Welcome to the monthly IOS Newsletter. We hope that this will serve to keep our community informed on the events and happenings around the IOS.

**Academic/Research**

### Quantum Coherence as a Design Tool for Solar Cells?

Prof. Gregory Scholes published an article in the latest issue of Nature Physics summarizing The Royal Society's Theo Murphy International Scientific Meeting on Quantum-Coherent Energy Transfer: Implications for Biology and New Energy Technologies that took place this past April. The article summarized some of the advances being made in understanding the effect of quantum coherence in photosynthesis as well as some of the theoretical and experimental challenges in fully understanding these systems. With significant improvements required for solar energy to become a more important component in our energy mix, the most pressing question presented at this meeting was 'how do quantum-coherent effects help?' and can they be used by scientists and engineers to develop a new generation of light harvesting materials and systems?

The full article is available at Scholes G. *Nature Physics*. 7. 2011. 448

http://www.nature.com/nphys/journal/v7/n6/full/nphys2013.html

### Bending the Rules of Quantum Mechanics

In the June issue of Science, IOS faculty member Aephraim Steinberg surprised the physics community by challenging one of the established rules of quantum mechanics. His group designed an experiment that used, for the first time, a system of "weak measurements" to observe both the wave-like and particle-like properties of light. Marlan Scully of Texas A&M University, a quantum physicist who has published on the idea of sneaking around this quantum limit before, said: "It's a beautiful series of measurements by an excellent group, the likes of which I've not seen before. This paper is probably the first that has really put this weak measurement idea into a real experimental realisation, and it also gave us the trajectories." For his part, Professor Steinberg believes that the result reduces a limitation not on quantum physics but on physicists themselves. "I feel like we're starting to pull back a veil on what nature really is."

The full paper can be found at Kocsis et al., *Science*, 2011, 332 (6034): 1170-1173

http://www.sciencemag.org/content/332/6034/1170.abstract

**Entrepreneurship**

### Techno2011 Opens

The IOS is excited to host its second annual Techno entrepreneurship workshop. Designed to provide graduate students and post-docs in physical sciences and engineering the tools necessary to transfer their technical knowledge into the core of a new company, the month long program includes lectures, work sessions, networking events, and a presentation session. Beginning on June 20th, 25 participants from the University of Toronto, University of Waterloo, University of Guelph, University of McMaster and Memorial University have been working on developing their ideas and technologies into viable products and businesses. During the first two weeks the participants learnt basic aspects of technology entrepreneurship including management fundamentals, accounting, market analysis, business model, etc. Over the final two weeks of the workshop there will be additional sessions on negotiations, financial forecasting, product development, and others, a banquet with representatives from government agencies and Toronto
Look out for information on the new companies on the IOS and Techno websites (http://techno.optics.utoronto.ca), as well as in next month's newsletter!

**IOS Spotlight - Kinetica Dynamics**

Michael Montgomery is the co-founder of Kinetica Dynamics, a University of Toronto spin-off company, and a recent graduate from the Department of Civil Engineering at the University of Toronto where he obtained his Ph.D. under the supervision of Professor Constantin Christopoulos. During his graduate studies Michael was the co-inventor of a new damping device, the Fork Configuration Damper (FCD), which enhances the damping properties of tall buildings and has the potential to improve the way high-rise buildings are designed worldwide. This new technology will not only lead to more efficient designs for high-rise buildings, but will also improve the resilience of these important structures in the wake of natural disasters such as hurricanes and earthquakes.

The underlying technology was developed after Michael identified a disconnect between the way high-rise buildings are designed and the actual behavior of high-rise buildings when they are subject to wind and earthquake vibrations, in particular the extremely low levels of inherent building damping. This low level of inherent damping leads to significant challenges in the design of these buildings and, coupled with the sharp increase in high-rise construction worldwide, there is a substantial need and a potentially very large market for such a damping system.

Over the next few years, Michael will lead the efforts of Kinetica Dynamics towards the implementation of the FCD technology in a number of high-rise buildings in Canada and beyond. Michael is a recipient of the 2011 MITACS Commercialization Fellowship and is currently housed within the IOS at the University of Toronto where, along with other fellows and with the support and strong experience of the IOS staff, he is working on the early development of Kinetica Dynamics.

**Pueblo Science Conducts first Mission to the Philippines**

Six members from Pueblo Science, the IOS's first non-profit start-up company, have recently returned from their first mission to the Philippines as part of their goal to promote science literacy in developing countries. Over their three-week trip, the team organized three 2 to 3 day workshops across different provinces, providing over 100 elementary and high school teachers with hands-on kits and experiments that they could take back and use in their own classrooms. This focus on hands-on learning and experimentation is a drastic shift away from the normal memorization-based curriculum that is prominent in these areas. With this first mission, Pueblo hopes to provide the tools and training to create a more exciting and relevant education program to increase the level of basic science literacy in the remote areas of the Philippines.

More information on the company and their missions can be found at http://puebloscience.org/
Student Activities

Research Skills Program Student Presentations

The IOS Research Skills Program teaches undergraduate students some of the key skills needed to successfully conduct independent research. On Thursday August 4th, we will host a practice presentations session and lunch to provide the students experience in formally presenting their work to a group of peers.

Events

Brown Bag Lunch on Mondays

Every Monday at noon the IOS conference room hosts informal discussions with faculty and staff on a wide variety of research problems. Bring your own lunch!