



University College Dublin,
Ireland



SPIE Student Chapter

Bi-Annual report
June – December 2005

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Chapter Activities since last report:

Members from our student chapter have attended conferences in Bulgaria, San Diego, Tucson and Boston.

Michael and Damien, along with other members of our research group, attended SPIE's 50th Annual Meeting in San Diego. Michael received an SPIE student travel grant for this conference. Members from our chapter, along with members from the DCU SPIE student chapter attended the first meeting of Optics related researchers in Ireland held in Trinity College Dublin. The event, which was organised by Prof. Chris Dainty of the Imperial College London and NUI Galway, was held over two sessions and contained presentations given by post-graduate and post-doctorate researchers and outlined the various types of optical research being carried out in Ireland. The event was a great success with a very large turnout from a wide range of institutes. More of these events should be held, to promote continuing education across the optics community in Ireland.



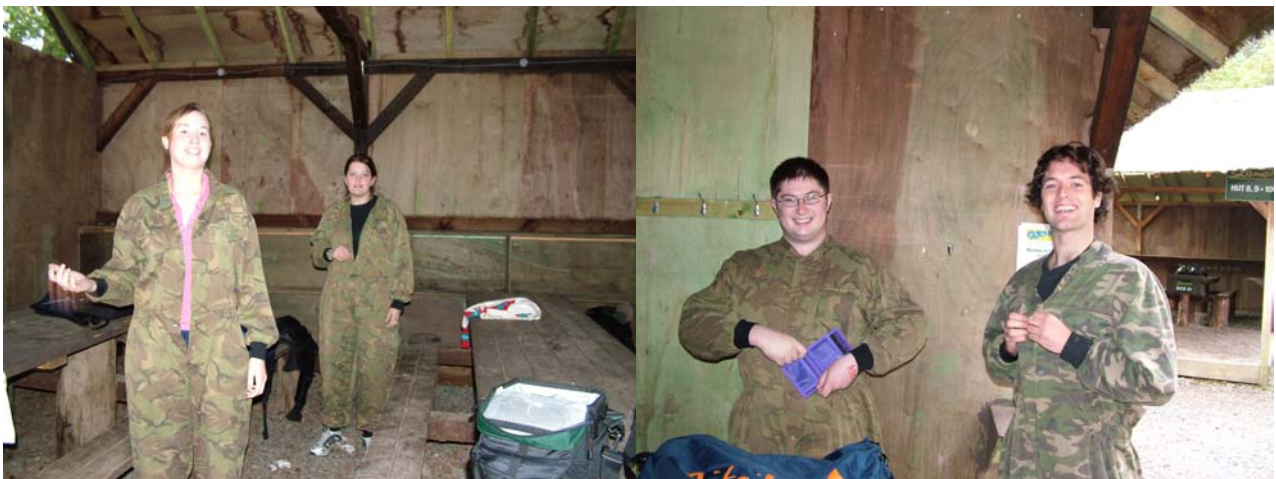
Michael Gleeson, Bryan Hennelly, John Kelly and David Monaghan enjoying the conference dinner at the Holography 2005, International Conference on Holography, Optical Recording and Processing of Information, Varna, Bulgaria.



(left) John Kelly and Michael Gleeson discuss the events and talks of the day.
(right) John Kelly enjoys a tradition Bulgarian Kebab after presenting his paper at the 'Materials for holographic and optical data storage' session. Varna Bulgaria.



September of this year saw the inauguration of the first Irish student chapter of the Optical Society of America. This OSA student chapter is based in UCD. The UCD OSA student chapter and our student chapter joined forces to organise a day trip in October. The students went paintballing followed by a social evening. The event was a great success and gave new members of the chapters a chance to get to know each other (and pelt each other with paint ☺).



Jennifer Ward, Ciara Close, John Healy and David Monaghan prepare do to battle!!!

