

Draft: Catalogue and Comments: Astronomy EPO for DAA/DI

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Internal:

Historically, the University of Toronto has not been very interested in outreach, except as it relates to recruitment (though now there is a strong Community Service Learning emphasis, with its own office). There are outreach programs within the Faculty of Engineering, but these were severely cut, a couple of years ago. The Faculty of Arts and Science also has some outreach programs; see:

<http://www.artsci.utoronto.ca/futurestudents/academics/hsprograms/hs>

- **Astronomy and Space Exploration Society (ASX)** is a mostly-student organization based at U of T, which organizes a major public lecture event each year, and several smaller events. It has its own EPO program: space.society@utoronto.ca

<http://asx.sa.utoronto.ca>

- **The “Blue Book” of Media Contacts:** the University maintains a list of individuals who are willing to speak to the media. DAA/DI faculty are encouraged to register! Media Relations also offers some advice on developing press releases, and working with the media. Also: events can be listed or advertised in *The Bulletin* or on the University website.

<http://www.bluebook.utoronto.ca>

- **Centre for Science, Math, and Technology Education**, Ontario Institute for Studies in Education (OISE), part of U of T. They do education research, train grad students at the MA and PhD level, and provide pre-service (BEd) and in-service education. They are a bit of an “ivory tower”. I am a core member of SMT, and am trying to encourage more interaction with the rest of the University. Of interest to us: (i) they have a seminar and brown-bag series, to which I have invited Arts and Science colleagues as speakers (including Mike Reid and Libby Harper-Clark). (ii) For many years, I gave two-hour workshops on astronomy teaching to the Physics and General Science classes in the BEd program. A new instructor took over this year, and I did not press myself on them. *But we might be able to continue this useful function.* (iii) OISE/UT has a special interest and expertise in reaching under-served groups such as inner-city and Aboriginal; my contact and collaborator is Bev Caswell: beverly.caswell@utoronto.ca (iv) They could be able to provide us with expertise and advice about education research e.g. evaluating our programs.

<http://smt.oise.utoronto.ca>

- **Centre for Teaching Support and Innovation** offers many resources and workshops for instructors and TAs. Director: Professor Carol Rolheiser.

<http://www.teaching.utoronto.ca>

- **DAA Public Tours:** these have become very successful, thanks to the grad students. They are well presented and well attended, and probably only need “fine-tuning”. But I would be keen to see us reaching out for new and non-traditional audiences.
- **Faculty Science Instructors’ Interest Group?:** *it would be useful to have an informal “interest group” of Faculty of Arts and Science instructors with a special interest in teaching and/or EPO, for occasional meetings, notification of education colloquia etc.*
- **International Astronomy Day/Week:** has been celebrated in the DAA for many years, normally as an evening event. The attendance depends to some extent on the promotion (and on the weather), and can be dozens to hundreds.
- **Let’s Talk Science:** a national organization which, among other things, partners grad students with elementary school teachers. It has branches in most universities, including U of T; the branches provide recruitment, organization, and training. DAA grad students have occasionally participated. We should encourage our grad students to continue to do so.

<http://www.letstalkscience.ca>

- **Public Lectures:** these are held occasionally by the DAA or other partners. There would be merit to recording and archiving these, as the Royal Canadian Institute does, so they would be available anytime and anywhere. There are various endowed lectureships around the university, which we have used once or twice. Remember that the DDO came about as a result of a public lecture by C.A. Chant!
- **Reaching our Undergraduates:** the DAA has decided, on a number of occasions, that it needs to do a better job of making its program students (and maybe prospective program students, and maybe non-program students) feel part of the department – such as through informal academic and social events. *More needs to be done.*

Undergrads could also benefit (and benefit us) by participating in our EPO activities. They can be supported through the Research Opportunity Program, through the Ontario Work-Study Program etc. while doing EPO projects.

