

External Awards

Young Scientist Presentation Award

Winner: Shengnan Wang, Alice Dearle, Hiroki Hibino, and Kazuhide Kumakura, NTT Basic Research Laboratories

Date: March 17, 2018

Organization: The Japan Society of Applied Physics (JSAP)

For “Growth of Uniform Hexagonal Boron Nitride Film Using Chemical Vapor Deposition.”

Published as: S. Wang, A. Dearle, H. Hibino, and K. Kumakura, “Growth of Uniform Hexagonal Boron Nitride Film Using Chemical Vapor Deposition,” The 78th JSAP Autumn Meeting, Fukuoka, Japan, Sept. 2017.

TELECOM System Technology Award

Winner: Yoji Yamato, NTT Network Service Systems Laboratories

Date: March 22, 2018

Organization: The Telecommunications Advancement Foundation

For “Automatic Verification Technology of Software Patches for User Virtual Environments on IaaS Cloud.”

Published as: Y. Yamato, “Automatic Verification Technology of Software Patches for User Virtual Environments on IaaS Cloud,” J. Cloud. Comp., Vol. 4, 2015.

The Young Scientists’ Prize, the Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology

Winner: Masayuki Hashisaka, NTT Basic Research Laboratories

Date: April 17, 2018

Organization: Ministry of Education, Culture, Sports, Science and Technology

For his research on electron dynamics in quantum Hall systems.

This prize is given for experimental studies on fractional-quasiparticle excitations and Tomonaga-Luttinger behaviors in quantum Hall systems.

The Young Scientists’ Prize, the Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology

Winner: Hiroki Mashiko, NTT Basic Research Laboratories

Date: April 17, 2018

Organization: Ministry of Education, Culture, Sports, Science and Technology

For his research on a petahertz optical drive with wide-bandgap semiconductor characterized by an isolated attosecond pulse.

This prize is given for experimental studies on observation of petahertz (quadrillion of a hertz) electron oscillation in a gallium nitride semiconductor using an isolated attosecond pulse.

Achievement Award

Winner: Yoshihide Tonomura, NTT Service Evolution Laboratories

Date: June 19, 2018

Organization: The Telecommunication Technology Committee

For his contribution to the standardization of immersive live experience technology.

Papers Published in Technical Journals and Conference Proceedings

15 × 200 Gbit/s 16-QAM SDM Transmission over an Integrated 7-core Cladding-pumped Repeatered Multicore Link in a Recirculating Loop

C. Castro, S. Jain, E. De Man, Y. Jung, J. Hayes, S. Calabrò, K. Pulverer, M. Bohn, S. Alam, D. J. Richardson, K. Takenaga, T. Mizuno, Y. Miyamoto, T. Morioka, and W. Rosenkranz

IEEE Journal of Lightwave Technology, Vol. 36, No. 2, pp. 349–354, January 2018.

We investigate a realistic integrated multicore system consisting of directly spliced components: homogeneous trench-assisted seven-core fiber with a length of 60 km, cladding-pumped seven-core amplifiers, integrated seven-core isolators, and fiberized fan-in/fan-out couplers. We analyze the performance of an in-line repeatered

multicore transmission system in a recirculating loop by transmitting a 200 Gbit/s 16-QAM test channel and 14×100 Gbit/s QPSK neighboring channels between the wavelengths of 1558.58 and 1564.27 nm in a 50-GHz grid. For every position of the test channel within the considered band we demonstrate transmission distances over 720 km.

Ultrahigh-spectral-efficiency WDM/SDM Transmission Using PDM-1024-QAM Probabilistic Shaping with Adaptive Rate

H. Hu, M. P. Yankov, F. Da Ros, Y. Amma, Y. Sasaki, T. Mizuno, Y. Miyamoto, M. Galili, S. Forchhammer, L. K. Oxenløwe, and T.

Morioka

IEEE Journal of Lightwave Technology, Vol. 36, No. 6, pp. 1304–1308, March 2018.

