KYLE MANCHEE

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EDUCATION

PhD Physics – ***Ongoing*** 2013
University of Toronto, Toronto ON, Canada -present

MSc Condensed Matter Physics 2011
University of Alberta, Edmonton AB, Canada

BSc Chemical Physics 2009
University of Guelph, Guelph ON, Canada

WORK EXPERIENCE

Ph.D. Research, ***Dr. R.J. Dwayne Miller*** 09/2013 –
University of Toronto, Dept. of Physics, Toronto ON, Canada present

- Design, construction and characterization of high power, ultrafast lasers.
- Specialization in Ytterbium-doped gain materials.
- Fiber-based, femtosecond oscillators and power amplifiers.
- Single mode and large mode area fiber amplifiers. High average power photonic-crystal rod amplifiers.
- Bulk amplification. Regenerative amplifier for high pulse energy amplification.
- Nonlinear amplifiers (NOPA) for use at 1um and 3um wavelengths.
- Extensive beam, laser cavity, and amplifier simulations. Gaussian beam, laser rate dynamics, gain dynamics, nonlinear pulse propagation, nonlinear amplification.
- Laser system design. AutoCAD, machining, electronic signalling/triggering and control, systems monitoring, and software design.

Lab Technician 11/2012 –
Lester B. Pearson College, Victoria BC, Canada 06/2013

- Organized the lab space, budgets, and inventory for the Science Department at Pearson College
- Aided in preparing and running experiments in Physics, Chemistry, Biology, and Marine Science
- Supervised several student-led research projects
- Oversaw the safety procedures of the laboratories

Research Assistant, ***Dr. Al Meldrum*** 09/2011 –
University of Alberta, Dept. of Physics, Edmonton AB, Canada 12/2011

- Performed the surface functionalization of fluorescent-core microcapillary sensors (developed in MSc) with a biomolecular binding system in order to demonstrate and study analyte-specific detection
- Developed analysis software for time-resolved biosensing measurements
- Required extensive coding in *Mathematica*, using the principles of nonlinear least-squares curve fitting and discrete Fourier analysis

M.Sc. Research Project, ***Dr. Al Meldrum*** 09/2009 –
University of Alberta, Dept. of Physics, Edmonton AB, Canada 09/2011

- Thesis: Refractometric sensing with fluorescent-core microcapillaries
- Involved the preparation and application of silicon nanocrystals for use in optical microcavity systems
- Developed a refractometric sensor based on optical resonance for use in microfluidic systems
- Project required the design, construction, modeling, testing, and characterization of the sensor system
- Skills and techniques: fluorescence spectroscopy, finite-difference time-domain simulation for optical cavity modeling, silicon nanocrystal synthesis, microfluidic system design, computer programing (Matlab, Mathematica), experience with metal machining, computer-aided design of apparatus components (AutoCAD)

Undergraduate Research Project, ***Dr. John Dutcher*** 09/2008 –
University of Guelph, Dept. of Physics, Guelph ON, Canada 04/2009

- Studied the properties of beta-lactoglobulin protein at oil-water interfaces
- Used atomic force microscopy to study structural changes in beta-lactoglobulin when environmental stresses, such as changes in temperature and pH, are applied to these protein-stabilized emulsions
- Skills and techniques: Atomic force microscopy, force-curve modeling

NSERC Undergraduate Research Assistant, ***Dr. Stefan Kycia*** 05/2008 –
University of Guelph, Dept. of Physics, Guelph ON, Canada 08/2008

- Developed new methods for X-ray diffraction
- Designed and built apparatus components for Laue and four circle diffractometers used for single crystal diffraction, powder diffraction, and X-ray fluorescence
- Required proficiency with *AutoDesk Inventor* software for component design and use of metal machining and electronics shops where several metal and electrical components were personally built
- Skills and techniques: x-ray diffraction, computer-aided design of control boxes (AutoCAD), experience in metal machine shop and electronics workshop

AWARDS and SCHOLARSHIPS

NSERC-Alexander Graham Bell Canada Graduate Scholarship (CGS-D) $35,000.00 2014
Natural Sciences and Engineering Research Council of Canada

University of Toronto Admission Award $3,000 2013
Department of Physics, University of Toronto

Ivy A Thomson and William A Thomson Graduate Scholarship $18,000 2010
University of Alberta

Alberta Ingenuity Nanotechnology Top-up Alberta Innovates Technology Futures, *formerly* Alberta Ingenuity	$17,500	2009
NSERC-Alexander Graham Bell Canada Graduate Scholarship (CGS-M) Natural Sciences and Engineering Research Council of Canada	$17,500	2009
J.B. Reynolds Graduation Gold Medal in Physics University of Guelph	Gold Medal	2009

