

# Dr Raymond Osborn

Materials Science Division,  
Argonne National Laboratory  
Argonne, IL 60439-4845

**Address:** 5928 Northgate Court, Woodridge, IL 60517

**Date of Birth:** October 10, 1957      **Nationality :** USA

**Marital Status:** Married, 3 children

**Education:** 1976–1979  
Imperial College of Science and Technology,  
University of London, London, United Kingdom

1979–1982  
University of Southampton, Southampton, United Kingdom  
(with scholarship from the Institut Laue Langevin, Grenoble, France)

**Qualifications:** B.Sc (1<sup>st</sup> Class Honors), A. R. C. S., Physics (Imperial College)  
Ph.D (Department of Physics, Southampton)

**Employment:** Research Associate, 1982–1985  
Clarendon Laboratory  
University of Oxford  
Oxford, OX1 3PU  
United Kingdom

Higher Scientific Officer, 1985–1989  
Senior Scientific Officer, 1989–1991  
Principal Scientific Officer, 1991–1992  
ISIS Pulsed Neutron and Muon Facility  
Rutherford Appleton Laboratory  
Chilton, Oxon, OX11 0QX  
United Kingdom

Physicist, 1992–2006  
Group Leader, Neutron & X-ray Scattering Group, 2006–2011

Senior Scientist, 2012-present  
Materials Science Division  
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**Honors**

- Fellow of the American Physical Society
- Fellow of the Neutron Scattering Society of America
- University of Chicago Distinguished Performance Award (2006)

**Professional Service:**

- Chair, “1<sup>st</sup> Workshop on Software Development at Neutron Scattering Sources (SoftNeSS’94)”, Argonne National Laboratory, October 6–7, 1994
- Chair, “3<sup>rd</sup> Workshop on Software Development at Neutron Scattering Sources (SoftNeSS’96)”, Argonne National Laboratory, October 14–18, 1996
- Member, ISIS Scheduling Panel for Inelastic Neutrons, Rutherford Appleton Laboratory, UK, 1996–2000
- Member, IPNS Program Advisory Committee, Argonne National Laboratory, IL, 1996-1999
- Member, Program Committee, 8th Joint MMM/Intermag Conference, San Antonio, TX, January 7-11, 2001.
- Scientific Director, National School of Neutron and X-ray Scattering, 2001–2007 (An annual DOE-funded summer school for 60 US graduate students at Argonne)
- Chair, Publication Committee, International Conference on Strongly Correlated Electron Systems (SCES’2001), Ann Arbor, MI, August 6–10, 2001.
- Chair, NeXus International Advisory Committee, 2003–2006 (Overseeing development of a data format standard for neutrons and x-rays with representatives of thirteen international large-scale facilities).
- Member, International Advisory Board, International Conference on Strongly Correlated Electron Systems (SCES’2005), Vienna, July 25–30, 2005.
- Member, Publication Committee, International Conference on Neutron Scattering (ICNS’2005), Sydney, November 27–December 2, 2005.
- Member, Executive Committee, ARCS Instrument Development Team, Spallation Neutron Source, Oak Ridge National Laboratory, Oak Ridge, TN, 2005–present
- Organizer, Workshop on “Competing Interactions and Colossal Responses in Transition Metal Compounds,” Telluride, CO, July 16–22, 2006
- Member, International Advisory Committee, International Collaboration on Advanced Neutron Sources (ICANS-XIX), Grindelwald, Switzerland, March 8–12, 2010
- Member, International Advisory Committee, International Conference on Strongly Correlated Electron Systems (SCES’2010), Santa Fé, NM, June 27–July 2, 2010

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- Member, International Advisory Committee, Workshop on “New Opportunities for Better User Group Software” (NOBUGS), Gatlinburg, TN, October 10-13, 2010
- Member, ISIS Facility Access Panel for Muons, Rutherford Appleton Laboratory, UK, June 2008–June 2011
- Member, International Advisory Committee, International Collaboration on Advanced Neutron Sources (ICANS-XX), Bariloche, Argentina  
March 4–9, 2012
- Member, ORNL Neutron Science Review Committee, Oak Ridge National Laboratory, TN, April 2013–Present

