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**Laserlab III Training School for  
Potential Users**

Laser Applications in Spectroscopy, Industry and  
Medicine

Book of Abstracts

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# Wavelength filters for all-optical signal processing

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Rapid development of optical transmission systems leads to investigation of wavelength filter parameter and to new solutions for more flexible and scalable wavelength division multiplexing (WDM) systems. Travelling through a multiple optical band-pass filters the optical signal experiences spectral narrowing WDM systems. From other point of view, narrowing of pass-band in band-pass filters could be used for realization of novel applications like all-optical modulation format conversion. We could perform a linear phase-to-intensity modulation format conversion with a Raised-Cosine band-pass filter [1].

Multiple physical realizations such as fibre Bragg gratings (FBG), microring resonators (MRR) and others of wavelength filters have been studied. The format conversion with a single uniform FBG of 40 Gb/s return to zero on-off keying (RZ-OOK) to non-return to zero on-off keying (NRZ-OOK) has been demonstrated numerically for the first time [2]. The cascadability of uniform FBG for 40 Gb/s RZ-OOK to NRZ-OOK format conversion has been shown [3]. RZ-differential phase shift keying (DPSK) to NRZ-DPSK format conversion in a silicon MRR is demonstrated experimentally for the first time at 41.6 Gb/s. The converted signal eye diagrams and bit-error-rate measurements show the good performance of the scheme [4]. As well as simultaneous RZ-OOK to NRZ-OOK and RZ-DPSK to NRZ-DPSK modulation format conversion in a single silicon MRR with free spectral range equal to twice the signal bit rate is experimentally demonstrated for the first time at 41.6 Gb/s [5]. The cascadability of a single silicon MRR for carrier suppressed RZ (CSRZ)-OOK and CSRZ-DPSK signals is experimentally demonstrated at 40 Gb/s for the first time. Error-free performance is obtained for both modulation formats after 5 cascaded resonators [6].

## References

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