We demonstrate wavelength-division-multiplexed (WDM) and space-division-multiplexed (SDM) transmission of probabilistically shaped polarization-division-multiplexed (PDM) 1024-state quadrature amplitude modulation (QAM) channels over a 9.7-km single-mode 30-core fiber, achieving aggregated spectral efficiency of 297.82 bit/s/Hz on a 12.5-GHz grid and 7.01-Tbit/s spatial-superchannel on a 25-GHz grid without multiple-input multiple-output (MIMO) processing. Actual soft-decision forward error correction (SD-FEC) decoding was employed to obtain error-free performance, and adaptive rates and spectral efficiencies for individual WDM/SDM channels have been applied according to their channel conditions by adjusting the SD-FEC overhead without changing the modulation format. Probabilistically shaped PDM-1024-QAM has been used to further increase the aggregated achievable rate due to the added performance improvement through shaping gain.

Hybrid Cladding-pumped Multicore EDFA/Raman Amplification for Space Division Multiplexing Transmission Systems

T. Mizuno, A. Isoda, K. Shibahara, H. Ono, M. Fukutoku, and Y. Miyamoto

Optics Express, Vol. 26, No. 10, pp. 13639–13646, May 2018.

We propose and demonstrate a hybrid cladding-pumped multicore erbium-doped fiber amplifier (EDFA) and distributed Raman amplification for space division multiplexing transmission systems. The cladding-pumped multicore EDFA is used to efficiently amplify signals in multiple cores simultaneously, while Raman pumping is used to control loss in each core individually. We construct an in-line amplified 7-core transmission line, and show that distributed Raman amplification can compensate loss variation between cores. Furthermore, we transmit 46 WDM PDM-16QAM signals over a long distance of greater than 1000 km and demonstrate good transmission performance.

Temporary Optical Coupler for Optical Cable Re-routing without Service Interruption

T. Uematsu, T. Kiyokura, H. Hirota, H. Iida, T. Kawano, and T. Manabe

IEEE Photonics Journal, Vol. 10, No. 3, June 2018.

We design a temporary optical coupler to obtain high injection and extraction efficiencies while keeping the bending loss low with the aim of realizing optical cable re-routing without service interruption. The temporary optical coupler injects/extracts signal lights into/from a fiber by using fiber bending. The extraction efficiency is improved by using a double-clad fiber or a graded-index fiber for light injection and extraction, while the injection efficiency is maintained compared with that of a conventional temporary optical coupler that uses a single-mode fiber. This improvement enables us to realize an optical cable re-routing operation support system that requires no service interruption.

Label Propagation with Ensemble of Pairwise Geometric Relations

X. Wu, K. Hiramatsu, and K. Kashino

International Journal of Computer Vision, Vol. 126, No. 7, pp. 689–713, July 2018.

Spatial verification methods permit geometrically stable image matching, but still involve a difficult trade-off between robustness as regards incorrect rejection of true correspondences and discriminative power in terms of mismatches. To address this issue, we ask whether an ensemble of weak geometric constraints that correlates with visual similarity only slightly better than a bag-of-visual-words model performs better than a single strong constraint. We consider a family of spatial verification methods and decompose them into fundamental constraints imposed on pairs of feature correspondences. Encompassing such constraints leads us to propose a new method, which takes the best of existing techniques and functions as a unified Ensemble of pairwise GEometric Relations (EAGER), in terms of both spatial contexts and between-image transformations. We also introduce a novel and robust reranking method, in which the object instances localized by EAGER in high-ranked database images are reissued as new queries. EAGER is extended to develop a smoothness constraint where the similarity between the optimized ranking scores of two instances should be maximally consistent with their geometrically constrained similarity.

Reranking is newly formulated as two label propagation problems: one is to assess the confidence of new queries and the other to aggregate new independently executed retrievals. Extensive experiments conducted on four datasets show that EAGER and our reranking method outperform most of their state-of-the-art counterparts, especially when large-scale visual vocabularies are used.