

## Brillouin in Spatial-Division-Multiplexed Fibres: From Distributed Sensing to Integrated Sensing & Communication

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The spatial-division-multiplexed (SDM) optical fibres, as evidenced over the past 10 years, open a new dimension for the optical information manipulation. The multi-core fibre. few-mode fibre. orbital-angular-momentum fibre, and their combinations, have been investigated, manufactured, and applied in lab environments and field trials. Although the SDM fibre has been developed mainly for ultra-large capacity communication, people soon found many interesting phenomena and applications of SDM fibres in sensing, especially the Brillouin based distributed fibre sensing systems. In this talk, I will introduce the research work about the Brillouin in SDM fibres in 3 aspects: 1) By unveiling the spatial dimension, new opportunities have been achieved such as multi-parameters sensing, curvature and vector bending sensing, and distributed shape profiling. 2) By incorporating new technologies like frequency-agility frequency comb. traditional time-consuming BOTDA and BOCDA methods can be improved with unprecedented performance enhancement in terms of speed, resolution, and dynamic range. 3) Integrating the sensing and communication functions in the same SDM fiber link to add value of the conventional fibre communication system, as well as to enhance the maintenance capability of fibre network. Finally, the prospects and outlook of SDM fibre related Brillouin techniques will be discussed.



## Short Bio:

**Ming Tang** received the B.Eng. degree from Huazhong University of Science and Technology (HUST), Wuhan, China, in 2001, and the Ph.D. degree from Nanyang Technological University (NTU), Singapore, in 2006. He conducted the



postdoctoral research fellowship in the Network Technology Research Centre (NTRC) in NTU from 2006 to 2009. From February 2009 to 2011, he was a Research Scientist with Tera-Photonics Group, led by Prof. H. Ito in RIKEN, Sendai, Japan, conducting research on terahertz-wave generation, detection, and application using nonlinear optical technologies. Since March 2011, he has been a Professor at the School of optical and Electronic Information, Wuhan National Laboratory for Optoelectronics, HUST. His current research is concerned with the high-speed optical fiber communications, including the novel transmission fibers and the advanced digital signal processing techniques. He has published more than 200 technical papers in the international recognized journals and conferences. He has been a Member of the IEEE Photonics Society since 2001, and also a Member of the Optica. He has been awarded the NSFC Distinguished Young Scholar (2022) and Excellent Young Scholar (2017), and the new century talent program of MOE in China. He was awarded the Second prize of National award for scientific & technological advancement, 2019, "Ultra-high speed and Ultra-long distance Tb/s Optical fiber transmission system".