WASSAP - Wireless At Sub-mm waves: Signals, Antennas and Photonics

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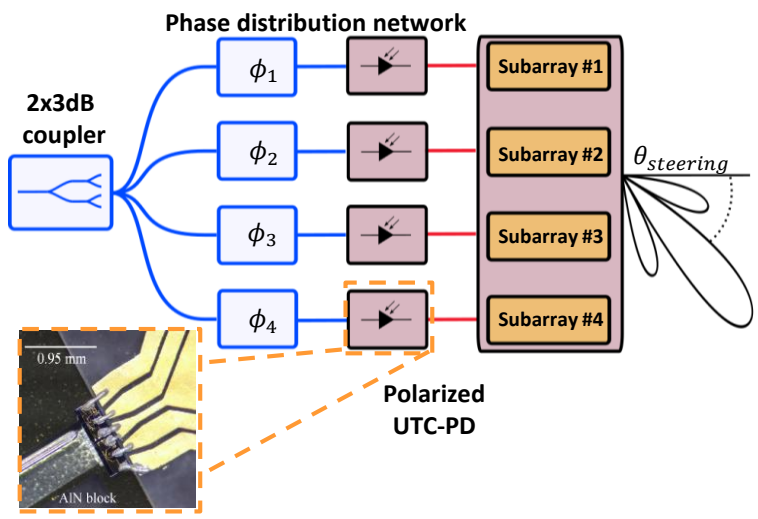
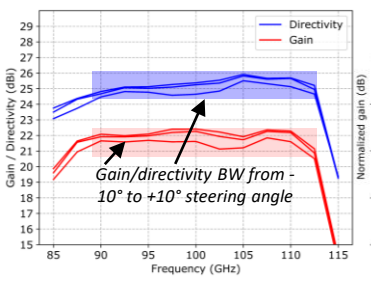
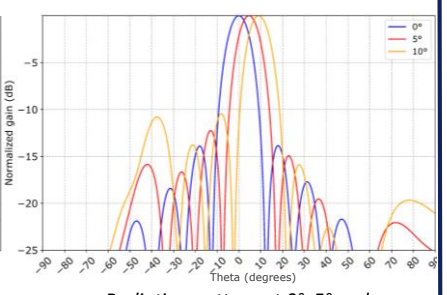
WP1: Design and fabrication of photonic transmitting antenna array

Transceiver architecture



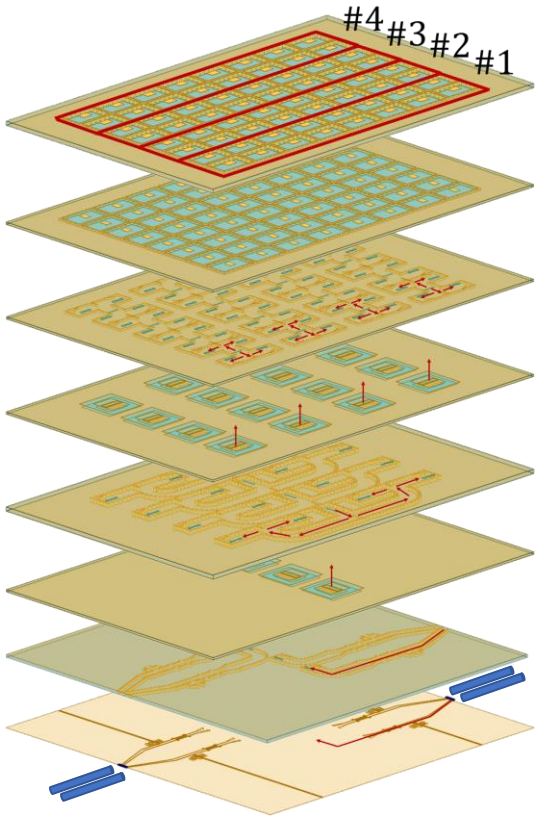


Gain and directivity at 0°, 5° and 10° steering angle



Radiation pattern at 0°, 5° and 10° steering angle

Modelised beam-steering capable antenna

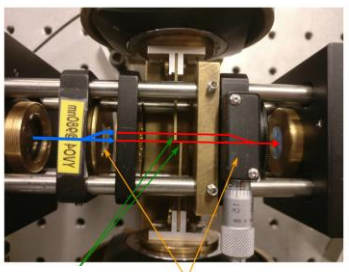


Photonic phase control

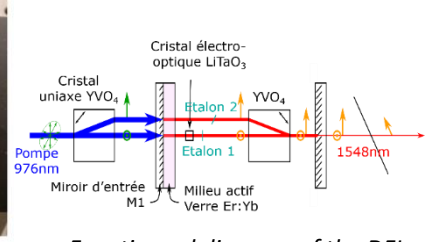
Advantages	Compromises
• Active alignment • Continuous scan • Power combining	• Difficulty to mount many UTC-PD • Complex polarization network of the UTC-PDs

WP2: Design and implementation of photonic sub-systems.