## Invited Talks

- 1) “High Resolution Neutron Scattering Investigation of the Crystal Field Splittings in  $\text{UO}_2$ ”  
Workshop on Fundamental Properties of  $\text{UO}_2$  and Actinide Oxides,  
Proceedings of the Polar Solids Discussion Group, Royal Society of Chemistry  
March 24, 1986, Oxford, UK
- 2) “Inelastic Magnetic Scattering on HET”  
Workshop on Scientific Opportunities using the Pulsed Neutron Facility ISIS  
June 29–July 3, 1987, Turin, Italy
- 3) “High Energy Magnetic Inelastic Scattering at ISIS”  
Workshop on X-Ray and Neutron Scattering from Magnetic Materials  
November 6–7, 1987, Argonne, IL
- 4) “High Energy Magnetic Neutron Scattering in Heavy Fermion Compounds”  
International Conference on the Physics of Highly Correlated Electron Systems  
September 11–15, 1989, Santa Fé, NM
- 5) “Neutron Scattering Studies of Intermultiplet Transitions in Rare Earths and Actinides”  
VI International School of Neutron Physics  
October 8–18, 1990, Alushta, USSR
- 6) “Influence of the Superconducting Energy Gap on the Linewidths of Crystal Field Transitions in High- $T_c$  Superconductors”  
International Conference on Neutron Scattering  
August 27–30, 1991, Oxford, UK
- 7) “Crystal Fields as a Probe of Rare-Earth Intermetallic Compounds”  
Magnetic Materials—Structures and Excitations Symposium  
IOP Condensed Matter and Materials Physics Conference  
December 17–19, 1991, Birmingham, UK
- 8) “Crystal Fields as a Local Probe of the Atomic and Electronic Structure of Ceramic Superconductors”  
November 23, 1993, A.T.&T. Bell Laboratories, New Jersey
- 9) “Rare Earth Crystal Fields as a Probe of the Atomic and Electronic Structure of High  $T_c$  Materials”  
Materials Science Division Colloquium,  
Dec 8, 1993, Argonne National Laboratory, IL

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- 10) “Marginal Fermi Liquid Scaling in  $UCu_{5-x}Pd_x$ ”  
James Franck Laboratory Seminar  
May 6, 1994, University of Chicago
- 11) “Non-Fermi Liquid Scaling of the Magnetic Response of  $UCu_{5-x}Pd_x$ ”  
Institut Laue-Langevin Seminar, France,  
Dec 12, 1994, Grenoble, France
- 12) “Non-Fermi Liquid Scaling of the Magnetic Response of  $UCu_{5-x}Pd_x$ ”  
Quantum Impurity Problems Workshop  
February 24–26, 1995, University of Florida, Gainesville, FL
- 13) “NeXus – A common data format for neutron and X-ray data”  
Joint ILL–ESRF Workshop on “New Opportunities for Better User Group  
Software”  
January 10–12, 1996, Grenoble, France
- 14) “Non-Fermi Liquid Effects in f-Electron Materials”  
1996 March Meeting of the American Physical Society  
March 18–22, 1996, St. Louis, MO
- 15) “Magnetic Inelastic Neutron Scattering – Present Results and Future Trends”  
International Workshop on Science in Neutron-arena of JHP  
March 26–27, 1996, Tsukuba, Japan
- 16) “Quantum Critical Scattering in Uranium Compounds”  
Neutron Scattering Satellite Meeting of the XVII International Union of  
Crystallography Congress  
August 5–7, 1996, National Institute of Standards and Technology, MD
- 17) “Magnetic correlations above  $T_C$  in layered manganites”  
Workshop on Magnetoresistive Oxides  
July 13–18, 1998, Telluride, CO
- 18) “Heavy Fermion and Non-Fermi Liquid Physics”  
1998 Annual Meeting of the Los Alamos Neutron Science Center User Group  
August 10–12, 1998, Los Alamos National Laboratory, NM
- 19) “The Link Between Magnetic and Charge Correlations in Naturally Layered  
Manganites”  
1999 JRCAT Workshop on Complex Phenomena of Correlated Electrons in Oxides  
May 26–29, 1999, Hawaii

