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Ian McNulty received a PhD degree in physics from Stony Brook University in 1991 and joined the Advanced Photon Source as an Enrico Fermi Postdoctoral Scholar in June that year. He became a staff physicist at Argonne in 1992 and built the first intermediate-energy x-ray microscopy beamline at APS in 1997. Ian subsequently oversaw the development of the APS Sector 2 beamlines and led the APS X-ray Microscopy Group in 2000-2004. Ian became Senior Scientist and joined the Argonne Center for Nanoscale Materials in 2012. His research focuses on ordering in nanomagnetic materials and orbital angular momentum states of light using coherent x-rays.

Selected Recent Publications:

Y.-C. K. Chen-Wiegart, S. Wang, W.-K. Lee, I. McNulty, P.W. Voorhees, and D.C. Dunand, "In situ imaging of dealloying during nanoporous gold formation by transmission x-ray microscopy," *Acta Materialia* **61**, 1118 (2013).

B. Chen, B. Abbey, R. Dilanian, E. Balaur, G. van Riessen, M. Junker, C.Q. Tran, M.W.M. Jones, A.G. Peele, I. McNulty, D.J. Vine, C.T. Putkunz, H.M. Quiney, and K.A. Nugent, "Diffraction Imaging: the Limits of Partial Coherence," *Phys. Rev. B* **86**, 235401 (2012).

R.P. Winarski, M.V. Holt, V. Rose, P. Fuesz, D. Carbaugh, C. Benson, D. Shu, D. Kline, G.B. Stephenson, I. McNulty, and J. Maser, "A hard x-ray nanoprobe beamline for nanoscale microscopy," *J. Synchr. Rad.* **19**, 1056 (2012).

I. Peterson, B. Abbey, C.T. Putkunz, D.J. Vine, G. van Riessen, G.A. Cadenazzi, E. Balaur, R. Ryan, H.M. Quiney, I. McNulty, A.G. Peele, and K.A. Nugent, "Nanoscale Fresnel coherent diffraction imaging tomography using ptychography," *Optics Express* **20**, 24678 (2012).

S.O. Hruszkewycz, M.V. Holt, C.E. Murray, J. Bruley, J. Holt, A. Tripathi, O.G. Shpyrko, I. McNulty, M.J. Highland, and P.H. Fuoss, "Quantitative imaging of lattice distortions in epitaxial semiconductor heterostructures using x-ray Bragg ptychography," *Nano Lett.* **12**, 5148 (2012).

D.J. Vine, D. Pelliccia, C. Holzner, S.B. Baines, A. Berry, I. McNulty, S. Vogt, A.G. Peele, and K.A. Nugent, "Simultaneous x-ray fluorescence and ptychographic microscopy of Cyclotella meneghiniana," *Optics Express* **20**, 18287 (2012).

M.R. Krejci, B. Wasserman, L. Finney, I. McNulty, D. Legnini, S. Vogt, and D. Joester, "Selectivity in biomineralization of barium and strontium," *J. Struct. Biol.* **176**, 192 (2011).

A. Tripathi, J. Mohanty, S.H. Dietze, O.G. Shpyrko, E. Shipton, E.E. Fullerton, S.S. Kim, and I. McNulty, "Dichroic coherent diffractive imaging," *Proc. Natl. Acad. Sci.* **108**, 13393 (2011).

J.J. Turner, X. Huang, O. Krupin, K.A. Seu, D. Parks, S. Kevan, E. Lima, K. Kisslinger, I. McNulty, R. Gambino, S. Mangin, S. Roy, and P. Fischer, "X-ray diffraction microscopy of magnetic structures," *Phys. Rev. Lett.* **107**, 033904 (2011).

B. Abbey, L.W. Whitehead, H.M. Quiney, D.J. Vine, G.A. Cadenazzi, C.A. Henderson, K.A. Nugent, E. Balaur, C.T. Putkunz, A.G. Peele, G.J. Williams, and I. McNulty, "Lensless imaging using broadband x-ray sources," *Nature Photonics* **5**, 420 (2011).

C.T. Putkunz, J.N. Clark, D.J. Vine, G.J. Williams, M.A. Pfeifer, E. Balaur, I. McNulty, K.A. Nugent, and A.G. Peele, "Phase-diverse coherent diffractive imaging: high sensitivity with low dose," *Phys. Rev. Lett.* **106**, 013903 (2011).

M.D. de Jonge, C. Holzner, S.B. Baines, B.S. Twining, K. Ignatyev, J. Diaz, D.L Howard, D. Legnini, A. Miceli, I. McNulty, C.J. Jacobsen, and S. Vogt, "Quantitative 3-D elemental microtomography of Cyclotella meneghiniana at 400-nm resolution," *Proc. Natl. Acad. Sci.* **107**, 15676 (2010).

Y.-C. Chen, Y. Chu, J. Yi, I. McNulty, Q. Shen, P. Voorhees, and D.C. Dunand, "Morphological and topological analysis of coarsened nanoporous gold by x-ray nanotomography," *Appl. Phys. Lett.* **96**, 043122 (2010).

L.W. Whitehead, G.J. Williams, H.M. Quiney, D. Vine, S. Flewett, K.A. Nugent, A.G. Peele, E. Balaur, and I. McNulty, "Coherent diffractive imaging with partially coherent X-rays," *Phys. Rev. Lett.* **103**, 243902 (2009).

B. Abbey, K.A. Nugent, G.J. Williams, J.N. Clark, A.G. Peele, M.A. Pfeifer, M. de Jonge, and I. McNulty, "Keyhole coherent diffractive imaging," *Nature Phys.* **4**, 394 (2008).

J. Diaz, E. Ingall, C. Benitez-Nelson, D. Paterson, M.D. de Jonge, I. McNulty, and J.A. Brandes, "Marine polyphosphate: A key player in geologic phosphorus sequestration," *Science* **320**, 652 (2008).

S. Sasaki and I. McNulty, "Proposal for generating brilliant x-ray beams carrying orbital angular momentum," *Phys. Rev. Lett.* **100**, 124801 (2008).

M. van Veenendaal and I. McNulty, "Prediction of strong dichroism induced by x-rays carrying orbital momentum," *Phys. Rev. Lett.* **98**, 157401 (2007).