Michael J. Dick

California Institute of Technology Postdoctoral Scholar
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Education

University of Waterloo
PhD in Physics, May 2007, Supervisor – Dr. Peter Bernath.
Thesis: "Laser spectroscopy of calcium and strontium containing polyatomic molecules"
Selected Courses: Molecular Spectroscopy, Atomic Physics, Atmospheric Chemistry and Spectroscopy.

University of New Brunswick
MSc in Physics May 2003, Supervisor – Dr. Colan Linton.
Thesis: "Laser spectroscopy of holmium monofluoride and holmium monochloride"
Selected Courses: Quantum Mechanics, Electronic Spectroscopy of Diatomic Molecules, Microwave Spectroscopy.

University of New Brunswick
BSc in Chemical Physics, Jan. 2001
Cumulative G.P.A. - 3.8, Member of Dean's list 1996-1999

Laboratory Skills

- Extensive experience tuning and operating various laser systems and sub-millimeter wave sources.
- Vast knowledge of various spectroscopic equipment and components including, monochromators, wavemeters, filters, photodiodes, photomultiplier tubes, RF synthesizers, lenses and mirrors.
- Practice in various spectroscopic experiments including fourier transform, laser ablation/molecular jet, laser induced fluorescence, double resonance, collisional cooling and time-resolved spectroscopy.
- Broad understanding of vacuum systems, delay generators, high voltage power supplies, cryogenic refrigeration systems, waveform generators and lock-in amplifiers.

Experience

Postdoctoral Scholar
Jet Propulsion Laboratory, Pasadena, CA (09/07-present)

- Designed, built and implemented a new THz/collisional cooling apparatus to study water under interstellar conditions.
- Performed pressure broadening measurements of water and CO from 20K to 296K and analyzed results.
- Validated the new experiment by comparing the pressure broadening measurements with both previous theoretical and experimental investigations.
- Begun a time-resolved spectroscopic investigation of water in an effort to extract the state-to-state collision rates.

Research Assistant
Department of Physics, University of Waterloo, Waterloo, ON (09/03 – 05/07)

- Repaired, tuned and operated various laser systems including: titanium sapphire (Coherent 899-29), ring dye (Coherent 699-29), argon ion (Coherent Innova and Sabre) Nd:YAG (Continuum Surelite-10) and linear dye.
- Conducted laser excitation studies in the visible and near infrared regions using a laser ablation molecular jet source.
- Completed optical-optical double resonance experiments using a Broida oven flow reactor molecular source.
- Obtained, processed and analyzed high resolution spectra of various molecules including: linear polyatomics, symmetric and asymmetric tops.

Teaching Assistant
Department of Physics, University of Waterloo, Waterloo, ON (09/03 – present)

- Conducted tutorial sessions for first year physics courses.
- Lectured to a class of approximately 50 students and tutored students one-on-one.
- Oversaw weekly testing and marked both exams and assignments.
- Helped fellow teaching assistants in their preparation for instructing.
- Operated online database for the first year course including data entry, website maintenance and addressing student problems.

Research Assistant
Department of Physics, University of New Brunswick, Fredericton, NB (05/00 – 09/03)

- Repaired, tuned and operated various laser systems including: pulse dye (Lumonics HD500), ring dye (Coherent 699-29), argon ion (Coherent Sabre) and Nd:YAG (Lumonics YM600, HY400).
- Conducted laser induced fluorescence studies using a Broida oven molecular source, including dispersed fluorescence and selective detection investigations.
- Advised and instructed new students ensuring that they would quickly become accustomed to the lab.
- Coordinated and oversaw lab affairs including purchasing of supplies, maintenance of facilities and repair of equipment.

Teaching Assistant
Departments of Physics and Chemistry, University of New Brunswick, Fredericton, NB (09/00 – 05/03)

- Instructed both first and upper year lab courses in both physics and chemistry.
- Oversaw the weekly instruction of up to 40 students including general lecturing and individual explanation.
- Helped setup and coordinate lab facilities and advised on course content.
- Marked and critiqued weekly lab reports.