- **School of Graduate Studies:** offers special-topic workshops to graduate students. Ivan Semeniuk gave a 4-week workshop on science communication. *We could arrange one on outreach.*
- **Science Rendezvous** is a one-day science festival, held in early May. It was started at U of T, in partnership with other universities and research institutes. The DAA has participated from the beginning.

<http://www.sciencerendezvous.ca>

- **University of Toronto Mentorship Program,** administered by the Faculty of Arts and Science, enables outstanding senior high school students to work on projects at the University. I have taken 1-4 students a year since the program started in 1987, but a couple of departments, notably Mathematics, take 30-40, so *this would be an excellent way to engage up to 40 top students through a program administered through the University.* We could start next fall! But we might also want other programs for students who are more interested but less talented, and programs that were single events.

- There are many other opportunities to connect with schools; there is a school (University of Toronto Schools) affiliated with the university (though there are plans for the school to eventually disaffiliate). The students at UTS are academically very strong, and some might well appreciate a connection with DAA/DI. There is also the potential to connect, both face-to-face and through technologies such as Skype, with students at other schools, both local and remote.

Outreach to the Schools:

- **Ontario Ministry of Education and Training** sets the curriculum, and reviews and revises it every few years. I have had input, and have done the final review to make sure that it “makes sense”. The content, which also includes a large dose of space studies, is reasonable, and there is a good strong emphasis on science skills, technology, and applications to society. There is astronomical content in Grades 1, 6, 9, and 12, with the grades 6 and 9 being most intense and compulsory.
- **Physics:** There is an informal network of physics teachers, mostly from the Toronto board, which we hosted once during IYA.
- **School Boards:** The Network includes the secondary school science coordinator for the Toronto District School Board, but we should probably also have contacts with both the public and separate school boards in Toronto and surroundings, at both the secondary and elementary level. It’s hard to get things into the hands of teachers, without going through the coordinators (or STAO – see below).
- **Science Teachers Association of Ontario (STAO)**, founded in 1890, has an excellent three-day conference each fall, at which there are anything up to 25 sessions on astronomy and space. Most Ontario universities have exhibits at these excellent conferences, but U of T has little or no presence. In 2009, STAO co-sponsored a three-day teachers workshop on astronomy with us in the DAA building; it was fully funded by the Ontario Teachers Federation. They have also partnered on the development of teachers’ strategy resources for grade nine (supported by NRC) and for grade six (supported by DI/TMT) and for the use of the *GalileoScope* (supported by ASP). *They are an excellent partner.* Contact: Malisa Mezenberg, PD Coordinator: malisa_mezenberg@stao.org

<http://www.stao.org>

Greater Toronto Area:

Sara Poirier and I co-ordinate a loose network of organizations and individuals in the GTA which are involved in astronomy EPO. We recently organized the IYA kickoff in 2009 and *One World, One Sky* festival of astronomy and culture in 2010. *This network should be encouraged and supported. Coordination and partnership are always effective.*

- **Art and Astronomy:** Robin Kingsburgh is a professional astronomer and an artist; she teaches at both York University and the Ontario College of Art and Design, so she is the obvious contact for interdisciplinary EPO in this area: rkingsburgh@faculty.ocad.ca .
- **Canadian Space Resource Centre**, based at Marc Garneau CI, a science magnet school, distributes mostly-Canadian space resources to schools. Contact: Steve Lang: CSRC@rogers.com

<http://www.spacenet.on.ca>

- **Cosmic Connections:** Brian Cheaney and his staff offer daytime and evening astronomy programs in schools across the GTA: cosmicconnections@rogers.com

<http://www.cosmicconnections.ca>

- **David Dunlap Observatory** is presently operated by the RASC Toronto Centre, and still has an active EPO program. Several DAA/DI faculty, pdfs, and grad students have supported this. Contact: Paul Mortfield: Paul@theDDO.ca

<http://theDDO.ca>

- **Heritage:** the University of Toronto has an astronomical heritage stretching back to 1840, and many people are interested in this. For the past two years, I have led an annual walk for Heritage Toronto, attracting about 100 people. [The University has an Institute for the History and Philosophy of Science and Technology; DAA and IHPST occasionally organize joint colloquia.]

