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Curriculum Vitae

CURRENT POSITIONS

Research Associate (JILA, Boulder, Colorado)

Adjunct Instructor (Colorado School of Mines, Golden, Colorado)

DEGREES

PhD Physics, September 2003, University of Sheffield, Sheffield, UK
Thesis: "Optical Investigation of AlGaAs Photonic Crystal Waveguides"

MSc Optoelectronics and Laser Devices, July 1998, Heriot-Watt University, Edinburgh, UK

BSc (Hons.) Interdisciplinary Physics, July 1997, University of East Anglia, Norwich, UK

RESEARCH EXPERIENCE

Research Associate with Prof. Steven Cundiff (Nov. 2006 – present)
JILA, University of Colorado and National Institute of Standards and Technology, USA

- Construction of a 2D Fourier-transform spectrometer with all-optical phase retrieval
- Coherent nonlinear response of semiconductor nanostructures with 2D-FT spectroscopy
- Second-harmonic generation inspection of surfaces and buried material interfaces

Postdoctoral Fellow with Prof. Henry van Driel (Oct. 2003 – Oct. 2006)
Department of Physics and Institute for Optical Sciences, University of Toronto, Canada

- Enhancement of optical parametric generation by 2D photonic crystals and microrings
- Fabrication and optical characterization of metallodielectric Bragg stacks
- Development, fabrication and investigation of on-chip all-optical delay lines
- Ballistic current injection in bulk and patterned semiconductors measured using THz radiation

Research Assistant with Profs. Maurice Skolnick and Mark Fox (Jan. 2000 – Sept. 2003)
Department of Physics, University of Sheffield, UK

- Ultrafast nonlinear optical switching in 2D photonic crystals
- Band-edge and defect microcavity lasing in photonic crystal waveguides
- Optical characterization of single- and dual-period photonic crystal waveguides
- Fabrication and electron-microscopy characterization of photonic micro-disk structures

Research Assistant with Prof. Robert Cywinski (Sept. 1998 – Jul. 1999)
Department of Physics, University of St. Andrews, UK

- Fabricating magnetic metals alloys containing Manganese
- Magnetic characterization using Mössbauer spectroscopy and vibrating sample magnetometry
- Inelastic and polarized neutron scattering experimentation at the Institut Laue-Langevin
- Muon relaxation spectroscopy at ISIS Spallation Source, Rutherford-Appleton Laboratory

Research Assistant with Dr. Peter Foote (Apr. 1998 – Sept. 1998)
British Aerospace (Sowerby Research Centre), Bristol, UK

- Laboratory characterization of fiber-optic strain and impact sensors embedded in composite panels
- Assisted with field tests of fiber-optic strain sensors inserted into boat masts and booms

Research Assistant with Prof. Paul Colman (Sept. 1996 – May. 1997)
Department of Physics, University of East Anglia, Norwich, UK

- Defect studies of porous-silicon by positron implantation spectroscopy

TEACHING EXPERIENCE

Instructor for PHGN-480, "Laser Physics" (Colorado School of Mines, Fall 2009)

Volunteer with "JILA Physics Frontier Center (PFC) Partnerships for Informal Science Education in the Community (PISEC)" outreach program (JILA, Dec. 2008 – Jul. 2009)

Extensively mentored graduate research (Sheffield, Toronto, JILA, Apr. 2002 – present)

Mentored undergraduate research toward project thesis (Toronto, JILA, Jun. 2004 – present)

Trained graduate students in clean room protocols (Toronto, Oct. 2004 – Mar. 2006)

Trained new graduate students on scanning electron microscope (Sheffield, Sept. 2002 – Mar. 2003)

Volunteer with local secondary school science outreach program, organized by the Yorkshire Branch of the Institute of Physics (Sheffield, Apr. 2001 – Apr. 2002)

Laboratory Assistant for "Electronics for Scientists" (Sheffield, Sept. 2000 – Apr. 2002)

OTHER PROFESSIONAL EXPERIENCE

Session chair: Four Corners Section of the American Physics Society Annual Meeting (Oct. 2009)

Organizer/presider: JILA Interdisciplinary Student & Postdoctoral Seminars (JILA, Jun. 2008 – Aug. 2009)

Postdoctoral representative to the JILA Fellows (JILA, Jan. 2008 – Aug. 2009)

Internal referee of pre-submission articles for NIST employees (JILA, Nov. 2006 – present)

Referee for several prominent scientific journals (Jan. 2004 – present)

Assistant to Programme Committee Chair of the 26th International Conference for the Physics of Semiconductors, Prof. Maurice Skolnick (Sheffield, Jan. 2002 – May 2002)