Low phase noise mm-Wave source : Dual frequency laser

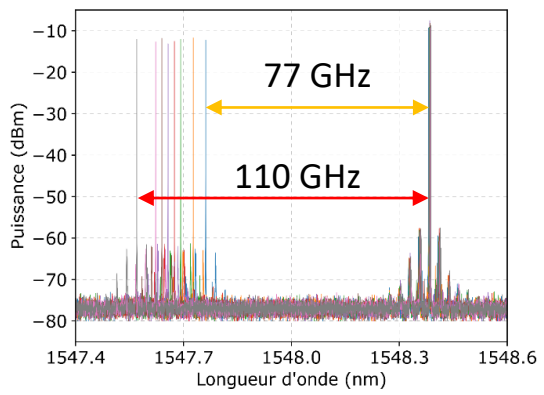


Etalons — YVO4 birefringent crystals



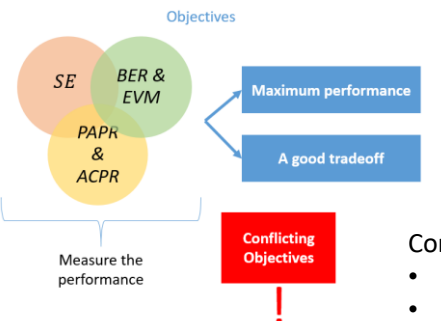
Functionnal diagram of the DFL

- Closed loop configuration : 75 dBc/Hz at 1 kHz at f_c=100 GHz
- Tunable from DC to THz



WP3: Signal processing, modulation and waveforms.

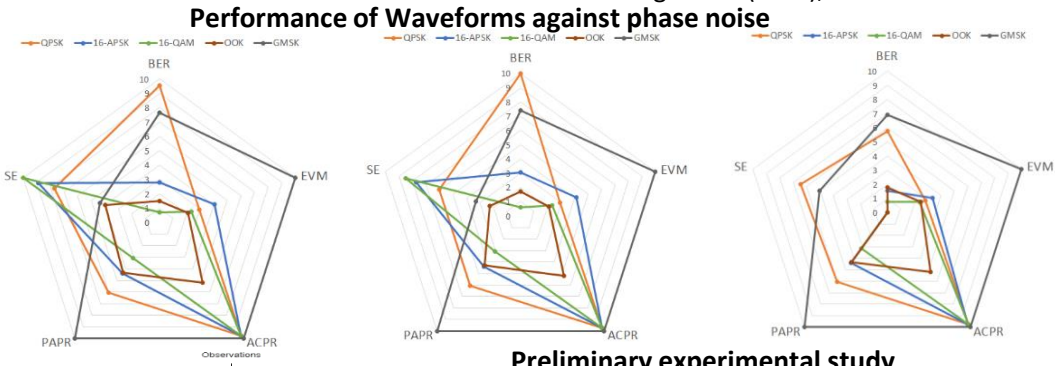
Waveform selection



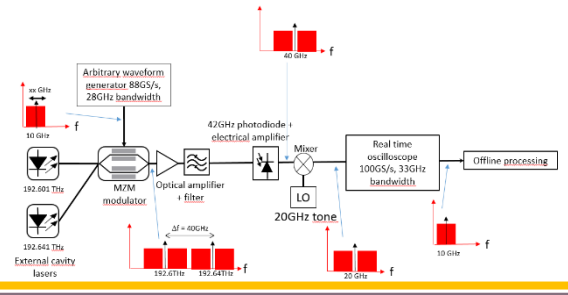
Comparison metrics used to select the waveform:

