Aston University
Engineering & Applied Science

Rigorous, Relevant
Research

Photonics

Introduction

The Photonics Research Group has a world-recognised record of achievement in ultrafast optical transmission and processing, and in fibre optic components formed by laser inscription techniques. It is an acknowledged centre of excellence for experimental and theoretical research in fibre grating technologies and their applications in optical communications components, sensors and biomedical techniques, optical soliton transmission, high speed optical systems, fibre optic sensors, and all-optical networks. Now comprising more than 40 research staff and students, the Group is among the largest in photonics research in the UK, and pursues a diverse range of theoretical and experimental device – and system-level topics at the leading edge of technology. It has an extensive patent portfolio administered by the Aston Business Partnership Unit, and its activities have led to the formation of a series of start-up companies. It maintains fertile collaborations with industrial companies and academic institutions throughout the world.

Sponsors and funders

EPSRC, TSB (DIUS), EU, MoD, Industrial companies, US Air Force, Leverhulme Trust, Wellcome Trust, Royal Society, etc.

Academic partners

The Photonics Research Group maintains active collaborations with numerous UK and overseas universities and research institutes.

Key projects

- Fibre grating technology and its applications
- Fibre optic sensors
- Femtosecond laser processing of materials
- Bio-photonics
- High capacity fibre optic transmission systems
- Planar integrated optics
- Polymer fibre optics
- Microwave optics and RF-on-fibre systems
- Nonlinear optical devices and interactions
- All-optical processing
- Optical networking
- Ultrafast laser diodes and optoelectronics
- Medical applications of photonics
- Mathematical modelling of optical communication systems and networks
- Dynamics and stability of nonlinear coherent structures and soliton theory
- Theory of self-focusing and wave collapse
- Smart structure applications
- New laser materials.

Recent publications

- Allsop T, Carroll KE, Lloyd G, Webb DJ, Miller M and Bennion I, 2007 “Application of long-period grating sensors to respiratory plethysmography” J Biomedical Optics, 12, pp 064003.
- Carroll KE, Zhang C, Webb DJ, Kalli K, Argyros A and Large MC, 2007 “Thermal response of Bragg gratings in PMMA microstructured optical fibers” Optics Express, 15, pp 8844-8850.
- Shu X, Sugden K and Bennion I, 2008 “Apodisation of photo-induced waveguide gratings using double-exposure with complementary duty cycles” Optics Express, 16, pp 2221-2225.
- Zhou K, Chen X, Lai Y, Sugden K, Zhang L and Bennion I, 2008 “In-fibre polymer-glass hybrid waveguide Bragg grating” Optics Letters, 33, pp 1650-1658.
- Petrovic J, Lai Y, and Bennion I, 2008 “Numerical and experimental study of microfluidic devices in step-index optical fibres” Applied Optics, 47, pp 1410-1416.
- Karalekas V, Ania-Castañón JD, Pérez-González J, Chen X, Zhang L and Harper P, 2007 “Performance optimization of ultra-long Raman laser cavities for quasi-lossless transmission links” Optics Communications, 277, pp 214-218.
- Ams M, Marshall GD, Dekker P, Dubov M, Mezentsev VK, Bennion I and Withford MJ, 2008 “Investigation of ultrafast laser-photonic material interactions: challenges for directly written glass photonics” IEEE J Selected Topics in Quantum Electronics, 14.
- Derevyanko S and Turitsyn SK, 2007 “Bit-error probability for direct detection of optical RZ signal degraded by ASE noise and timing jitter” J Lightwave Technology, 25, pp 638-643.

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