Aid to the Local Organizer of the 3rd Liquid Matter Conference, Prof. Phillip Salmon (UEA, Jun. 1996)

Member of the Optical Society of America and American Physics Society (Dec. 2003 – present)

JOURNAL PUBLICATIONS

1. D. Karaiskaj, A.D. Bristow, L. Yang, X. Dai, R. P. Mirin, S. Mukamel, S.T. Cundiff, "Coherent two-dimensional Fourier-transform spectra of exciton resonances in semiconductor quantum wells for many-body interactions," arXiv:0906.4068v1 [cond-mat.mes-hall]
2. S.A. Yang, X.Q. Li, A.D. Bristow, J.E. Sipe, "Second harmonic generation from tetragonal centro-symmetric crystals," Physical Review B **80**, 165306 (2009).
3. A.D. Bristow, D. Karaiskaj, X. Dai, T. Zhang, C. Carlsson, K.R. Hagen, R. Jimenez, S.T. Cundiff, "A versatile platform for multidimensional spectroscopy," Review of Scientific Instruments, **80**, 073108 (2009).
4. S.T. Cundiff, T. Zhang, A.D. Bristow, D. Karaiskaj, X. Dai, "Optical two-dimensional Fourier-transform spectroscopy of semiconductors," Accounts of Chemical Research **42**, 1423 (2009).

5. A.D. Bristow, D. Karaiskaj, X. Dai, R.P. Mirin, S.T. Cundiff, "Polarization dependence of semiconductor exciton and biexciton contributions to phase-resolved optical two-dimensional Fourier-transforms spectra," Physical Review B **79**, 161305(R) (2009).
6. L. Yang, T. Zhang, A.D. Bristow, S. T. Cundiff, S. Mukamel, "Excitonic Raman coherences in two-dimensional correlation spectroscopy," Journal of Chemical Physics **129**, 234711 (2008).
7. A.D. Bristow, D. Karaiskaj, X. Dai, S.T. Cundiff, "All-optical phase retrieval of global phase for two-dimensional Fourier-transform spectroscopy," Optics Express **16**, 18017 (2008).
8. L. Costa, M. Spasenovic, M. Betz, A.D. Bristow, H.M. van Driel, "All-optical generation of electrical currents in silicon," Nature Physics **3**, 632 (2007).
9. A.D. Bristow, N. Rotenberg, H.M. van Driel, "Two-photon absorption and optical Kerr coefficients of silicon for 850 – 2200 nm," Applied Physics Letters **90**, 191104 (2007).
10. N. Rotenberg, A.D. Bristow, M. Pfeiffer, M. Betz, H.M. van Driel, "Nonlinear absorption in Au films: role of thermal effects," Physics Review B **75**, 155426 (2007).
11. A.D. Bristow, R. Iyer, J.S. Aitchison, H.M. van Driel, Arthur.L. Smirl, "All-optical switching of $Al_xGa_{1-x}As$ on-chip optical delay lines," Applied Physics Letters **90**, 101112 (2007).
12. Z. Yang, P. Chak, R. Iyer, A.D. Bristow, H.M. van Driel, J.S. Aitchison, Arthur L. Smirl, J.E. Sipe, "Enhanced second harmonic generation using slow light in AlGaAs microring resonators," Optics Letters **32**, 826 (2007).
13. T.K. Lee, A.D. Bristow, J. Hübner, H.M. van Driel, "Linear and nonlinear optical properties of metallodielectric Bragg stacks," Journal of the Optical Society of America B **23**, 2141 (2006).
14. A.D. Bristow, D.O. Kundys, A.Z. García-Déniz, J.-P.R. Wells, A.M. Fox, M.S. Skolnick, D.M. Whittaker, A. Tahraoui, T.F. Krauss, J.S. Roberts, "Enhanced all-optical tuning of leaky eigenmodes in photonic crystal waveguides," Optics Letters **31**, 22834 (2006).
15. A.D. Bristow, J.P. Mondia, H.M. van Driel, "Sum and difference frequency generation as diagnostics for leaky eigenmodes in two-dimensional photonics crystal waveguides," Journal of Applied Physics **99**, 023105 (2006).
16. A.D. Bristow, A.Z. García-Déniz, A.M. Fox, D.M. Whittaker, M.S. Skolnick, T.F. Krauss, M. Hopkinson, "Reflection and emission of Brillouin zone edge states for active photonic crystal waveguides," Journal of Optics A **7**, S270 (2005).
17. A.D. Bristow, D.O. Kundys, A.Z. García-Déniz, J.-P.R. Wells, A.M. Fox, M.S. Skolnick, D.M. Whittaker, A. Tahraoui, T. F. Krauss, J. S. Roberts, "Ultrafast nonlinear tuning of the reflection properties of AlGaAs in photonic crystal waveguides by two-photon absorption," Journal of Applied Physics **96**, 4729 (2004).
18. A.D. Bristow, J.-P.R. Wells, W.H. Fan, A.M. Fox, M.S. Skolnick, D.M. Whittaker, A. Tahraoui, T.F. Krauss, J.S. Roberts, "Ultrafast non-linear modulation of reflectivity in AlGaAs photonic crystal waveguides," Applied Physics Letters **83**, 851 (2003).
19. A.D. Bristow, V.N. Astratov, D.M. Whittaker, M.S. Skolnick, A. Tahraoui, T.F. Krauss, M.P. Croucher, G.A. Gehring, "Defect states and commensurability in dual-period AlGaAs photonic crystal waveguides," Physical Review B **68**, 033303 (2003).
20. A.D. Bristow, V.N. Astratov, R. Shimada, I.S. Culshaw, D.M. Whittaker, M.S. Skolnick, A. Tahraoui, T.F. Krauss, "Polarization conversion in reflectivity properties of photonic crystal waveguides," IEEE Journal of Quantum Electronics **38**, 880 (2002).

