Curriculum Vitae

PERSONAL INFORMATION

First Name:	Rui	Family Name:	Zhang
Email Address:	rz10@phy.duke.edu	Phone:	(919) 660-2506
Current Position:	Research Scientist	Current Advisor:	Daniel Gauthier
Address:	Physics Building, Duke University, Durham, NC, 27705, USA		

EDUCATION CAREER

Ph.D. in Optics, University of Bonn, Germany 2006
Dissertation: Propagation of Ultrashort Light Pulses in Tapered Fibers and Photonic Crystal Fibers

Certificate Equivalent to Diploma in Germany, University of Bonn, Germany 2003
Thesis: Group and phase velocity in a birefringent time retarding device

Bachelor's Degree in Physics, Tsinghua University, Beijing, P. R. China 2001

JOURNAL PUBLICATIONS

- R. Zhang, H.L.D. de Calvacante, D.J. Gauthier, J.E.S. Socolar, M. Adams, D.P. Lathrop, "Boolean Chaos," Phys. Rev. E 80, 045202(R) (2009).
- H.L.D. de Calvacante, D.J. Gauthier, J.E.S. Socolar, and R. Zhang, "On the Origin of Chaos in Autonomous Boolean Networks," to appear in Philos. Trans. Royal Soc. A (2009).
- R. Zhang, J. Teipel, and H. Giessen, "Supercontinuum Generation by Liquid-core Photonic Crystal Fiber," Opt. Express **14**, 6800-6813 (2006).
  http://www.opticsinfobase.org/abstract.cfm?URI=oe-14-15-6800.
- R. Zhang, X. Zhang, D. Meiser, and H. Giessen, "Mode and group velocity dispersion evolution in the tapered region of a single-mode tapered fiber," Opt. Express **12**, 5840-5849 (2004).
  http://www.opticsinfobase.org/abstract.cfm?URI=oe-12-24-5840.
- R. Zhang, J. Teipel, X. Zhang, D. Nau, and H. Giessen, "Group velocity dispersion of tapered fibers immersed in different liquids," Opt. Express **12**, 1700-1708 (2004).
  http://www.opticsinfobase.org/abstract.cfm?URI=oe-12-8-1700.
- R. Zhang and H. Giessen, "Polarization maintaining tapered fiber," in preparation.

PRESENTATION

- R. Zhang, H.L.D de Cavalcante, Z. Gao, M. Adams, J.E.S. Socolar, D.J. Gauthier, and D.P. Lathrop, "Ultra-Wide Band Digital Chaotic Circuits - Part I: Introduction and Implementation, " Dynamics Days 2009, San Diego, CA, 2009.
- H.L.D de Cavalcante, R. Zhang, Z. Gao, M.A dams, J.E.S. Socolar, D.J. Gauthier, and D.P. Lathrop, "Ultra-Wide Band Digital Chaotic Circuits - Part II: Characterization and Details, " Dynamics Days 2009, San Diego, CA, 2009.
- R. Zhang , J. Teipel, D. Türke, H. Giessen . "Generation of white light laser radiation in tapered fibers," Proc. SPIE Vol. 6101, 61010H, San Jose, USA (2006).
- R. Zhang, J. Teipel, and H. Giessen, "Supercontinuum Generation using a Liquid-core Photonic Crystal Fiber," Frühjahrstagung der DPG Frankfurt 2006 [talk Q 55.2].
- R. Zhang and H. Giessen, "Polarization maintaining tapered fiber," Frühjahrstagung der DPG Frankfurt 2006 [talk Q

55.5].

- R. Zhang, J. Teipel, D. Türke and H. Giessen, "White light generation in tapered fibers: basic research and applications," Photon. Europe 2006, Strasbourg, France [invited talk 6190-12].
- R. Zhang, S. Pricking, X. P. Zhang, and H. Giessen, "Mode and group velocity dispersion evolution in the tapered region of a single-mode tapered fiber," Frühjahrstagung der DPG Berlin 2005 [talk Q 15.2].

WORK EXPERIENCE

Duke University, USA

Research scientist 2008-present

- Current research interest: demonstrating slow light delay over a wide bandwidth in the near infrared, and developing new type of optical coherence tomography.
- Found Boolean chaos by building a simple network of electronic logic gates that are not regulated by a clocking signal. The resulting power spectrum is ultrawide band, extending from dc to beyond 2 GHz. Electronic Boolean chaos may find application as an ultrawide-band source of radio waves.
- Developed Boolean model to qualitatively reproduce the observed chaos in the electronic logic gates network. The model includes history-dependent time delays associated with the propagation of information from one circuit element to another, rather than the typical models based on synchronous (clocked) or random asynchronous updating rules. The simplicity of the Boolean models, including only logic functions and time delays, makes it very efficient to simulate and analyze the network.

University of Bonn, Germany (Ultrafast Optics Lab)

Research assistant 2002-2006

- Measured and analyzed spectral, temporal, and polarization properties of supercontinuum generation.
- Solved nonlinear Schrodinger equation (NLSE) and coupled NLSE to model and analyze the light propagation in tapered fibers and photonic crystal fibers.
- Designed novel highly nonlinear fibers for supercontinuum generation by filling a highly nonlinear liquid into hollow photonic crystal fibers. Theoretical simulations show that the spectrum generated by this novel nonlinear fiber ranges from 700 nm to more than 3000 nm. In order to accomplish this task, a complete quantitative response function of carbon disulfide in the femto-second and pico-second regime was determined.
- Investigated a tapered fiber with elliptical cross section in the waist region, which was demonstrated to exhibit excellent polarization maintaining properties. The theoretical model was built by using Mathieu functions. Coupled nonlinear Schrodinger equation was solved to analyze the polarization properties of the supercontinuum generation using such a fiber.
- Demonstrated a practical and convenient way to tailor the group velocity dispersion of tapered fibers by immersing the fibers in liquids (such as acetonitrile, pentane, hexane, and liquid Series AAA from Cargille Labs). This method makes tapered fiber a challenging device to generate supercontinuum radiation in the near infrared region.
- Modeled the transverse modal distribution, nonlinear parameter, and group velocity dispersion in the taper transition region of a tapered fiber.
- Designed time retarding device using BBO crystal to control the time delay of a beam.

PROFESSIONAL ACTIVITIES

Reviewer for Optics Express, Optics Letter, Journal of the Optical Society of America B, Optics Communication, and IEEE Journal of Lightwave Technology.