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- 20) “The role of Magnetic and Charge Correlations in the CMR of Naturally Layered Manganites”  
Workshop on the Science and Technology of Magnetic Oxides’99  
La Jolla International School of Physics  
July 5–7, 1999, La Jolla, CA
- 21) “Time-of-Flight Inelastic Neutron Scattering”  
National School for Neutron and X-ray Scattering  
August 16–27, 1999, Argonne National Laboratory, IL
- 22) “Spiral Magnetic Correlations in CMR Layered Manganites”  
CMR Manganites and Related Transition Metal Oxides  
July 16–22, 2000, Telluride, CO
- 23) “Phonons and Superconductivity in  $MgB_2$ ”  
2002 March Meeting of the American Physical Society  
March 18–22, 2002, Indianapolis, IN
- 24) “Probing the Polaronic State of Layered CMR Manganites”  
Basic Energy Sciences Synchrotron Radiation Center Third Users Meeting  
May 3, 2002, Argonne, IL
- 25) “Nanoscale Frustration: Competing Charge, Orbital, and Magnetic Order in Layered CMR Manganites”  
2002 Annual Meeting of the American Crystallographic Association  
May 25–30, 2002, San Antonio, TX
- 26) “Competing Charge, Orbital, and Magnetic Order in Layered CMR Manganites”  
Second ORNL Nanophase Materials Sciences Workshop: Symposium on Nanoscience and Neutron Scattering  
June 23–25, 2002, Knoxville, TN
- 27) “Competing Charge, Orbital, and Magnetic Order in Layered CMR Manganites”  
American Conference on Neutron Scattering  
June 23–27, 2002, Knoxville, TN
- 28) “Orbital Correlations in Transition Metal Oxides”  
Novel Quantum Phenomena in Transition Metal Oxides  
August 29–31, 2002, Sendai, Japan
- 29) “Quantum Critical Scaling in  $UCu_{5-x}Pd_x$ ”  
Workshop on Non-Fermi Liquid Behavior and Quantum Phase Transitions  
Leiden University, Leiden, the Netherlands, May 12–23, 2003.

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- 30) “Polarized Neutron Studies of Quantum Critical Scaling”  
Workshop on Polarised Neutrons and Synchrotron X-rays for Magnetism  
Venice, Italy, August 4–6, 2003
- 31) “Inelastic Magnetic Scattering”  
LANSCE Neutron Scattering Winter School on Magnetism  
Los Alamos, NM, January 9–16, 2004
- 32) “Neutron Scattering Data Analysis: A US Perspective”  
Workshop on Data Visualisation, Reduction and Analysis at Australia’s  
Replacement Research Reactor  
Lucas Heights, Australia, March 30–31, 2004
- 33) “Prospects for Single Crystal Diffuse Scattering with Elastic Discrimination”  
American Conference on Neutron Scattering  
College Park, MD, June 6–10, 2004
- 34) “Orbital Correlations in a Layered Ruthenate”  
Workshop on Colossal Magnetoresistive and Related Transition Metal Oxides,  
Telluride, CO, June 28–July 5, 2004
- 35) “Spin and Lattice Correlations in Bilayer Manganites”  
Workshop on Colossal Magnetoresistive and Related Transition Metal Oxides  
Telluride, CO, June 28–July 5, 2004
- 36) “Spin Correlations and the Orbital Phase Transition in  $\text{La}_4\text{Ru}_2\text{O}_{10}$ ”  
IOP Theoretical Magnetism Workshop  
Abingdon, UK, July 22–23, 2004
- 37) “High Energy X-ray Diffuse Scattering”<sup>[SEP]</sup>  
Workshop on Science with High-Energy X-rays<sup>[SEP]</sup>  
Argonne, IL, August 9–10, 2004
- 38) “The Coupling of Spin and Orbital Degrees of Freedom in a Layered Ruthenate: An  
Inelastic Neutron Scattering Study”  
2004 MRS Fall Meeting  
Boston, MA, November 29–December 3, 2004
- 39) “Corelli: Single Crystal Diffraction with Elastic Discrimination”  
International Conference on Neutron Scattering  
Sydney, Australia, November 27–December 2, 2005
- 40) “The Origin of Polaron Correlations in Bilayer Manganites”  
IOP Meeting on Theoretical and Experimental Magnetism  
Abingdon, UK, August 3–4, 2006

