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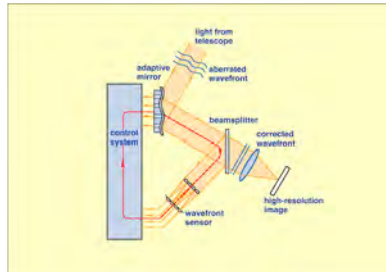
http://optics.nuigalway.ie



Research Cluster and Interests: Optics Applied Optics Group

The Applied Optics Group was formed in 2002 under a €5.2M grant from Science Foundation Ireland, and funding was renewed in 2007 until 2012 at €4.5M. Currently there are approximately 25 researchers in the group, including 14 PhD students and academic staff (Chris Dainty, Nicholas Devaney and Alexander Goncharov). Additional funding comes from Enterprise Ireland, the EU, IRCSET and industry.

Research projects in the Applied Optics Group range from topics in vision to those in optical lithography. Several projects involve the technique of adaptive optics, shown schematically in the figure on the left. The key parts are the wavefront sensor, deformable mirror and the control system.



Several other projects involve imaging in the eye, with or without adaptive optics. Another research area is optical propagation through turbulence and the application to free space optical communication. This involves an understanding of the role -- and elimination -- of optical vortices.

In 2009, the Applied Optics Group expects to have 3-5 fully funded PhD posts available. These include specific topics, such as an industrially funded project on vector polarimetry (a new method of imaging based on polarisation and electromagnetic theory), optics in exascale computing (an IRCSET Embark project with IBM Ireland) and smart optics (either IRCSET Embark with Fotonation Tessera or SFI funded) and open ones in any of the Group's research areas. The group is well equipped for the research areas pursued. Several lecture courses (e.g. Diffraction and Imaging, Geometrical Optics and Optical Design, Image Processing) are given by staff members of the group, and professional skills courses are offered each year. Each PhD student is expected to attend and present papers at one international conference per year. Frequent Colloquia and Group Meetings are held throughout the year. There is extensive opportunity for interaction with industry: in the past two years, we have established relations with more than 40 companies, 75% of them based in Ireland.

Selected Recent Publications:

H H Barrett, J C Dainty and D Lara, 'Maximum-likelihood methods in wavefront sensing: Stochastic models and likelihood functions', *J Opt Soc Am A* **24** 391-414 (2007)

E Dalimier, J C Dainty and J Barbur, "Effects of higher order aberrations on functional vision as a function of light level", *J Modern Optics* **55** 791-803 (2008)

A Goncharov, M Nowakowski, M T Sheehan and J C Dainty, "Reconstruction of the optical system of the human eye with reverse ray-tracing", *Optics Express* **16** 1692-1703 (2008)

E Logean, E Dalimier and J C Dainty, "Measured double pass intensity point spread function after adaptive optics correction of ocular aberrations", *Optics Express* **16** 17348 – 17357 (2008)