**10 GBT/S 2-PSK TRANSMISSION AND HOMODYNE COHERENT DETECTION USING COMMERCIAL OPTICAL COMPONENTS**

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**Coherent detection:** potential field of application:
- Multilevel optical phase modulation (N-PSK)
- Dispersion compensation in the electrical domain
- Ultra-dense WDM
- Fastly reconfigurable optical networks
- Optical sensor, microwave photonics, etc.

**Targets of this work:**
- We introduce a novel technique to implement an optical homodyne PLL using only off-the-shelf optical components
- We demonstrate its feasibility on a 10 Gbit/s PSK experiment
  - We show that the RX sensitivity is significantly better than conventional IM-DD

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**System schematic**

The Sub-Carrier OPLL (SC-OPLL) is our novel OPLL setup. It is the key element of the proposed coherent system.

**Photodiode Input**
- modulated PSK signal

**Photodiode Output**
- electrical low-pass filter

**Sub Carrier Optical PLL (SC-OPLL)**

Two main Sub Carriers at frequency $f_{SC}$ are generated. We are able to tune both by simply changing the voltage applied to the electrical VCO, thus implementing an Optical VCO. $f_{SC}$ is set in order to obtain the received signal frequency $f_{RX}$.

**Optical VCO**

The amplitude modulator is a high bandwidth Corning-OTI LiNbO$_3$ Mach-Zehnder (MZ) and is biased at a null of its transfer function, a sinusoidal carrier-suppressed modulation is obtained.

The electrical VCO is a low jitter silicon-bipolar based 20 GHz VCO from Agilent Technologies.

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**Experimental Results**

All the SC-OPLL components are commercially available today

We demonstrated its feasibility on a 10 Gbit/s PSK experiment
- RX sensitivity is 4 dB better than conventional IM-DD

**Conclusions**

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