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- 41) “Neutron Scattering as a Probe of Complex Disorder”  
Nuclear Science and Engineering Colloquium  
University of California, Berkeley, CA, November 19, 2007
- 42) “Spin glass order induced by dynamic frustration in PrAu<sub>2</sub>Si<sub>2</sub>”  
IOP Meeting on Theoretical and Experimental Magnetism  
Abingdon, UK, August 12, 2008
- 43) “Resonant Spin Excitations in Iron Arsenide Superconductors”  
International Workshop on Iron Related high-T<sub>c</sub> Superconductors (IRiSes2009)  
Tokyo, Japan, January 25, 2009
- 44) “Corelli: Single Crystal Diffraction with Elastic Discrimination”  
J-PARC Seminar  
Tokai, Japan, January 26, 2009
- 45) “Unconventional Superconductivity in Iron Arsenides”  
Illinois Institute of Technology Symposium  
Chicago, IL, March 5, 2009
- 46) “Resonant Spin Excitations in Ba<sub>0.6</sub>K<sub>0.4</sub>Fe<sub>2</sub>As<sub>2</sub>”  
IOP Meeting on Theoretical and Experimental Magnetism  
Abingdon, UK, July 2-3, 2009
- 47) “Resonant Spin Excitations in Iron Arsenide Superconductors”  
Workshop on Competing Interactions and Colossal Responses in Transition Metal  
Compounds  
Telluride, CO, August 10-14, 2009
- 48) “Dynamic Frustration in PrAu<sub>2</sub>Si<sub>2</sub>”  
Brockhouse Institute Colloquium, McMaster University  
Hamilton, Ontario, Canada, November 16, 2010
- 49) “Dynamic Frustration in PrAu<sub>2</sub>Si<sub>2</sub>”  
Quantum Matters Seminar, University of Waterloo  
Waterloo, Ontario, Canada, November 17, 2010
- 50) “Resonant Spin Excitations in Iron Arsenide Superconductors”  
Max Planck Institute for the Physics of Complex Systems  
Dresden, Germany, February 25, 2010
- 51) “A Python-based approach to interactive x-ray and neutron data analysis”  
NSLS-II workshop on Scientific Computing at Modern Synchrotron Facilities  
Brookhaven National Laboratory, NY, April 20–21, 2010



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- 52) “The Doping Dependence of Resonant Spin Excitations in  $\text{Ba}_{1-x}\text{K}_x\text{Fe}_2\text{As}_2$ ”  
Workshop on Emergent Quantum States in Complex Correlated Matter  
Dresden, Germany, August 23 - 27, 2010
- 53) “Unconventional Superconductivity Cast in Iron”  
Physics Department Colloquium, Temple University  
Philadelphia, April 18, 2011
- 54) “Unconventional Superconductivity Cast in Iron”  
25th Anniversary Symposium of EPL  
Munich, Germany, May 2-4, 2011
- 55) “Fermi Surface Nesting in Arsenides and Chalcogenides”  
IOP Meeting on Theoretical and Experimental Magnetism  
Abingdon, UK, June 16-17, 2011
- 56) “The role of Fermi surface nesting in the iron-based superconductors”  
Workshop on Competing Interactions and Colossal Responses in Transition Metal  
Compounds  
Telluride, CO, July 18-22, 2011
- 57) “The Effect of Fermi Surface Nesting on Resonant Spin Excitations in  $\text{Ba}_{1-x}\text{K}_x\text{Fe}_2\text{As}_2$ ”  
13th International Workshop on Vortex Matter in Superconductors  
Chicago, July 31-August 5, 2011
- 58) “Unconventional Superconductivity Cast in Iron”  
Physics Department Colloquium, University of Central Florida  
Orlando, FL, September 23, 2011
- 59) “Fermi surface nesting in iron-based superconductors”  
Condensed Matter and Materials Physics (CMMP11)  
Manchester, UK, December 13-15, 2011
- 60) “Neutrons as a Probe of Electronic Structure”  
ESS Symposium on Spin Dynamics  
Abingdon, UK, February 23-24, 2012
- 61) “Resonant Spin Excitations in Hole-Doped  $\text{BaFe}_2\text{As}_2$ ”  
Beijing Institute of Physics, Chinese Academy of Sciences  
Beijing, China, June 5, 2012
- 62) “Diffuse Neutron Scattering as a Probe of Mesoscopic Structure”  
BIT's 1st Annual World Congress of Advanced Materials-2012 (WCAM 2012)  
Beijing, China, June 6-8, 2012

