

# Table of contents

<b>Abstract</b>	<b>iii</b>
<b>List of papers</b>	<b>vii</b>
<b>Abbreviations used in the text</b>	<b>xi</b>
<b>1 Introduction</b>	<b>1</b>
1.1 Fiber-optics Systems .....	3
1.1.1 Optical Fibers .....	5
1.1.2 Electro-optical Modulation .....	12
1.1.3 Photodetection .....	14
1.2 Microwave Photonics .....	16
1.2.1 Microwave Photonics Filters .....	17
1.3 Terahertz Photonics .....	20
1.3.1 Terahertz Generation .....	20
1.3.2 Terahertz Detection .....	21
1.3.3 Terahertz Photonics in the Telecom Band .....	23
1.3.4 Terahertz Time-Domain Spectroscopy Systems ....	25
1.4 Motivation and Outline .....	27
<b>2 Photonic Microwave Filtering</b>	<b>29</b>
2.1 Filter Response Reconfigurability through Four-Wave Mixing .....	30
2.2 Single Band Pass Response based on a Phase-Shifted Fiber Bragg Grating .....	32
2.3 Single Band Pass Filtering based on Phase Modulation and Microring Resonators .....	34

<b>3</b>	<b>Fiber-based Terahertz Time-Domain Spectroscopy Systems</b>	<b>37</b>
3.1	Enhancing Spectral Brightness in the Terahertz Band...	40
3.1.1	Terahertz Shaping based on Third-Order Dispersion and Self-Phase Modulation .....	44
3.1.2	Terahertz Shaping based on Time-Domain Modulation of the Optical Spectrum .....	44
3.2	Towards Reduced Acquisition Times .....	45
3.2.1	Pulse Delay based on Gain Saturation in Semiconductor Optical Amplifiers .....	48
3.2.2	Optical Delay Line based on Frequency-to-Time Modulation .....	49
<b>4</b>	<b>General discussion</b>	<b>51</b>
<b>5</b>	<b>Conclusion</b>	<b>55</b>
	<b>References</b>	<b>59</b>
	<b>Papers A-G</b>	