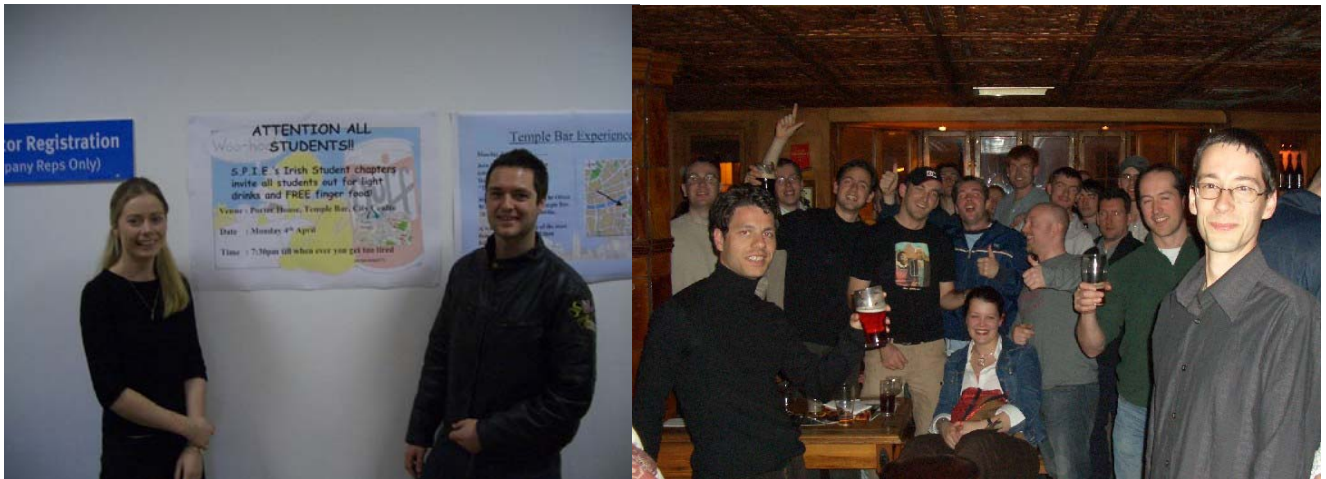


UCD OSA and SPIE student chapter members tired and sore but still smiling.

Brief review Of Opto-Ireland (April 2005)

One of the success stories of the year was of course Opto-Ireland 2005 and all that it entailed. From a student perspective it allowed their work to be presented to the international optical community in either poster or oral form in a friendly atmosphere. A large proportion of the presentations were given by students the standard of which was universally agreed to be very high. We also send our congratulations to Lisa O'Reilly who was awarded best student paper. Of course on student's minds is the daunting prospect of finally having to write up their work. Writing clearly and cogently is a skill that has to be learned but nevertheless is one that can prove difficult to master. To this end Sunny Baines organised a very helpful and well received work-shop entitled "Technical Writing for Physical Scientists and Engineers".

As, Wilde pointed out, "Everything in moderation, including moderation". With this in mind and after the dust had settled on the Poster display there was a mass exodus to the student chapter social night, organised by UCD SPIE president David Monaghan and DCU SPIE president Aisling Clarke. The night was a huge success and was attended by many international students.



DCU SPIE president Aisling Clarke and UCD SPIE president David Monaghan invite all international students to a social night out during Opto-Ireland. Student chapter social extravaganza.

The following papers have been produced by chapter members:

J. V. Kelly, M. R. Gleeson, C E. Close, F. T. O'Neill, J. T. Sheridan, S. Gallego, C. Neipp, "Temporal analysis of grating formation in photopolymer using the nonlocal polymer driven diffusion model," *Opt. Exp.*, Vol. 13, No. 18, pp. 6990-7004, 2005.

M. Gleeson, F. T. O'Neill, J. T. Sheridan, "Recording beam modulation during grating formation," *Appl. Opt.*, Vol. 44, No. 26, pp. 5475-5482, (2005).

R. F. Patten, B. M. Hennelly, D. P. Kelly, F. T. O'Neill, Y. Liu, J. T. Sheridan, "Speckle Photography: Mixed domain fractional Fourier motion detection", *Opt. Lett.*, Vol., No., pp., (Accepted for publication September, 2005, to appear 1st January 2006).

D. P. Kelly, F. T. O'Neill, J. E. Ward, R. F. Patten, B. M. Hennelly, Y. Liu, J. T. Sheridan, "Re-interpreting speckle photography with the optical fractional Fourier and the linear canonical transforms," *Asian Journal of Optics*, **INVITED PAPER**, (Accepted for publication November 2005).

D. P. Kelly, B. M. Hennelly, J. T. Sheridan, "Numerical analysis of linear optical systems," Opt. Eng., Vol., No., pp., (Accepted for publication December 2005).

J. T. Sheridan, J. V. Kelly, M. R. Gleeson, F. T. O'Neill, "Holographic data storage systems: Optimized material use through the randomisation of the stored pattern," J. Pure Appl. Opt., (Accepted for publication December 2005).