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- 63) “Progress in Measuring  $S(Q,\omega)$  in 4 Dimensions Using the Sweep Mode”  
American Conference on Neutron Scattering (ACNS 2012)  
Washington, DC, June 24-28, 2012
- 64) “Unconventional superconductivity in hole-doped  $\text{BaFe}_2\text{As}_2$  from inelastic neutron scattering”  
Materials and Mechanisms of Superconductivity Conference (M<sup>2</sup>S 2012)  
Washington, DC, July 29-August 3, 2012
- 65) “Software Institute Concepts”  
Workshop on Scientific Workflows for Scattering Science  
California Institute of Technology, Pasadena, CA, January 31–February 2, 2013
- 66) “Neutron Scattering as a Probe of Fermi Surface Nesting in Iron-Based Superconductors”  
2013 March Meeting of the American Physical Society  
Baltimore, MD, March 18–22, 2013,
- 67) “Single-crystal Diffuse Scattering Using High-energy X-rays”  
Symposium on High-energy X-rays on Single Crystals: A Unique Capability at the APS  
APS/CNM Users Meeting 2013  
Argonne, IL, May 8, 2013
- 68) “Novel Magnetic States Close to the Quantum Phase Transition in Iron Pnictides”  
Workshop on Quantum Criticality in Correlated Materials and Model Systems  
Natal, Brazil, July 21–31, 2014
- 69) “A New Magnetic Phase in Hole-Doped  $\text{BaFe}_2\text{As}_2$ : Implications for the Origin of Nematicity”  
2015 March Meeting of the American Physical Society  
San Antonio, TX, March 2–6, 2015
- 70) “Single-crystal Diffuse Scattering: Big Data Beyond the Workflow”  
Workshop on Experimental and Computational Challenges of *in situ* Multimodal Imaging of Energy Materials  
APS/CNM Users Meeting 2015  
Argonne, IL, May 13, 2015
- 71) “Diffuse Neutron Scattering” and “Time-of-Flight Spectrometers”  
XIII School of Neutron Scattering (SoNS) “Francesco Paolo Ricci”  
Erice, Italy, July 28-August 4, 2015
- 72) “A Reentrant  $C_4$  Phase in Hole-Doped  $\text{BaFe}_2\text{As}_2$ ”  
11th International Conference on Materials & Mechanisms of Superconductivity  
Geneva, Switzerland, August 23-28, 2015

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- 73) “Advances in Single Crystal Diffuse Scattering”  
2015 Taiwan NSRRC Users' Meeting and Workshops  
Hsinchu, Taiwan, September 9-10, 2015
- 74) “Evidence for Itinerant Magnetism in the  $C_4$  Phase of Hole-Doped Iron Arsenides”  
International Conference on Spectroscopies in Novel Superconductors  
Stuttgart, Germany, June 19-24, 2016
- 75) “Future Opportunities for Single Crystal Diffuse Scattering”  
Workshop on Defects, Distortions, and Dynamics in complex materials  
Cornell University, Ithaca, NY, June 27-28, 2016
- 76) “Probing Nanoscale Disorder in Functional Materials”  
Materials Science and Data Technology Nexus Meeting,  
Santa Fé, NM, September 21, 2016
- 77) “Imaging Nanoscale Disorder in Reciprocal Space”  
APS Colloquium  
Argonne, IL, January 11, 2017
- 78) “Unconventional Superconductivity Cast in Iron”  
Instituto de Ciencia de Materiales de Madrid  
Madrid, Spain, March 30, 2017
- 79) “Cloud Servers for Photon and Neutron Data”  
RDA-PanSig Workshop on Data Interoperability  
Alba Synchrotron, Barcelona, Spain, April 3-4, 2017
- 80) “3D Fourier Methods on *Corelli*”  
Workshop on Advanced Fourier Methods: Dynamic PDF and Beyond  
Oak Ridge, TN, May 5, 2017
- 81) “Imaging Nanoscale Disorder in Reciprocal Space”  
Diamond/ISIS Colloquium Series on Strongly Correlated Electron Systems  
Rutherford Appleton Laboratory, UK, June 30, 2017
- 82) “Imaging Nanoscale Disorder in Reciprocal Space”  
University of Warwick, UK, July 3, 2017
- 83) “Diffuse Scattering”  
National School of Neutron and X-ray Scattering  
Oak Ridge National Laboratory, TN, August 18, 2017
- 84) “Fingerprints of Itinerant Magnetism in the Iron Arsenides”  
IOP Meeting on Theoretical and Experimental Magnetism  
Abingdon, UK, July 4-6, 2017

