. Alp, G. Bortel, M.Y. Hu, P. Lee, W. Sturhahn, T.S. Toellner, R. Colella and H. Sinn. Poster presented by J. P. Sutter, graduate student from Purdue, at the VIth Gordon Conference on X-ray Physics, Plymouth, New Hampshire, July 25-30, 1999.
 67. "Phase Determination of Resonant Scattering in Germanium", by R. Felici, ESRF, Grenoble and by R. Colella. Poster presented at the VIth Gordon Conference on X-ray Physics, Plymouth, New Hampshire, July 25-30, 1999.
 68. "Debye-Waller Factors in a Quasicrystal", by R. Colella, Y. Zhang, J.P. Sutter, S.N. Ehrlich, S.W. Kycia. Poster presented at the VIth Gordon Conference on X-ray Physics, Plymouth, New Hampshire, July 25-30, 1999.
 69. "Debye-Waller Factors in a Quasicrystal", by R. Colella, Y. Zhang, J.P. Sutter, S.N. Ehrlich, S.W. Kycia. Poster presented at the XVIIIth International Conference on Crystallography, Glasgow, United Kingdom, August 4-13, 1999.
 70. "Many-beam X-ray Diffraction from Silicon at Exact Backscattering", by J.P. Sutter, E.E. Alp, G. Bortel, M.Y. Hu, P. Lee, W. Sturhahn, T.S. Toellner, R. Colella, H. Sinn. Poster presented by J.P. Sutter, graduate student from Purdue, at the XVIIIth International Conference on Crystallography, Glasgow, United Kingdom, August 4-13, 1999.
 71. "Are Quasicrystalline Grains Grown up to Now Really "Highly Perfect" ? S. Agliozzo, J. Baruchel, R. Colella, M. de Boissieu, J. Gastaldi, J. Härtwig, H. Klein and L. Mancini. Poster to be presented by J. Härtwig to the joint French-German Colloquium on Quasicrystals to be held in Jülich (Germany), 5 - 7 April 2000.

72. "Phase Determination of Resonant Scattering in Germanium", by R. Felici and R. Colella, ESRF, Grenoble. Paper presented by R. Colella at the March Meeting of the American Physical Society, Minneapolis, MN, March 22, 2000.
73. "Anomalous Transmission in Quasicrystals", by J. Härtwig, S. Agliozzo, J. Baruchel, R. Colella, M. de Boissieu, J. Gastaldi, H. Klein, L. Mancini and J. Wang. Poster presented at the Biennial Conference on High Resolution X-Ray Diffraction and Topography XTOP-2000, 13-15 September, 2000; Ustron - Jaszowiec, POLAND.
74. "Resonant Scattering in Germanium", by T.L. Lee, R. Felici, B. Cowie, R. Colella, J. Zegenhagen, (ESRF, Grenoble), and K. Hirano (Photon Factory, Tsukuba). Paper presented by R. Colella at the March Meeting of the American Physical Society, Seattle, WA, March 12-16, 2001.
75. "Lattice Constant Measurements by X-ray Back-Scattering", by M.Y. Hu, H. Sinn, A. Alatas, E.E. Alp, W. Sturhahn, R. Colella, H.C. Wille, Y. Shvyd'ko. Poster presented by M.Y. Hu at the 7th Gordon Conference on X-Ray Physics, New London, Connecticut, July 22-27, 2001.
76. "The Effect of Isotopic Composition on the Lattice Parameter of Germanium" by M.Y. Hu, H. Sinn, A. Alatas, E.E. Alp, W. Sturhahn, H.C. Wille, Y. Shvyd'ko, J.P. Sutter, J. Bandaru, E.E. Haller, V.I. Ozhogin, S. Rodriguez, R. Colella, E. Kartheuser, M.A. Villeret. Paper presented by R. Colella at the March Meeting of the American Physical Society, Indianapolis, IN, March 18-22, 2002.
77. "The Effect of Isotopic Composition on the Lattice Parameter of Germanium" by M.Y. Hu, H. Sinn, A. Alatas, E.E. Alp, W. Sturhahn, H.C. Wille, Y. Shvyd'ko, J.P. Sutter, J. Bandaru, E.E. Haller, V.I. Ozhogin, S. Rodriguez, R. Colella, E. Kartheuser, M.A. Villeret. Oral presentation by R. Colella at the 50th Midwest Solid State Conference, University of Illinois at Urbana-Champaign, Urbana, Illinois, October 18-20, 2002.
78. "Anomalous Isotopic Dependence of Thermal Expansion Coefficient of Ge Determined by X-ray Metrology" by E.E. Alp, H. Sinn, A. Said, H. Yavas, A. Alatas, and J. Zhao, Argonne National Laboratory; R. Colella and B. Reinhart, Purdue University. Poster presentation by R. Colella at the 51st Midwest Solid State Conference, Purdue University, West Lafayette, Indiana, October 30-31, 2004.

