

# All-Fiber Microwave Arbitrary Waveform Generation and Processing based on Advanced Fiber Bragg Grating Technology

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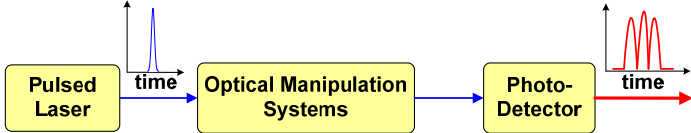
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## 1. Introduction

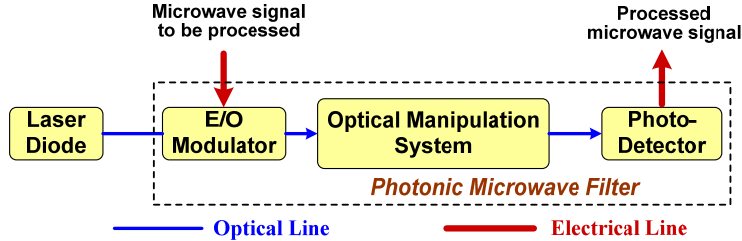
### Applications of Microwave Arbitrary Waveforms

- ❑ Pulsed Radar systems,
- ❑ Ultrawide-band (UWB) and multiple-access systems,
- ❑ Electronic countermeasures.

### Photonic Microwave Arbitrary Waveform Generation (AWG)

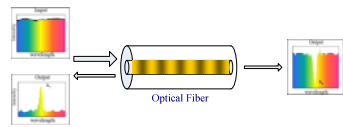


### Photonic Microwave Arbitrary Waveform Processing

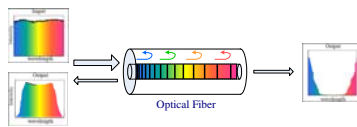


### Fiber Bragg grating (FBG) technology

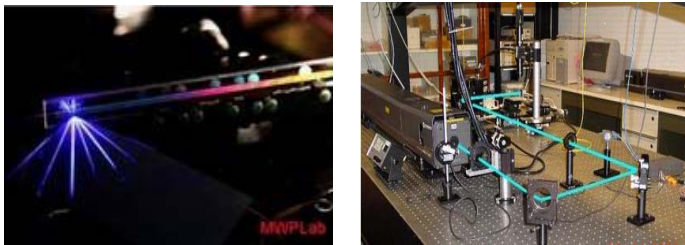
#### Uniform FBG



#### Chirped FBG

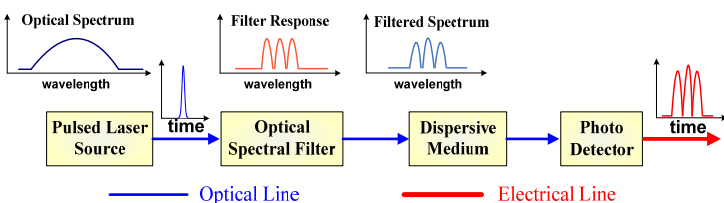


#### FBG fabrication: Phase mask technique



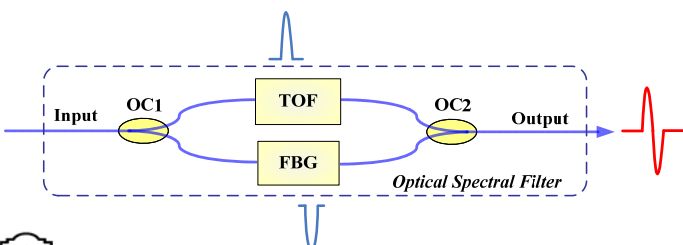
## 2. Photonic Microwave Waveform Generation

### Microwave AWG based on optical spectral shaping and dispersion-induced wavelength-to-time mapping

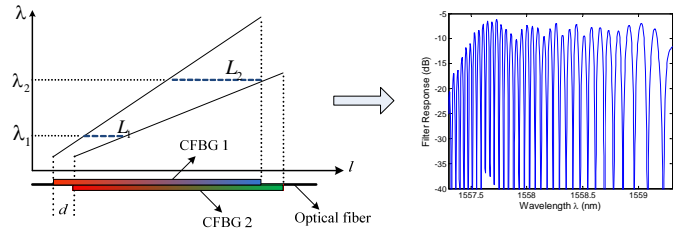


#### A. FBG as an optical spectral filter

##### Optical spectral filter for UWB pulse generation

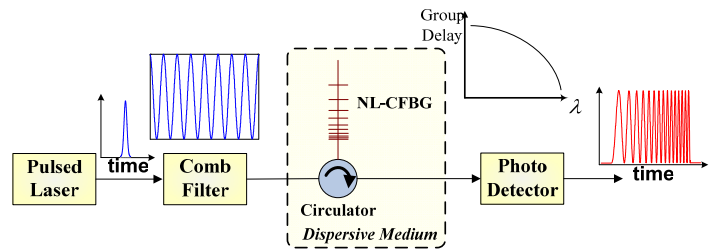


##### Optical spectral filter for chirped microwave pulse generation

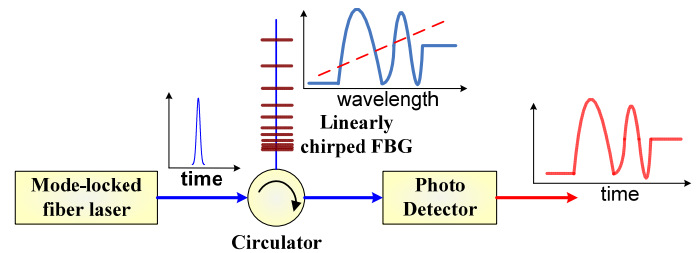


#### B. FBG as a wavelength-to-time mapper (nonlinear)

##### Nonlinear mapping for chirped microwave pulse generation

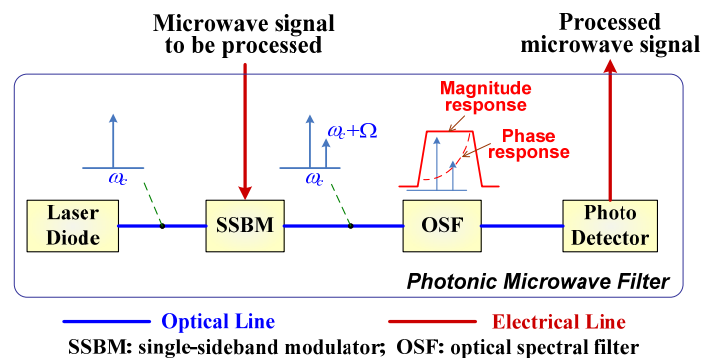


#### C. FBG with both functionalities for microwave AWG

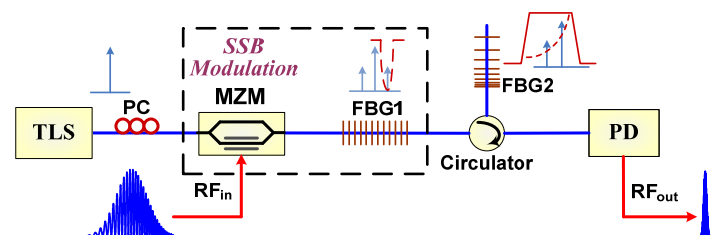


## 3. Photonic Microwave Waveform Processing

### Photonic microwave filter based on optical filter response to microwave filter response conversion



##### Phase-only matched filter for chirped RF pulse compression



## 4. Conclusion

FBG-based optical techniques have been proposed and demonstrate to generate and process microwave arbitrary waveforms which cannot be easily fulfilled by conventional electronic techniques.