PUBLICATIONS IN PROGRESS

1. D. Karaiskaj, A.D. Bristow, L. Yang, X. Dai, R. P. Mirin, S. Mukamel, S.T. Cundiff, "Coherent two-dimensional Fourier-transform spectra of exciton resonances in semiconductor quantum wells for many-body interactions," *Submitted to Physical Review Letters (Jul. 2009).*
2. X. Dai, A.D. Bristow, D. Karaiskaj, S.T. Cundiff, "Two-dimensional Fourier-transform spectroscopy of potassium vapor in a thin transmission cell," *Submitted to Physical Review A (Nov. 2009).*
3. A.D. Bristow, X. Dai, D. Karaiskaj, R. P. Mirin, S.T. Cundiff, "Distribution of the biexciton binding energy due to quantum-well inhomogeneity determined from the two-dimensional spectroscopic lineshape," *In preparation*.
4. X. Dai, A.D. Bristow, C. Falvo, D. Karaiskaj, S. Mukamel, S.T. Cundiff, "Two-Quantum resonances observed in potassium vapor by two-dimensional Fourier-transform spectroscopy," *In preparation*.
5. G.A. Moody, A.D. Bristow, M.E. Siemens, X. Dai, D. Karaiskaj, S.T. Cundiff, A. Bracker, D. Gammon, "Two-dimensional Fourier-transform spectral linewidths of natural quantum dots," *In preparation*.

CONFERENCE PROCEEDINGS

1. A.D. Bristow, D. Karaiskaj, X. Dai, G.A. Moody, S.T. Cundiff, "Advances in optical two-dimensional spectroscopy applied to the study of semiconductor and atomic systems," *In preparation for Photonics West 2010*.
2. T. Zhang, I. Kuznetsova, L. Yang, A.D. Bristow, X. Dai, X. Li, T. Meier, P. Thomas, S. Mukamel, R.P. Mirin, S.T. Cundiff, "Ultrafast coherent interactions in semiconductor quantum wells studied by two-dimensional Fourier-transform spectroscopy," **Ultrafast Phenomena XVI** p.247 (Springer Series in Chemical Physics, 2009).
3. M. Betz, L. Costa, M. Spasenović, R.W. Newson, J.-M. Menard, C. Sames, A.D. Bristow, H.M. van Driel, "Coherently controlled ballistic charge currents in unbiased bulk silicon and single-walled carbon nanotubes," **Ultrafast Phenomena XVI** p.256 (Springer Series in Chemical Physics, 2009).
4. A.D. Bristow, T. Zhang, S.T. Cundiff, "Coherent optical processes of semiconductors studied via two-dimensional Fourier-transform spectroscopy," Proc. SPIE **6892**, 68921Q (2008).
5. M. Betz, L. Costa, M. Spasenović, A.D. Bristow, H.M. van Driel, "All-optical generation of ballistic electrical currents in un-biased silicon," Phys. Stat. Sol. (c) **5**, 340 (2008).