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- 85) “Three-Dimensional PDF Analysis of Diffuse Scattering”  
Gordon Research Conference on Neutron Scattering  
The Hong Kong University of Science and Technology, August 6-11, 2017
- 86) “Imaging Nanoscale Disorder in Reciprocal Space”  
China Spallation Neutron Source, Dongguan, China, August 14, 2017
- 87) “Coherent Band Excitations in CePd<sub>3</sub>”  
2018 March Meeting of the American Physical Society  
Los Angeles, CA, March 5–9, 2018
- 88) “Measuring Band Excitations with Inelastic Neutron Scattering”  
American Conference on Neutron Scattering (ACNS 2018)  
College Park, MD, June 24-28, 2018
- 89) “Coherent Band Excitations Studied With Inelastic Neutron Scattering”  
International Conference on Magnetism (ICM 2018)  
San Francisco, CA, July 15-20, 2018
- 90) “Diffuse Scattering”  
National School of Neutron and X-ray Scattering  
Argonne National Laboratory, IL, August 3, 2018
- 91) “Imaging Nanoscale Disorder in Reciprocal Space”  
Physics Department Colloquium, University of Minnesota  
Minnesota, MN, October 17, 2018
- 92) “Imaging Nanoscale Disorder in Reciprocal Space”  
Materials Research Colloquium, California Institute of Technology  
Pasadena, CA, May 29, 2019
- 93) “Diffuse Scattering”  
National School of Neutron and X-ray Scattering  
Argonne National Laboratory, IL, July 28, 2019
- 94) “Challenges in Studying Correlated Disorder”  
Workshop on “Machine Learning Quantum Matter Data”  
Simons Foundation, New York, NY, January 23-24, 2020
- 95) “Imaging Nanoscale Disorder in Reciprocal Space”  
Department of Physics Colloquium, Drexel University  
Philadelphia, PA, February 13, 2020

## Publications

1. J. S. Abell, J. X. Boucherle, R. Osborn, B. D. Rainford, and J. Schweizer  
“Polarized neutron study of the intermetallic compound  $GdAl_2$ ”  
Journal of Magnetism and Magnetic Materials **31–34**, 247 (1983)
2. K. Clausen, W. Hayes, M. T. Hutchings, J. E. Macdonald, R. Osborn, and P. G. Schnabel  
“Investigation of oxygen disorder, thermal parameters, lattice vibrations and elastic constants of  $UO_2$  and  $ThO_2$  at temperatures up to 2930K”  
Revue de la Physique Appliqué **19**, 719 (1984)
3. K. Clausen, W. Hayes, J. E. Macdonald, R. Osborn, and M. T. Hutchings  
“Observation of oxygen Frenkel disorder in uranium dioxide above 2000K by use of neutron-scattering techniques”  
Physical Review Letters **52**, 1238 (1984)
4. N. H. Andersen, K. Clausen, M. A. Hackett, W. Hayes, M. T. Hutchings, J. E. Macdonald, and R. Osborn  
“Coherent neutron scattering investigation of the defect structure of yttria-stabilized zirconia”  
*Transport–Structure Relations in Fast Ion and Mixed Conductors* (Risø, Denmark, 1985) p. 279
5. M. T. Hutchings, K. Clausen, W. Hayes, J. E. Macdonald, R. Osborn, and P. G. Schnabel  
“Oxygen Frenkel disorder in  $UO_2$  and  $ThO_2$  observed above 2000K using neutron scattering techniques”  
High Temperature Science **20**, 97 (1985)
6. K. Clausen, W. Hayes, M. T. Hutchings, J. K. Kjems, J. E. Macdonald, and R. Osborn  
“Lattice dynamics and elastic constants of uranium dioxide at high temperatures investigated by neutron scattering”  
High Temperature Science **19**, 189 (1985)
7. J. E. Macdonald, K. Clausen, B. Garrard, M. A. Hackett, W. Hayes, R. Osborn, P. G. Schnabel, and M. T. Hutchings  
“Thermally induced Frenkel disorder in  $UO_2$  and  $ThO_2$ ”  
High Temperatures – High Pressures **17**, 27 (1985)

