University of Birmingham

Professor Shuang Zhang BSc,MSc,PhD

Professor of Metamaterials

School of Physics and Astronomy (/schools/physics/index.aspx)

Contact details

Telephone **+44 (0) 121 414 4719 (tel:+44 121 414 4719)**

Email **s.zhang@bham.ac.uk (mailto:s.zhang@bham.ac.uk)**

School of Physics and Astronomy
University of Birmingham
Edgbaston
Birmingham
B15 2TT
UK

About

Shuang Zhang is a Professor in the school of Physics & Astronomy.

Professor Shuang Zhang has published over 50 research papers in journals including Nature, Nature Physics, Nature Materials, Nature Communicatons, Physical Review Letters, Nano Letters and Optics Express.

He is the recipient of 2010 IUPAP award in Optics for his pioneering work on optical metamaterials.

Group Website:**http://www.metagroup-bham.co.uk/ (http://www.metagroup-bham.co.uk/)**

Adobe Flash Player or QuickTime is required for video playback. Get the latest Flash Player Get the latest version of QuickTime

Qualifications

- PhD in Electrical Engineering, Univ New Mexico, 2005
- MS in Physics, Northeastern Univ (USA) 1999
- BS in Physics, Jilin Univ (China), 1993

Biography

Professor Shuang Zhang received BS in Physics from Jilin University, Changchun, China, in 1993, MS. in Physics from Northeastern University, Boston, MA, in 1999, and Ph.D in Electrical Engineering from the University of New Mexico, Albuquerque, in 2005.

From December 2005 to August 2006, he was a Postdoctoral Research Fellow at the University of Illinois at Urbana-Champaign, and from August 2006 to March 2010, he was first a Postdoctoral Research Fellow and later an Assistant Research Engineer at the University of California Berkeley. In March 2010, he took the position of Reader in the School of Physics & Astronomy, University of Birmingham, and was promoted to professor in March, 2013.

Professor Zhang is the recipient of IUPAP (International Union of Pure and Applied Physics) Young Scientist Prize in Optics, 2010 for his research on optical metamaterials.

Professor Zhang's recent work on macroscopic invisibility cloaking of visible light was selected as "top 10 breakthroughs for 2010" by Physics World, "top 100 stories in 2011" by Discover Magazine, and received numerous media coverage including BBC News, Telegraph, Channel 4, ITV, Guardian, Fox News, USA Today, MSNBC.

Teaching

* Year 3 Photonics Lab

* Midlands Physics Alliance (MPAGS) postgraduate module "Nanophotonics and Metamaterials"

Postgraduate supervision

Supervision of the following research PhD students in Metamaterials and Plasmonics:

- Mark Lawrence
- Mitchell Kenney
- Yao-Ting Wang
- Biao Yang
- Xueqian Zhang
- Qinghua Guo
- Wenlong Gao
- Naomi Waterman

Past PhD students:

- Lingling Huang
- Shumei Chen

Research

Research Themes

- Optical metamaterials
- Transformation Optics and Invisibility
- Plasmonics
- Nonlinear Optics
- Super-resolution imaging
- Opto-electronics

Research Activity

Professor Zhang's research has centred on the development of plasmonic devices and optical metamaterials whose electromagnetic properties cannot be obtained from nature materials. His contributions to this field include the design and demonstration of the first bulk optical negative-index metamaterials— fishnet metamaterial, the first mid-infrared magnetic metamaterials and the first terahertz chiral negative index metamaterials, and the first optical invisibility cloak of macroscopic size.

He has also been involved in the development of optoelectronic devices, such as semiconductor distributed feedback lasers, infrared single photon detectorsand plasmonic enhanced infrared detectors.

Professor Zhang's current research focuses on the integration of optoelectronics, plasmonics and metamaterials to achieve the active control of the nanophotonic devices, and to investigate new functional photonic materials with exotic optical properties and applications.

Other activities

Programme co-chair, IEEE Nano, 2012 (Birmingham)

Symposium organizer, MRS, 2013 (San Francisco)

subcommittee member, CLEO/QELS

subcommittee member, Fronter in Optics

Referee for journals including Nature, Science, Nature Materials, Nature Photonics, Nature Communications, Light: Science & Applications, Scientific Reports, Phys. Rev. Lett., Nano Lett., Phys. Rev. B, Appl. Phys. Lett., Opt Lett., Opt. Exp.

Publications

Selected publications:

A complete list of my publications is available at **Researcher ID (http://www.researcherid.com/rid/G-5224-2011)** and **google scholar citations (http://scholar.google.com/citations?user=sepjZ3sAAAAJ&hl=en)**

Guoxing Zheng, Holger Mühlenbernd, Mitchell Kenney, Guixin Li, Thomas Zentgraf and **Shuang Zhang**, "Metasurface holograms reaching 80% efficiency", ***Nature Nanotechnology***, doi:10.1038/nnano.2015.2 (2015).

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Y. Montelongo, J. O.Tenorio-Pearl, C. Williams, **S Zhang**, W. Ireland Milne, T. D. Wilkinson, "Plasmonic nanoparticle scattering for color holograms", ***PNAS***, 111, 12679 (2014)

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Guixin Li, Ming Kang, Shumei Chen, **Shuang Zhang**, Edwin Yue-Bun Pun, K. W. Cheah, and Jensen Li, "**Spin Enabled Plasmonic Metasurfaces for Manipulating Orbital Angular Momentum of Light (http://pubs.acs.org/doi/abs/10.1021/nl401734r)** ", ***Nano Letters***, 11, 4148 (2013)

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Lingling Huang, Xianzhong Chen, Benfeng Bai, Qiaofeng Tan, Guofan Jin, Thomas Zentgraf & **Shuang Zhang**, "**Helicity Dependent Directional Surface Plasmon Polariton Excitation Using a Metasurface with Interfacial Phase Discontinuity (http://www.nature.com/lsa/journal/v2/n3/full/lsa201326a.html)** ", ***Nature - Light: Science & Applications***, 2, e70 (2013)

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Expertise

Metamaterials with optical properties going beyond that of nature materials; plasmonics for controlling light in the nanoscale; transformation of optics and invisibility cloaks; nano-fabrication; optoelectronics

Media experience

Shuang's work in developing 'invisibility cloaks' was covered extensively in the national press including video content for **the Guardian (http://www.guardian.co.uk/science/video/2011/feb/03/scientists-invent-invisibility-cloak-video?INTCMP=SRCH)** and articles in the **Daily Mirror (http://www.mirror.co.uk/news/weird-world/2011/02/02/harry-potter-style-invisibility-cloak-built-by-scientists-115875-22893350/)** and **Metro (http://www.metro.co.uk/news/866472-big-ideas-for-the-future-include-invisibility-cloaks-and-rhubarb-that-prevents-cancer)**.

Alternative contact number available for this expert: **contact the press office (http://www.birmingham.ac.uk/news/contacts/index.aspx)**

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