FORMER GRADUATE STUDENTS:

- D. H. Bilderback, "X-Ray Determination of the Valence Charged Density of Grey Tin, Indium Antimonide, and Gallium Arsenide," Ph.D. degree, August 1975. Cornell University, High Intensity Synchrotron Source.
- S. D. LeRoux, "X-Ray Studies of Acoustoelectrically Amplified Phonons," Ph.D. degree, December 1975. Atomic Energy Commission in South Africa.
- D. R. Yoder, "Valence Electron Density in Silicon and InSb Under High Pressure," Ph.D. degree, January 1982. Michigan Technological University, Physics Department, Houghton, MI.
- L. D. Chapman, "X-Ray Diffraction Studies of Acoustoelectrically Amplified Phonons," Ph.D. degree, June 1981, National Synchrotron Light Source - Brookhaven National Laboratory.
- D.D.S. Kaufman, "X-ray Measurements of Lattice Parameter Changes in Electron Irradiated Silicon. Ph.D. degree, August 1984. (In absentia).
- S. M. Hsieh, "X-Ray Diffraction Studies of Layered Crystal Structures: Graphite and 1T-TaS₂." Ph.D. degree, December 1985. Texas Instruments, Dallas, TX.
- M. C. Schmidt, "X-Ray Scattering from Forbidden Reflections in Vanadium Silicide". Ph.D. Degree. December 1986. Amoco Research Center. Naperville, Illinois.
- Q. Shen, "Solution of the Phase Problem Using Multi-Beam X-Ray Diffraction". Ph.D. Degree. August 1987. Cornell University, Cornell High Energy Synchrotron Source, Ithaca, New York.
- J. R. Buschert, "Time Resolved X-Ray Diffraction Studies of Laser Annealing and Photostriction in Silicon". Ph. D. degree. December 1989. Goshen College, Physics Department, Goshen Indiana.
- Q. Zhao, Transferred to Electrical Engineering, Purdue University, 1990.
- Hyunsook Lee, "Phase Determination by Multiple Bragg Scattering of X-Rays in an Icosahedral Quasicrystal". Ph.D. degree, May 1993. Postdoctoral Research Associate, University of California at San Diego.
- Rachel Eisenhower, "Multiple Bragg Scattering in Decagonal Quasicrystals". Ph. D. degree, May 1996. Postdoctoral Research Associate at the National Synchrotron Light Source, Brookhaven National Laboratory.
- Yi Zhang, "X-Ray Diffraction Studies of Al-Pd-Mn Quasicrystal. Structural and Thermal Properties". Ph.D. degree, December 1997. Staff Scientist at Qualcomm Inc., San Diego, California.

John Sutter, “Applications of Special X-ray Diffraction Cases in Silicon Crystals”. Ph.D. Degree, May 2000. Performed “in absentia” at the Advanced Photon Source of Argonne National Laboratory. Postdoctoral Research Associate at HASYLAB (the German Synchrotron Radiation Source), Hamburg, Germany.

PAST RESEARCH ASSOCIATES:

Spencer Chang, September 1, 1974 - June 30, 1976.

Frank Sinclair, September 1, 1976 - June 30, 1978.

Roger Moret, January 1, 1978 - June 30, 1980.

Vladislav Minor, October 23, 1985 - July 31, 1988.

Keiichi Hirano, from the Photon Factory (Tsukuba), Sept. 1, 1999 – Aug. 31, 2000.

SUMMARY OF RESEARCH:

My general field of interest is in the area of diffraction physics, mostly by x-rays. The present description covers the last four or five years of research, and the work in progress.

The Phase Problem in Diffraction

Over the last few years a research project has been pursued in my laboratory for perfecting a method suitable for phase determination of x-ray reflections by making use of multiple Bragg scattering. It has been shown, in a sequence of progressive stages, that the method can be successfully applied to perfect and mosaic crystals, and, more recently, to organic crystals. Use of synchrotron x-rays (Brookhaven, Stanford) has been a key ingredient for success of this work. This work has attracted some attention. One conclusive short paper has recently appeared in *Nature* (**329**, 232 (1987)) with an editorial comment (p. 201 on the same issue). An article in reference to this work has also appeared in *Scientific American* ("The Science and the Citizen", January 1988, p. 10). The feasibility of applying this method for phasing Bragg reflections in protein crystals has been investigated. At the present time the method is being applied to quasicrystals.

Quasi-Crystals

New high quality single quasi-crystals are now available, in the family of the Al Cu Fe and Al Pd Mn alloys, and can be used for quantitative studies of quasi-crystallography. A new project has been started aimed at a quantitative understanding of the diffraction spots. Recent experiments using synchrotron x-rays, at the National Synchrotron Light Source of Brookhaven National Laboratory, have shown evidence of multiple diffraction effects in quasi-crystals, which may help in determining atomic locations within unit cells through phase information. The present results are in support of a non-centrosymmetric atomic arrangement.

Work is in progress in the following areas:

- Debye-Waller factors in Al Pd Mn, temperature dependence, non-Debye behavior at low temperature
- diffuse scattering studies near Bragg reflections, anisotropy and phason fluctuations.

Resonant Scattering in Germanium and other Crystals

Some x-ray reflections that are forbidden by the symmetry of the lattice become observable when the x-ray energy is tuned to one of the resonances of the germanium atom. The space-group of the crystal is then modified by the x-ray beam in resonant conditions.

Work is in progress to study this effect along the following directions:

- a) apply multiple beam diffraction to determine the phases of the scattered beams
- b) to characterize the energy dependence of the cross section for resonant scattering
- c) to study the polarization and the temperature dependence of the scattered beam
- d) to solve phase problems in manganates

Isotope Effect in Germanium

The lattice constant of Ge is slightly dependent on the nuclear mass. This phenomenon is due to the effect of nuclear mass on the zero point energy of the crystal. We are in the process of measuring the lattice constants, at various temperatures, of several highly enriched isotopes. The variations in lattice constants are quite small, and non-conventional techniques are being used. The experiments are all performed at synchrotron installations. This research is done in collaboration with Prof. S. Rodriguez for the theoretical part.