- **Humber College** of Applied Arts and Technology offers astronomy courses, and is involved in some EPO activity. Contact: Tatiana Ouvarova: Tatiana.Ouvarova@humber.ca

- **Journalists:** Dan Falk is the most active in astronomy-related articles, books, and radio programs in the GTA; Terence Dickinson is on the emailing list for our network. A few others occasionally write on astronomy. Jay Ingram and Bob McDonald – national figures – both have strong interests in astronomy.

The University's student newspaper *The Varsity* has an excellent science section, which we should feed material to; it's an excellent way of reaching students.

- **Later-Life Learning Courses and Lectures:** there are several groups that organize these for audiences of up to 250, most being retired professionals who can be quite supportive of the university (such as by funding scholarships, which most do). I average one course every year or two, including one in fall 2011 at Glendon College, York University. Very satisfying – these are excellent audiences!

- **North York Astronomical Association** organizes the annual *StarFest*, one of the largest summer star parties in the world. They are not formally represented in our network.

- **Ontario Science Centre** has astronomy exhibits and programs, a small but modern planetarium, school programs and teachers workshops in astronomy, and hosts the RASC Toronto Centre, which organizes occasional star parties. There are several staff members with astronomy backgrounds. *They are an excellent partner.* Contact: Sara Poirier: sara.poirier@osc.on.ca

<http://www.osc.on.ca>

- **Parks:** The RASC offers star parties in several city parks, most recently the Don Valley Brickworks, operated by Evergreen as a major centre for ecology and sustainability.

- **RASC (Royal Astronomical Society of Canada) Toronto Centre** meets twice a month at the science centre, organizes regular public star parties in parks, does school programs in the daytime and at night [contact: Leslie Harvey: leslieharvey1@gmail.com],

awards a medal to our top graduate each year, and partners with some of our outreach activities. President: Dr. Ralph Chou: president@toronto.rasc.ca

<http://toronto.rasc.ca>

- **RASC Mississauga Centre** meets at and is hosted by UTM, and organizes star parties in several locations, notably at Riverwood Conservancy, and partners with some of our outreach activities. President: Randy Attwood: jrattwood@rogers.com

<http://mississauga.rasc.ca>

- **Royal Canadian Institute** (founded 1849) offers free public lectures in the McLeod Auditorium during the fall and winter, as well as other science outreach events. There are generally one or two astronomy lectures. They are video-archived. The RASC Toronto Centre usually co-sponsors these. The Fields Institute often co-sponsors math lectures, so it would make sense for the DI/DAA to do so also, in the case of astronomy.

<http://www.royalcanadianinstitute.org>

- **Royal Ontario Museum:** (i) accommodates 30,000 schoolchildren each year in its portable planetariums; contact: outreach@rom.on.ca or schoolc@rom.on.ca; (ii) has an excellent collection of meteorites, especially the rarer kinds. Contact: Ian Nicklin (iann@rom.on.ca).
- **Solar Wind:** Cathy McWatters has a portable planetarium, and offers school programs across the GTA: solar.wind@pathcom.com
- **Toronto Public Library:** we have offered several dozen astronomy presentations in TPL branches, especially during and after IYA. They are not formally represented in our network, but we might want to include someone from the Merrill Collection of Science Fiction, located on the edge of campus. They provide an excellent infrastructure for public presentations, and excellent promotion.
- **University of Ontario Institute of Technology (UOIT)** in Durham has an astronomer, Rupinder Brar, who was 2010 winner of TVO's "Best Lecturer" award, and who is active in EPO: rupinder.brar@uoit.ca
- **York University** has a campus observatory with a very active EPO program, and a very active undergrad astronomy club. Contact: Paul Delaney: pdelaney@yorku.ca

Provincial and National

There was a very successful national partnership between CASCA, FAAQ, and RASC (see below for these acronyms) during IYA, with other national players participating through an Advisory Board, and the IYA structure established by the national Executive Committee. The committee continues, with two reps from each organization; Jim Hesser is chair: Jim.Hesser@nrc-cnrc.gc.ca A focus of BIYA in Canada, supported by a *PromoScience* grant (see below) is *reaching youth in underserved communities*, such as Aboriginal, inner-city, rural/remote.

