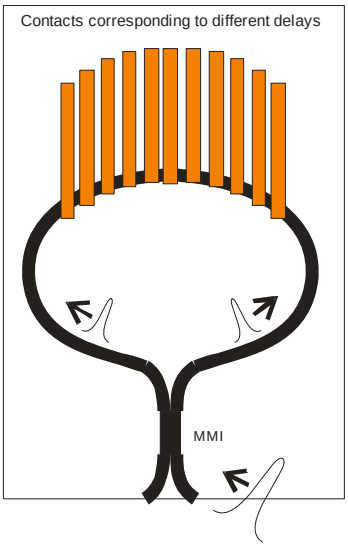
Processing of integrated autocorrelator.

The application: Photonic integration
The field of optoelectronics is today where the electronics industry was in the 50'ties: Single components put together on a circuit board. Monolithic integration of different components on a chip is therefore an obvious way of reducing the cost of complex optical circuits and it will drive the industrial development in the next many year. Unfortunately, compared to silicon electronics where only a few different components are used, the many different optoelectronic functions that need to be realized have much different structure which makes the problem much more challenging. Also, different from most current electronics, is the fact that we have to deal with the wave nature of the photons when routing signals on a chip.
At COM-DTU we have a lot of activities on short pulse lasers. In order to measure the pulses we normally use a bulky mechanical autocorrelator (see below) as electronics is not fast enough characterize the pulses.



Conventional autocorrelator (20cmx30cmx50cm) + electronics

Integrated autocorrelato (1mmx1mmx0.1mm) + electronics

The project:
The goal of the project is to make an integrated two-photon based autocorrelator based on a Sagnac interferometer as shown in the sketch above. This device can measure the length of picosecond pulses (which is much below what can be done with electronics). A mask design for the autocorrelator should be made and the device should be processed using a single deep dry etching step for the waveguide structure and standard contact processing. The device should be mounted and the performance tested in the communication labs.

Preferred prerequisite:
34032 Lasers and photonics (or similar), 34041 Fiber and integrated optics (or similar), 34057 Fabrication of nanophotonic devices.

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