INVITED SEMINARS/COLLOQUIA

1. *"Probing coherent light-matter interactions of quantum nanomaterials with the JILA-MONSTR,"* Seminar, **National Renewable Energies Laboratory**, Colorado (Nov. 2009)
2. "*The JILA-MONSTR: shedding new light on ultrafast coherent phenomena in semiconductors*," Colloquium, Department of Physics, **Colorado School of Mines**, Colorado (Sept. 2009)
3. "*The JILA-MONSTR: shedding new light on ultrafast coherent phenomena in semiconductor excitons*," Physics Seminar, Department of Physics, **Grinnell College**, Iowa (Apr. 2009)
4. "*Coherent light-matter interactions: shedding a new light on semiconductors*," Center for Controlled Quantum Systems Seminar, School of Physics and Engineering Physics, **Stevens Institute of Technology**, New Jersey (Mar. 2009)
5. "*Two-dimensional Fourier-transform spectroscopy: coherent semiconductor phenomena in a new light*," Walter-Schottky Institute Seminar, **Walter-Schottky Institute**, Technical University of Munich, Germany (Jun. 2008)

6. "*Coherent electronic interactions in semiconductor nanostructures investigated by two-dimensional Fourier-transform spectroscopy*," Quantum Optics Seminar, Department of Physics, **University of Toronto**, Canada (Mar. 2008)

CONFERENCE PRESENTATIONS

Invited

1. A.D. Bristow, D. Karaiskaj, X. Dai, G.A. Moody, S.T. Cundiff, "Advances in optical two-dimensional spectroscopy applied to the study of semiconductor and atomic systems," **Photonics West,** Ultrafast Phenomena in Semiconductors and Nanostructure Materials XIV (*to be held* Jan. 2010).
2. A.D. Bristow, T. Zhang, S.T. Cundiff, "Coherent optical processes of Semiconductors studied via two-dimensional Fourier transform spectroscopy," **Photonics West**, Ultrafast Phenomena in Semiconductors and Nanostructure Materials XII (Jan. 2008).
3. X. Li, T. Zhang, A.D. Bristow, S.T. Cundiff, R.P. Mirin, "Studies of exciton correlations with two-dimensional Fourier transform spectroscopy," **Fundamental Optical Processes in Semiconductors 2007**.

Contributed

1. A.D. Bristow, D. Karaiskaj, X. Dai, S.T. Cundiff, L. Yang, S. Mukamel, R.P. Mirin, "Optical 2D Fourier-transform spectra of GaAs quantum wells," **Four Corners Section of the APS Annual Meeting 2009**.
2. G.A. Moody, A.D. Bristow, M.E. Siemens, X. Dai, D. Karaiskaj, S.T. Cundiff, "Coherent excitonic resonances of natural quantum dots studied with optical 2D Fourier transform spectroscopy," **Four Corners Section of the APS Annual Meeting 2009**
3. X. Dai, A. D. Bristow, D. Karaiskaj, S. Mukamel, S. T. Cundiff, "Two-quantum resonances observed in potassium vapor by two-dimensional Fourier-transform spectroscopy," **CLEO/IQEC 2009** *(Postdeadline)*.
4. A.D. Bristow, D. Karaiskaj, X. Dai, R.P. Mirin, S.T. Cundiff, "Inhomogeneity and binding energy of biexcitons in quantum wells using 2-D Fourier-transform spectroscopy," **CLEO/IQEC 2009**.
5. D. Karaiskaj, A.D. Bristow, X. Dai, L. Yang, S. Mukamel, R.P. Mirin, S.T. Cundiff, "Many-body two-quantum coherences in 2-D Fourier-transform spectra of semiconductors," **CLEO/IQEC 2009**.
6. A.D. Bristow, D. Karaiskaj, X. Dai, S.T. Cundiff, "Biexciton lineshapes in semiconductor QWs are revealed by cross-polarized 2D Fourier-transform spectroscopy," **Frontiers in Optics Conference 2008 / Laser Science XXIV** (*Postdeadline*).
7. T. Zhang, I. Kuznetsova, L. Yang, A.D. Bristow, X. Dai, X. Li, T. Meier, P. Thomas, S. Mukamel, R.P. Mirin, S.T. Cundiff, "Ultrafast coherent interactions in semiconductor quantum wells studied by two-dimensional Fourier-transform spectroscopy," **Ultrafast Phenomena XVI** (Jun. 2008).
8. T. Zhang, L. Yang, A.D. Bristow, S. Mukamel, S.T. Cundiff, "Exciton Raman coherence revealed in two-dimensional Fourier-transform spectroscopy of semiconductors," **CLEO / QELS 2008**.
9. T. Zhang, A.D. Bristow, X. Dai, I. Kuznetsova, T. Meier, P. Thomas, S.T. Cundiff, "Direct determination of exciton homogeneous and inhomogeneous linewidths in semiconductor quantum wells with two-dimensional Fourier-transform spectroscopy," **CLEO / QELS 2008**.
10. T. Zhang, X. Li, A.D. Bristow, S.T. Cundiff, I. Kuznetsova, T. Meier, P. Thomas, R.P. Mirin, "Polarization-dependent 2D Fourier-transform spectroscopy of quantum wells," **Fundamental Optical Processes in Semiconductors 2007**.
11. T. Zhang, A.D. Bristow, S.T. Cundiff, L. Yang, S. Mukamel, "Isolating excitonic Raman coherences using 2D Fourier-transform spectroscopy," **Fundamental Optical Processes in Semiconductors 2007**.

