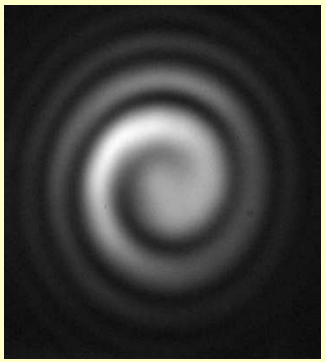
# Columbia University Optics Seminar

## "Scaling Network Capacity by *Twisting* light"


**Professor Siddharth Ramachandran**
ECE Department & Photonics Center
Boston University, Boston, MA


*Date/Time: Monday, June 3d, 11AM –12PM*
*Location: 750 Schapiro CEPSR Interschool Lab*




**Abstract:** In the last decade, perhaps the most extensively studied complex beam-shape of light is the class of vortex beams, which possess phase or polarization singularities. These beams are interesting because they resemble the emission patterns of single molecule dipoles, and they carry orbital angular momentum in addition to spin (polarisation). They have several potential applications, such as laser-based electron and particle acceleration, higher-dimensional quantum encryption, information capacity scaling, single-molecule spectroscopy and nano-scale imaging.

A recently developed fiber that resembles an anti-guide, which closely mirrors the field profile of optical vortices, has enabled their stable generation and propagation in optical fibers, for distances of up to kilometres for the first time. This talk will discuss recent results and intriguing possibilities enabled by fiber propagation of beams that have long been considered interesting, but hitherto unstable in nature. Specifically, we will consider their ramifications for scaling the data-transmission capacity of optical fiber networks using orbital angular momentum as a new degree of freedom.


**Bio:** Dr Siddharth Ramachandran obtained his Ph.D. in Electrical Engineering from the University of Illinois, Urbana-Champaign, in 1998. Thereafter, he joined Bell Laboratories as a Member of Technical Staff and subsequently continued with its spin-off, OFS Laboratories. After a decade in industry, Dr. Ramachandran moved back to academics in 2010, and is now an Associate Professor in the Department of Electrical Engineering at Boston University.

Prof. Ramachandran's research focuses on the optical physics of guided waves. He has authored ~200 refereed journal and conference publications, more than 40 invited talks, plenary lectures and tutorials, 3 book-chapters, edited one book, and has been granted over 30 patents. For his contributions in the field of fiber-optics, he was named a Distinguished Member of Technical Staff at OFS Labs in 2003, and a fellow of the Optical Society of America (OSA) in 2010. He served as a topical editor for Optics Letters from 2008-2011, and is currently an associate editor for the IEEE Journal of Quantum Electronics, in addition to serving on numerous conference and grant-review committees in the field of optics and applied physics.

Hosted by the **Professor Keren Bergman** For further information: e-mail bergman@ee.columbia.edu