

**Call for application for research scholarships
for post-graduate international candidates
RESEARCH PROJECT N. 15**

Title

Spatial Division Multiplexing: an enabler for future Petabit/s Optical Networks

Scientific responsible (name, surname, role)

Andrea Carena, Associate Professor (andrea.carena@polito.it)

Short description of the research activity (max 250 words)

In the last decades, network traffic has grown exponentially following cumulative annual growth rates (CAGRs) varying from 20% to 100%, depending on traffic types, applications and distances. The physical layer transport in next generation optical networks needs to keep up with such CAGR and deliver capacities reaching Petabit/s per fiber: a promising novel technology proposed during the last years is Spatial-Division-Multiplexing (SDM). Advanced SDM solutions are based on two approaches: multi-core (MCF) fibers and multi-mode (MMF) fibers. Furthermore, the two approaches are not mutually exclusive and have been combined in some of the above experiments.

Both solutions are driving the development of further new technologies needed to implement a complete SDM system: spatial multiplexer/demultiplexer, new fibers, SDM amplifiers and other components like add-drop multiplexers and cross-connects.

The research activity will cover two main areas:

1. study of SDM solutions, with focus on fiber propagation: building models and simulation tools to investigate capabilities of both MCF and MMF in order to evaluate the potential of these new technologies;
2. experimental demonstration of SDM systems: building a prototype of a high capacity (Petabit/s per fiber) optical transmission system based on MCF/MMF;

Simulations will be carried out on the OptCom cluster of servers based on last generation of CPUs and GPUs.

Experimental activities will be performed in the framework of PhotoNext the inter-departmental center of Politecnico di Torino for photonics technologies (www.facebook.com/PhotoNext).

Specific requirements (experiences, skills)

A background on electromagnetic fields theory, fiber propagation and digital transmission is preferred. Knowledge of Matlab environment is preferred.

Website of the research group (if any)

www.optcom.polito.it

Keywords (min 3, max 6)

Optical communication, Fiber optic, Photonics, Digital Transmission

Research Area (max 1)

Electronics, Control and Telecommunication Engineering