12. N. Rotenberg, A.D. Bristow, M. Pfeiffer, M. Betz, H.M. van Driel, "Pulse width dependent nonlinear absorption in Au films," **CLEO / QELS 2007**.
13. L. Costa, M. Spasenović, M. Betz, A.D. Bristow, H.M. van Driel, "Quantum interference control of electrical currents in silicon," **CLEO / QELS 2007**.
14. R. Iyer, A.D. Bristow, Z.S. Yang, J.S. Aitchison, H.M. van Driel, J.E. Sipe, A.L. Smirl, "On-chip, switchable, all-optical 188 ps delay line in AlGaAs," **OFC/NFOEC 2007**.
15. Z.S. Yang, R. Iyer, A.D. Bristow, J.S. Aitchison, H.M. van Driel, J.E. Sipe, A.L. Smirl, "Enhanced SHG using slow light in AlGaAs microring resonantors," **OSA Topical Meeting on Fast and Slow Light** (Jul. 2006).
16. R. Iyer, A.D. Bristow, Z.S. Yang, J.S. Aitchison, H.M. van Driel, J.E. Sipe, A.L. Smirl, "All-optical switching of AlGaAs on-chip delay lines, Rajiv Iyer," **OSA Topical Meeting on Fast and Slow Light** (Jul. 2006).
17. T.K. Lee, A.D. Bristow, J. Hübner, H.M. van Driel, "Linear and nonlinear optical properties of gold-polymer Bragg stacks," **CLEO / QELS 2006.**
18. A.D. Bristow, J.P. Mondia, H.M. van Driel, J.F. Young, "Enhanced parametric processes in 2-D GaAs photonic crystal waveguides," **CLEO / QELS 2005**.
19. A.D. Bristow, D.O. Kundys, J.-P.R. Wells, A.M. Fox, D.M. Whittaker, M.S. Skolnick, A. Tahraoui, T.F. Krauss, "Ultrafast nonlinear tuning of photonic coupling resonances in AlGaAs photonic crystal waveguides," **CLEO / IQEC 2004**.
20. R. Shimada, I.R. Sellers, A.D. Bristow, A. Tahraoui, T.F. Krauss, V.N. Astratov, D.M. Whittaker, M.S. Skolnick, "Emission properties of two-dimensional photonic crystal microcavities," **PIERS 2003**.
21. R. Shimada, I.R. Sellers, A.D. Bristow, A. Tahraoui, T.F. Krauss, V.N. Astratov, D.M. Whittaker, M.S. Skolnick, "Laser emission from two-dimensional photonic crystal microcavities," **PECS-IV** (Oct. 2003).
22. A.D. Bristow, J.-P.R. Wells, A.M. Fox, M.S. Skolnick, A. Tahraoui, T. F. Krauss, "Ultrafast resonant nonlinear response of AlGaAs photonic crystals," **CLEO / EQEC 2003**.
23. R. Shimada, A.D. Bristow, I.R. Sellers, A. Tahraoui, T.F. Krauss, V.N. Astratov, D.M. Whittaker, M.S. Skolnick, "Emission Properties of Two-Dimensional Photonic Crystal Microcavities," **26th ICPS** (Jul. 2002).
24. A.D. Bristow, D.M. Whittaker, M.S. Skolnick, V.N. Astratov, R. Shimada, A. Tahraoui, T.F. Krauss, "Large polarization conversion in a semiconductor photonic crystal waveguide," **26th ICPS** (Jul. 2002).
25. A.D. Bristow, V.N. Astratov, R. Shimada, M.S. Skolnick, D.M. Whittaker, A. Tahraoui, T.F. Krauss, "Reflection properties of 1D photonic crystal waveguides," **PECS-III** (Jun. 2001).