- **Canadian Astronomical Society (CASCA)** (i) maintains a bilingual website for teachers and students (grade 6-9), university instructors, youth, amateur astronomers, and the public: www.cascaeducation.ca; (ii) administers the CASCA-Westar Lectureships, which

send experienced astronomers on two-day visits to locations far from astronomical facilities; (iii) publishes a quarterly e-newsletter *ECass* which includes useful articles on EPO for professional astronomers and grad students. Its EPO committee is chaired by Dr. Dennis Crabtree: Dennis.Crabtree@nrc-cnrc.gc.ca Under his leadership, the committee is devoting more attention to communication, using various technology.

<http://www.cascaeducation.ca>

- **Canadian Space Agency** produces resources, and organizes workshops and other programs for schools. It has a grants program, but this and its willingness to partner are not very transparent.

<http://www.asc-csa.gc.ca/eng/educators/default.asp>

- **Federation des Astronomes Amateurs du Quebec (FAAQ)** is a federation of 35 francophone clubs. It has a strong EPO program, and was a very effective partner during IYA.

<http://www.faaq.org>

- **Let's Talk Science:** see Internal, above.

- **National Research Council** has astronomy education programs and resources, both through HIA and through its Ottawa HQ. The latter distributes free posters and other resources. Ottawa contact: Margaret Kennedy: Margaret.Kennedy@nrc-cnrc.gc.ca HIA contact: Dr. Jim Hesser: Jim.Hesser@nrc-cnrc.gc.ca

<http://www.nrc-cnrc.gc.ca/eng/education/astronomy/index.html>

- **National Science and Engineering Week** is celebrated each fall, but the DAA (and U of T in general) seems not to participate, unless they organize an event which happens to fall during this week (as “One World, One Sky” did in 2010).
- **Natural Sciences and Engineering Research Council (NSERC)** Canada has a grants program (PromoScience) which supports some aspects of science EPO.

http://www.nserc-crsng.gc.ca/Promoter-Promotion/PromoScience-PromoScience/About-Apropos_eng.asp

- **Royal Astronomical Society of Canada (RASC)** has 29 branches across Canada. It has published *Sky Ways* (in English and French), a useful teachers guide to astronomy. It developed several useful resources during IYA, including easy-to-assemble starfinders. It was a very effective partner during IYA.

<http://www.rasc.ca>

- **Science and Technology Awareness Network (STAN)** is an umbrella group of organizations interested in science outreach. STAN holds an annual conference which is useful for both information and networking. *DAA/DI should consider joining.*

<http://www.scienceandtechnologynetwork.ca>

- **Scientists in Schools:** sends scientists and engineers into classrooms, using resources which SiS has developed. There is a fee for this. I'm not aware that there is a branch at U of T. Charles Dyer is the local expert.

<http://www.scientistsinschool.ca>

International:

- **International Astronomical Union**, Commission 46 oversees astronomy education and development internationally. I have been very active in the past; I am less so, now. It would be a good vehicle for anyone interested in international astronomy development e.g. in schools.

http://www.iau.org/science/scientific_bodies/commissions/46/

- **International Astronomy Olympiad** is not as well-developed as its counterparts in Biology, Chemistry, or Physics (there are at least two competing olympiads), but we are occasionally asked to promote it. The University's Departments of Biology, Chemistry, and Physics are involved in training high school students for Canada's teams.