

Optical Fiber Communications LU LAB

呂研究室



Principal Investigator:
Guo-Wei LU (Associate Professor)

Advanced Optical Modulation Format and its All-Optical Processing

Keywords: fiber optical communications, photonic networks, optical modulation formats, all-optical signal processing

Background and Motivation

Fiber-optic communication systems form the high-capacity transport infrastructure that enables and supports the exponentially-growing broadband “Big Data” services and advanced Internet applications. The demand for higher per-fiber transport capacities and, at the same time, the drive for lower costs per end-to-end information bit has led to optical networks with ultra-fast capacity, high energy and spectrum efficiencies. Among enabling technologies, advanced optical modulation formats have become key to the design of modern optical fiber communication systems. Our research work mainly focuses on the following topics: (i) advanced modulation formats for next-generation ultra-fast optical networks, and (ii) all-optical signal processing techniques for achieving network functionality in an optical manner.

Originality

The originality of the research project consists in: (i) proposing and implementing the flexible and reconfigurable transmitter and receiver subsystems using off-the-shelf components with high cost efficiency and reduced implementation-complexity; (ii) applying the proposed modulation-level-scalable flexible transmitter concept to short-reach or long-range optical networks to realize network functionalities for dynamic optical networks; (iii) addressing the energy and power efficiency issue in optical transmission systems by exploiting novel modulation formats; and (iv) experimentally demonstrating the network functionalities using the nonlinearity in novel nonlinear fiber or semiconductor devices, such as quantum-dot semiconductor optical amplifiers.

Impact and Perspective

To support the exponential increase in “Big Data” and Internet data traffic, innovative technologies are required to develop ultra-fast, power- and spectrum- efficient optical networks. Our research works range from the development of reconfigurable transmitter, receiver subsystems to the design of flexible all-optical cross-connect nodes for the next-generation flexible optical network, which is identified as the solution for smooth system upgradability towards Terabit-per-second capacities. We are working on relevant enabling techniques to address the growing trend towards a more flexible photonic layer with dynamic configurability.

■ For more information:

http://www.u-tokai.ac.jp/tuiist/tt/announcement_lu.htm

■ CONTACT:

Guo-Wei LU, Ph.D.
Tokai University Institute of Innovative Science and Technology
4-1-1 Kitakaname, Hiratsuka City, Kanagawa 259-1292 JAPAN
Phone +81(0)463-58-1211 (Ext. 4090)
Fax +81(0)463-50-2478
Email gwlu@tokai-u.jp

