复旦大学物理系 物质科学报告

Time: 2:00pm, Tuesday, 2018.6.05

Location： Physics Building (Jiangwan), Room C108

Making irregular structures in telecom fibers

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Telecom fibers are designed for high speed communication transmission over long distances. They have advantages of low loss, low nonlinearity and easy to handle. However they are not designed for fiber based components; the most famous fiber device is the Fiber Bragg Gratings (FBGs), which was fabricated by phase mask with equal spatial period index modulation on telecom fibers to enhance coherent property of the light source as a narrowband filter. Here I will talk about a different technique to manipulate the coherence of the light source by enhancing fiber scattering with random index modulation periods to replace laser cavity mirrors, the irregular periods formed local interference pattern over a few centimeters fibers generating “massive modes”, which in fact gives ultra-narrow linewidth laser, the massive modes also create real time Gb/s random number generation, simultaneous high order Stokes waves lasing as frequency comb, tunable microwave generator, and multi-parameter sensing.

Xiaoyi Bao is the Canada Research Chair professor (Tier I) in Fiber Optics and Photonics in Center for Research in Photonics, physics department, University of Ottawa, Canada. She has been a professor in the University of Ottawa since 2000. Her research interests range from study of nonlinear effects in fibers to design and fabricate the hybrid specialty fiber waveguides to make fiber device, lasers and sensors. For her contributions to fiber optic technology, she was elected as a fellow of Academy of Science, Royal Society of Canada in 2009, OSA and SPIE. She received honorary Doctor Degree from the University of Lethbridge (Canada) in 2015, the Canadian Association of Physics (CAP) Medal for Outstanding Achievement in Industrial and Applied Physics (2013); CAP-INO Medal for Outstanding Achievement in Applied Photonics (2010).