Honors

- Ontario Graduate Scholarship (05/06 – 05/07)
- Graduate Student Presentation Competition at the 87th Canadian Chemistry Conference and Exhibition: First Place in the Physical and Theoretical Chemistry Division. (06/04)
- Ontario Graduate Scholarship in Science and Technology (01/04 – 04/04)
- University of Waterloo Entrance Scholarship (09/03 – 08/04)
- Don Hornibrook Graduate Student Prize in Physics (02/03)
- University of New Brunswick Board of Governors Merit Award for Graduate Studies (09/01 – 05/02)
- NSERC Undergraduate Research Award (05/00 – 08/00)
- N. Myles Brown Scholarship (04/97 – 04/00)

Publications

Dick, M. J., Drouin, B. J, and Pearson, J. C. "A collisional cooling investigation of the pressure broadening of the $1_{10} \leftarrow 1_{01}$ transition of water from 17K to 200K", Journal of Quantitative Spectroscopy and Radiative Transfer (2008) (in press).

Dick, M. J., Drouin, B. J., Crawford, T. J., and Pearson, J. C. "Pressure broadening of the *J* = 5 ← 4 transition of carbon monoxide from 17K to 200K: A new collisional cooling experiment", Journal of Quantitative Spectroscopy and Radiative Transfer (2008) (in press).

Wang, J.-G., **Dick, M. J**., Sheridan, P. M., Yu, S., and Bernath, P. F. "Further spectroscopic investigations of the high energy electronic states of SrOH: The $\tilde{B}'^2\Sigma^+(000)$- $\tilde{A}^2\Pi$ (000) and $\tilde{D}^2\Sigma^+(000)$ - $\tilde{A}^2\Pi(000)$ transitions", Journal of Molecular Spectroscopy, (2007) **245** 26.

Dick, M. J., Sheridan, P. M., Wang, J.-G. and Bernath, P. F. "High-resolution laser excitation spectroscopy of the $\tilde{B}^2E$ - $\tilde{X}^2A_1$ transitions of calcium and strontium monoborohydride", Journal of Chemical Physics (2007) **126**, 164311.

Sheridan, P. M., **Dick, M. J**., Wang, J.-G. and Bernath, P. F. "High-resolution investigation of the excited electronic states of CaSH and SrSH by laser excitation spectroscopy", Molecular Physics, (2006) **104**, 3245.

Dick, M. J., Sheridan, P. M., Wang, J.-G., S. Yu and Bernath, P. F. "Optical-optical double resonance spectroscopy of the $\tilde{D}^2\Sigma^+$ - $\tilde{A}^2\Pi$ transition of CaOH", Journal of Molecular Spectroscopy, (2006) **240** 238.

Yu, S., Wang, J.-G., Sheridan, P. M., **Dick, M. J**., and Bernath, P. F. "Laser spectroscopy of the $\tilde{A}^2\Pi$- $\tilde{X}^2\Sigma^+$ 0_0^0 and $\tilde{C}^2\Pi$- $\tilde{A}^2\Pi$ 0_0^0 transitions of SrOD", Journal of Molecular Spectroscopy, (2006) **240** 14.

Dick, M. J., Sheridan, P. M., Wang, J.-G. and Bernath, P. F. "High-resolution laser excitation spectroscopy of the $\tilde{A}^2E$ - $\tilde{X}^2A_1$ transition of $SrCH_3$", Journal of Chemical Physics, (2006) **124** 174309.

Wang, J.-G., Sheridan, P. M., **Dick, M. J**., and Bernath, P. F. "Optical-optical double-resonance spectroscopy of SrOH: $\tilde{C}^2\Pi$ - $\tilde{X}^2\Sigma^+$ transition", Journal of Molecular Spectroscopy, (2006) **236** 21.

Sheridan, P. M., **Dick, M. J**., Wang, J.-G. and Bernath, P. F. "A high-resolution spectroscopic investigation of the $\tilde{B}^2A_1$ - $\tilde{X}^2A_1$ transitions of $CaCH_3$ and $SrCH_3$", Journal of Physical Chemistry A, (2005) **109** 10547.