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8. N. H. Andersen, K. Clausen, M. A. Hackett, W. Hayes, M. T. Hutchings, J. E. Macdonald, and R. Osborn  
“The defect structure of yttria-stabilized zirconia, studied by quasielastic diffuse neutron scattering”  
*Physica B* **136**, 315 (1986)
9. R. Osborn, N. H. Andersen, K. Clausen, M. A. Hackett, W. Hayes, M. T. Hutchings, and J. E. Macdonald  
“Neutron scattering investigation of the defect structure of  $Y_2O_3$ -stabilized  $ZrO_2$  and its dynamical behavior at high temperatures”  
*Materials Science Forum* **7**, 55 (1986)
10. R. Osborn, B. C. Boland, Z. A. Bowden, A. D. Taylor, M. A. Hackett, W. Hayes, and M. T. Hutchings  
“A high resolution neutron scattering investigation of the crystal field splittings of  $UO_2$ ”  
*Journal of the Chemical Society: Faraday Transactions II* **83**, 1105–1108 (1987)
11. K. Clausen, W. Hayes, J. E. Macdonald, R. Osborn, P. G. Schnabel, M. T. Hutchings, and A. Magerl  
“Inelastic neutron scattering investigation of the lattice dynamics of  $ThO_2$  and  $CeO_2$ ”  
*Journal of the Chemical Society: Faraday Transactions II* **83**, 1109–1112 (1987)
12. R. Osborn, M. Loewenhaupt, B. D. Rainford, and W. G. Stirling  
“Magnons in  $CeAl_2$ ”  
*Journal of Magnetism and Magnetic Materials* **63&64**, 70 (1987)
13. R. Osborn, M. Hagen, D. L. Jones, W. G. Stirling, G. H. Lander, K. Mattenberger, and O. Vogt  
“High energy magnetic inelastic neutron scattering on  $USb$  and  $UTe$ ”  
*Journal of Magnetism and Magnetic Materials* **76&77**, 429–431 (1988)
14. G. Amoretti, A. Blaise, J. M. Fournier, R. Caciuffo, J. Larroque, R. Osborn, A. D. Taylor, and Z. A. Bowden  
“Crystal field excitations in UOS”  
*Journal of Magnetism and Magnetic Materials* **76–77**, 432–434 (1988)
15. R. Caciuffo, G. Amoretti, A. Blaise, J. M. Fournier, M. T. Hutchings, J. Larroque, R. Osborn, and A. D. Taylor  
“High energy neutron spectroscopy study of the electronic configuration in crystal-field-split 5f systems”  
*Neutron Scattering at ISIS: Recent Highlights in Condensed Matter Research* (Rome, 1988)

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16. S. Hull, N. H. Andersen, K. Clausen, T. W. D. Farley, M. A. Hackett, W. Hayes, M. T. Hutchings, R. Osborn, and W. G. Stirling  
“Quasielastic diffuse neutron scattering from yttria stabilized zirconia at elevated temperatures”  
*Solid State Ionics* **28–30**, 488 (1988)
17. R. Osborn, A. D. Taylor, Z. A. Bowden, M. A. Hackett, W. Hayes, M. T. Hutchings, G. Amoretti, R. Caciuffo, A. Blaise, and J. M. Fournier  
“High-resolution neutron spectroscopy of crystal-field excitations in uranium dioxide”  
*Journal of Physics C* **21**, L931–L937 (1988)
18. L. Rosta, G. Hutiray, R. Bellissent, A. Menelle, F. Mezei, A. D. Taylor, R. Osborn, and Z. A. Bowden  
“Neutron scattering study of the vibrational density of states of high- $T_c$  superconductors”  
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