Ying Liu, Damien P. Kelly, Bryan M. Hennelly, Jennifer E. Ward, Robert F. Patten, John T. Sheridan, "Linear canonical transforms and speckle based metrology," Proc. SPIE, Vol. 5826, pp. 437-448, 2005.

C. P. McElhinney, J. Maycock, J. B. McDonald, T. J. Naughton, B. Javidi, "Three-dimensional scene reconstruction using digital holograms" Proceedings of SPIE, Opto-Ireland 2005: Imaging and Vision \bf 5823\rm, pp. 48-57, Jun, 2005.

J. Maycock, C. P. McElhinney, T. J. Naughton, J. B. Mc Donald, B. Javidi, "Three-dimensional scene reconstruction of partially occluded objects using digital holograms" \it Submitted to Applied Optics Special Issue on Task-Specific Sensing and Computational Imaging (2005).

A. E. Shortt, T. J. Naughton, B. Javidi, "Compression of encrypted digital holograms using artificial neural networks, Optics in Information Systems, Special issue on Optical Encryption", vol. 16, no.1, July 2005. (**Invited article**).

A. E. Shortt, T. J. Naughton, B. Javidi, "Quantisation compression techniques for digital holograms of three-dimensional real-world objects, NUI Colloquium 2005.

Holography 2005, International Conference on Holography, Optical Recording and Processing of Information, Varna, Bulgaria (21st-25th May, 2005).

U. Gopinathan, D. S. Monaghan, A. E. Shortt, T. J. Naughton, J. T. Sheridan, B. Javidi, "Capture, Encryption, Compression, and Display of Digital Holograms of 3D Objects," Bulgaria, (2005).

M. R. Gleeson, J. V. Kelly, C. E. Close, F. T. O'Neill, J. T. Sheridan, "Material Kinetics during Grating Formation in Acrylamide based Photopolymer Materials", Bulgaria, (2005).

J. V. Kelly, Michael R. Gleeson, F. T. O'Neill, J. T. Sheridan, Sergi Gallego, Cristian Neipp, "The examination of temporal and kinetic effects in acrylamide based photopolymer using the nonlocal polymer driven diffusion model (NPDD)," Bulgaria, (2005).

B. M. Hennelly, D. S. Monaghan, J. T. Sheridan, "Efficient Numerical Algorithms for the Special Affine Fourier Transform" Bulgaria, (2005).

B. M. Hennelly, D. Kelly, J. T. Sheridan, "Quantifying Superresolution in Phase Space" Bulgaria, (2005).

SPIE International Symposium Optical Science and Technology, SPIE's 50th Annual Meeting, (30th - July 4th August 2005), San Diego, California, USA.

Advancement in Polymer optics, design, Fabrication and Materials:

F.T. O'Neill, I. C. Rowsome, A. J. Carr, S. M. Daniels, M. R. Gleeson. J. V. Kelly, J. R. Lawrence, J. T. Sheridan, "Micro-optical elements produced using an photo-embossing technique in photopolymers", Proc. SPIE Vol. 5872-9, AM05-OEI406-13, 2005. **INVITED ORAL PRESENTATION**

Recent Developments in Traceable Dimensional Measurements III:

Ying (Lucy) Liu, J. E. Ward, D. P. Kelly, B. M. Hennelly, J. T. Sheridan, "Plane and Spherical Wavefronts and their application to Speckle Photography based Metrology Systems", Proc. SPIE Vol. 5879-24, AM05-OEI216-32, 2005.

Optical Information Systems III:

D. S. Monaghan, U. Gopinathan, T. J. Naughton, J. T. Sheridan, "Digital Optics, Digital Holography and Optical Encryption", Proc. SPIE Vol. 5908-22, AM05-OEI312-33, 2005. **INVITED ORAL PRESENTATION**

D. P. Kelly, B. M. Hennelly, J. T. Sheridan, "Analytical and Numerical analysis of Linear Optical Systems", Proc. SPIE Vol. 5908-14, AM05-OEI312-28, 2005.

A. E. Shortt, T. J. Naughton, B. Javidi, "Compression of digital holograms of three-dimensional objects using the wavelet transform", 2005 vol. 5908-05 OEI312. **(Invited paper)**.

C. P. McElhinney, J. Maycock, T. J. Naughton, J. B. McDonald, B. Javidi, "Extraction of three-dimensional shape information from a digital hologram" vol. 5908-05 (2005).