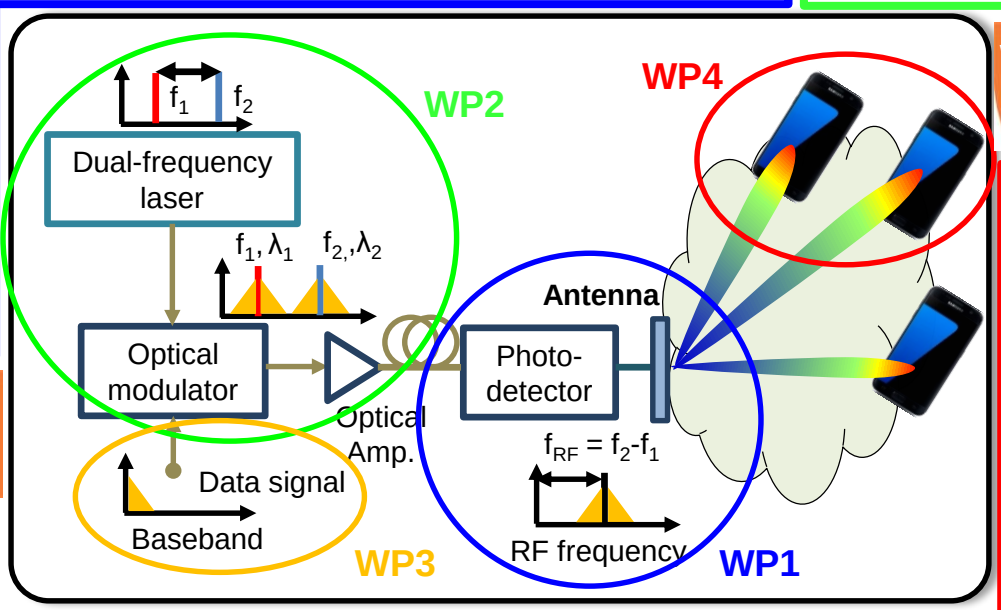
- Bit Error Rate (BER), to minimize,
- Peak-to-Average Power Ratio (PAPR), to minimize,
- Adjacent Channel Power Ratio (ACPR), to minimize,
- Spectral Efficiency (SE), to maximize,
- Error Vector Magnitude (EVM), to minimize.

Performance of Waveforms against phase noise



Preliminary experimental study





WP1 : Design and fabrication of photonic beam-steerable transmitting antenna array

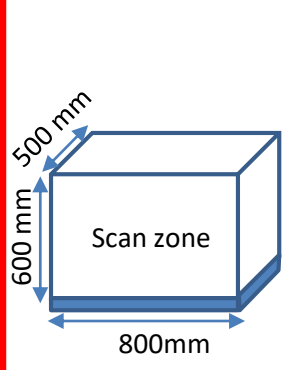
WP2 : Design and implementation of photonic sub-systems

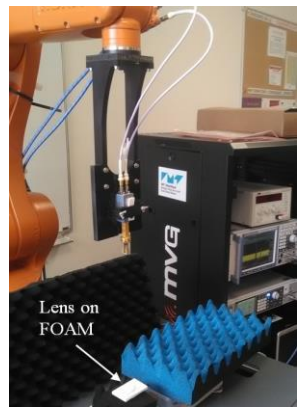
WP3 : Signal processing, modulation and waveforms

WP4 : System demonstrations

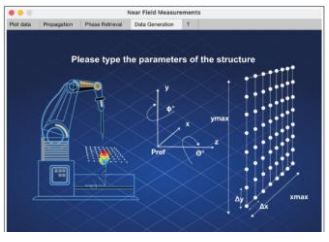
WP4: System demonstrations

Near-field antenna measurements

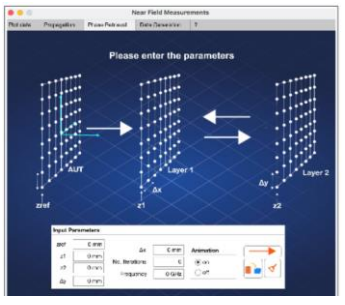




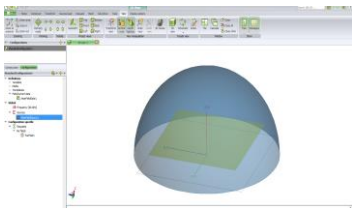
1- Type of scan and path description



2- Phase-less processing



3- Near-field to far-field (FEKO)



Beam-switching wireless link