REFEREED PUBLICATIONS

1. Kelly, Joel A.; Manchee, C.P. Kyle; Cheng, Susan; Ahn, Jun Myun; Shopsowitz, Kevin E.; Hamad, Wadood Y.; MacLachlan, Mark J., "Evaluation of form birefringence in chiral nematic mesoporous materials" *J. Mater. Chem. C 2*(26), 5093 (2014). doi:10.1039/c4tc00451e (*Front Cover*)

2. McFarlane, S.; Manchee, C.P.K.; Silverstone, J.; Veinot, J.G.C.; Meldrum, A., “Synthesis and operation of fluorescent-core microcavities for refractometric sensing”, *Journal of Visualized Experiments* (73), e50256, doi:10.3791/50256 (2013)

3. McFarlane, S.; Manchee, C.P.K.; Silverstone, J.; Veinot, J.G.C.; Meldrum, A., “Feasibility of a fluorescent-core microcapillary for biosensing applications”, *Sensor Letters* 11(8) 1513-1518 (2013).

4. Zhi, Y.; Manchee, C.P.K; Silverstone, J.W.; Zhang, Z; Meldrum, A., “Refractometric Sensing with Silicon Quantum Dots Coupled to a Microsphere”, *Plasmonics* 8(1), 71-78 (2013).

5. Silverstone, J.; McFarlane, S.; Manchee, C.P.K.; Meldrum, A., “Ultimate resolution for refractometric sensing with whispering gallery mode microcavities”, *Opt. Express* 20(8), 8284-8295 (2012).

6. Manchee, C.P.K.; Zamora, V.; Silverstone, J.; Veinot, J.G.C.; Meldrum, A., "Refractometric sensing with fluorescent-core microcapillaries", *Opt. Express* 19(22), 21540-21551 (2011).

7. Manchee, C.P.K.; Veinot, J.G.C.; Meldrum, A., “Theory and demonstration of fluorescence-based refractometric sensing in glass micro-capillaries with a silicon nanocrystal-embedded film”. *13th International Conference on Transparent Optical Networks ICTON* (2011): 1-4.

NON-REFEREED CONTRIBUTIONS AND PRESENTATIONS

1. Manchee, C.P.K and Miller, R.J.D., “High-power, Femtosecond Laser Source at 1um for Ultrafast Science,” CSC *Canadian Chemistry Conference* (Toronto, Ontario, May

2017), *poster*

2. Manchee, C.P.K and Miller, R.J.D., "Yb:KGW Regenerative Amplifier for Femtosecond CPA Laser System at 1 μm," *Photonics North* (Ottawa, Ontario, June 2017), *oral presentation*

3. Manchee, C.P.K.; Zia, H.; Miller, R.J.D.,"Versatile, high-power femtosecond laser source at 1 μm," in *Conference on Lasers and Electro-Optics*, OSA Technical Digest (2016) (Optical Society of America, 2016), paper JTu5A.35.

4. McFarlane, S.; Manchee, C.P.K.; Zamora, V.; Silverstone, J.; Veinot, J.G.C.; Meldrum, A., "Refractometric sensing in silica microcapillaries with nanocrystal-embedded films," *Alberta Quantum-Nano Workshop* (Red Deer, Alberta, July 2011), *poster*

5. Manchee, C.P.K.; Veinot, J.G.C.; Meldrum, A., "Theory and demonstration of fluorescence-based refractometric sensing in glass micro-capillaries with a silicon nanocrystal-embedded film." *13th International Conference on Transparent Optical Networks ICTON* (Stockholm, Sweden, June 2011), *oral presentation*

RELEVANT ACADEMIC EXPERIENCE

- Ongoing development of *beamtools* Python package. Tools aiding in the design and analysis of optical beams and systems
- CSC Ultrafast Science Satellite meeting (Toronto ON, 2017), *presenter and organizer*
- Chemical Biophysics Symposium (Toronto ON, 2013-2016), *participant*
- Alberta Innovates Technology Futures Nanotechnology Showcase (Calgary AB, 2011), *participant*
    - Industrial research showcase and networking opportunity for the technical industry in Alberta

- THECIS Science to Society Workshop, (Banff Centre, Banff 2010), *participant*
    - Multi-day workshop focusing on the process of commercializing your academic research
    - Brought students, entrepreneurs, and venture capitalists together to discuss topics including patents and copyrights, company formation, and fundraising strategies
    - Students fully sponsored based on research applications and marketability

- Canadian Institute for Advanced Research (CIFAR) summer session on Nanotechnology (University of Alberta, Edmonton AB, 2010), *participant and guide*
    - Week long student-led conference allowing Canadian graduate students to present and discuss their research to a broad-based interdisciplinary audience