J. Maycock, C. P. McElhinney, J. B. McDonald, T. J. Naughton, B. Javidi, "Independent Component Analysis Applied to Digital Holograms of Three-Dimensional Objects" vol 5908-06 (2005).

A. E. Shortt, T. J. Naughton, B. Javidi, "Nonuniform quantization for compression of encrypted digital holograms," vol. 5908-53 OEI312, (2005).

Optical Holographic Materials and Applications III:

J. V. Kelly, F. T. O'Neill, J. T. Sheridan "The use of the nonlocal diffusion model in describing grating evolution for short exposures in an Acrylamide based photopolymer", SPIE Vol. 5939-20, AM05-NP426-14, 2005.

M. R. Gleeson, C. E. Close, J. V. Kelly, F. T. O'Neill, M. Kennedy, J. T. Sheridan, "Control and measurement of physical parameters in the process of fabricating holographic gratings in Acrylamide based photopolymers", SPIE Vol. 5939-27, AM05-NP426-17, 2005.

C. E. Close, M. R. Gleeson, J. V. Kelly, F. T. O'Neill, M. Kennedy, J. T. Sheridan, "The Impact of Inhibition Mechanisms in Non-Local Photopolymer Materials", Proc. SPIE Vol. 5939-28, AM05-NP426-18, 2005.

Frontiers in Optics/Laser Science, Optical Society of America Annual Meeting, Tucson, Arizona, USA. (15th - 21st October 2005).

U. Gopinathan, D.S. Monaghan, T.J. Naughton, J.T. Sheridan, "An Optical Encryption Scheme that uses Polarization of Coherent Light", Image Information, Restoration and Encryption, Accepted June, 2005

C. E. Close, J. V. Kelly, M. R. Gleeson, F. T. O'Neill, J. T. Sheridan, "Material Kinetics during Fabrication of Holographic Gratings in Acrylamide-based Photopolymer", 2005.

LEOS Annual Meeting in Sydney, Australia, (23rd - 27th October, 2005).

U. Gopinathan, D.S. Monaghan, T.J. Naughton, J. T. Sheridan, "Strengths and limitations of optical techniques for 2D and 3D data encryption", 2005. **INVITED ORAL PRESENTATION**

OE05, Optics East 2005 SPIE Optics East 2005, Three-Dimensional TV, Video, and Display IV. Boston, USA, (23rd - 26th October 2005).

J. Maycock, C. P. McElhinney, A. E. Shortt, T. J. Naughton, J. B. McDonald, B. M. Hennelly, U. Gopinathan, D. S. Monaghan, J. T. Sheridan, B. Javidi, "Holographic image processing of three-dimensional objects", 2005. **INVITED ORAL PRESENTATION**

10th Europe, Middle East and Africa (EMEA) Academic Forum Gdansk, Poland, (17th - 20th May 2005).

J. T. Sheridan, J. V. Kelly, M. R. Gleeson, C. E. Close, F. T. O'Neill, "Holographic recording materials and data storage", 2005. (poster)

J. T. Sheridan, D. Kelly, R. Patten, Y. Liu, B. M. Hennelly, "Optical Signal processing and metrology", 2005. (poster)

J. T. Sheridan, D. S. Monaghan, U. Gopinathan, T. J. Naughton, "Digital holography and optical encryption", 2005. (poster)

Optics and Photonics Network, Trinity College Dublin, (31st August 2005).

U. Gopinathan, D. S. Monaghan, J. T. Sheridan, T. J. Naughton, "Polarisation based optical signal processing", 2005. (lecture)

Future Activities:

We are planning on running a number of team building social activities in conjunction with the UCD OSA chapter. We are looking into bringing over an invited speaker, from SPIE's invited speaker list, in the new year. Officer elections will be held in January 2006 at the student chapters AGM. Several members of the chapter will be attending and presenting papers at Photonics Europe in Strasbourg, France. Our Vice-president Michael Gleeson is also looking into organising a field trip to the Intel plant in Dublin.

Chapter members and their supervisors at the Engineering building in University College Dublin.



Back-row (left to right): Dr. Unnikrishnan Gopinathan, Conor McElhinney, Alison Shortt, Dr. Thomas Naughton, David Monaghan, Ciara Close, Ying (Lucy) Lui, Dr. John Sheridan. Front-row (left to right): John Ging, Johnathan Maycock, John Kelly.

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