Sheridan, P. M., **Dick, M. J**., Wang, J.-G. and Bernath, P. F. "Rotational analysis of the $\tilde{C}^2A_1$ - $\tilde{X}^2A_1$ transition of $SrNH_2$", Journal of Molecular Spectroscopy, (2005) **233** 278.

Dick, M. J., Sheridan, P. M., Wang, J.-G. and Bernath, P. F. "A high resolution laser ablation study of the $\tilde{A}^2\Pi$- $\tilde{X}^2\Sigma^+$ transition of SrCCH", Journal of Molecular Spectroscopy, (2005) **233** 197.

Linton, C., Ghosh, R. K., **Dick, M. J.** and Adam, A. G. "Laser spectroscopy of the A[16.4]8.5 – X7.5, A[16.4] – Y[0.15]8.5, and A[16.4]8.5 – Z[0.85]7.5 transitions of dysprosium monochloride", Journal of Molecular Spectroscopy, (2005) **232** 30.

Dick, M. J., Kristofferesen, A. and Linton, C. "Laser spectroscopy of the B[21.68]8-X8, B´[21.65]8-X8, and C[22.3]7-X_2 transitions of holmium monofluoride", Journal of Molecular Spectroscopy, (2005) **229** 216.

Dick, M. J, and Linton, C. "Laser spectroscopy of the B[17.7]8-X8 and C[19.3]-X8 transitions of holmium monochloride", Journal of Molecular Spectroscopy**,** (2004) **227** 187.

Dick, M. J., and Linton, C. "Laser spectroscopy of the A9-X8 transition of holmium monochloride", Journal of Molecular Spectroscopy, (2003) **217** 26.

Crozet P., Martin, F., Ross A. J., Linton C., **Dick, M. J**., and Adam, A. G. "The $\tilde{A}^2E$ - $\tilde{X}^2A_1$ system of $CaOCH_3$", Journal of Molecular Spectroscopy, (2002) **213** 28.

Oral Presentations:

Dick, M. J., Drouin, B. J, and Pearson, J. C. "Gas Phase Submillimeter Wave Spectroscopy in a Collisionally Cooled Cell", 63rd Ohio State University International Symposium on Molecular Spectroscopy, (2008).

Dick, M. J., Sheridan, P. M., Wang, J.-G. and Bernath, P. F. "High resolution laser excitation spectroscopy of $SrCH_3$, $CaBH_4$ and $SrBH_4$", 61st Ohio State University International Symposium on Molecular Spectroscopy, (2006).

Dick, M. J., Wang, J.-G., Sheridan, P. M. and Bernath, P. F. "Optical-optical double resonance spectroscopy of CaOH: Investigating the high energy states", 61st Ohio State University International Symposium on Molecular Spectroscopy, (2006).

Dick, M. J., Sheridan, P. M., Wang, J.-G. and Bernath, P. F. "Laser ablation spectroscopy of SrCCH and SrNC", 60th Ohio State University International Symposium on Molecular Spectroscopy, (2005).

Dick, M. J., Sheridan, P. M., Wang, J.-G. and Bernath, P. F. "Laser excitation spectroscopy of SrSH and CaSH", 60th Ohio State University International Symposium on Molecular Spectroscopy, (2005).

Dick, M. J., Bernath, P. F., Wang, J.-G., and Tang, J., "Laser spectroscopy of europium monofluoride", 59th Ohio State University International Symposium on Molecular Spectroscopy, (2004).

Dick, M. J., and Linton, C. "Laser spectroscopy of holmium monochloride", 58th Ohio State University International Symposium on Molecular Spectroscopy, (2003).

Dick, M. J., Linton, C., MacGregor, J. L., Adam, A. G., Crozet P., Ross A. J., "Laser spectroscopy of holmium monochloride", 57th Ohio State University International Symposium on Molecular Spectroscopy, (2002).

Dick, M. J., Kristofferesen, A. K., Linton, C., McBride, J. L., Adam, A. G., Crozet P., Ross A. J., "Laser spectroscopy of holmium containing molecules", 56th Ohio State University International Symposium on Molecular Spectroscopy, (2001).