Future HEP links

Istituto Nazionale di Fisica Nucleare

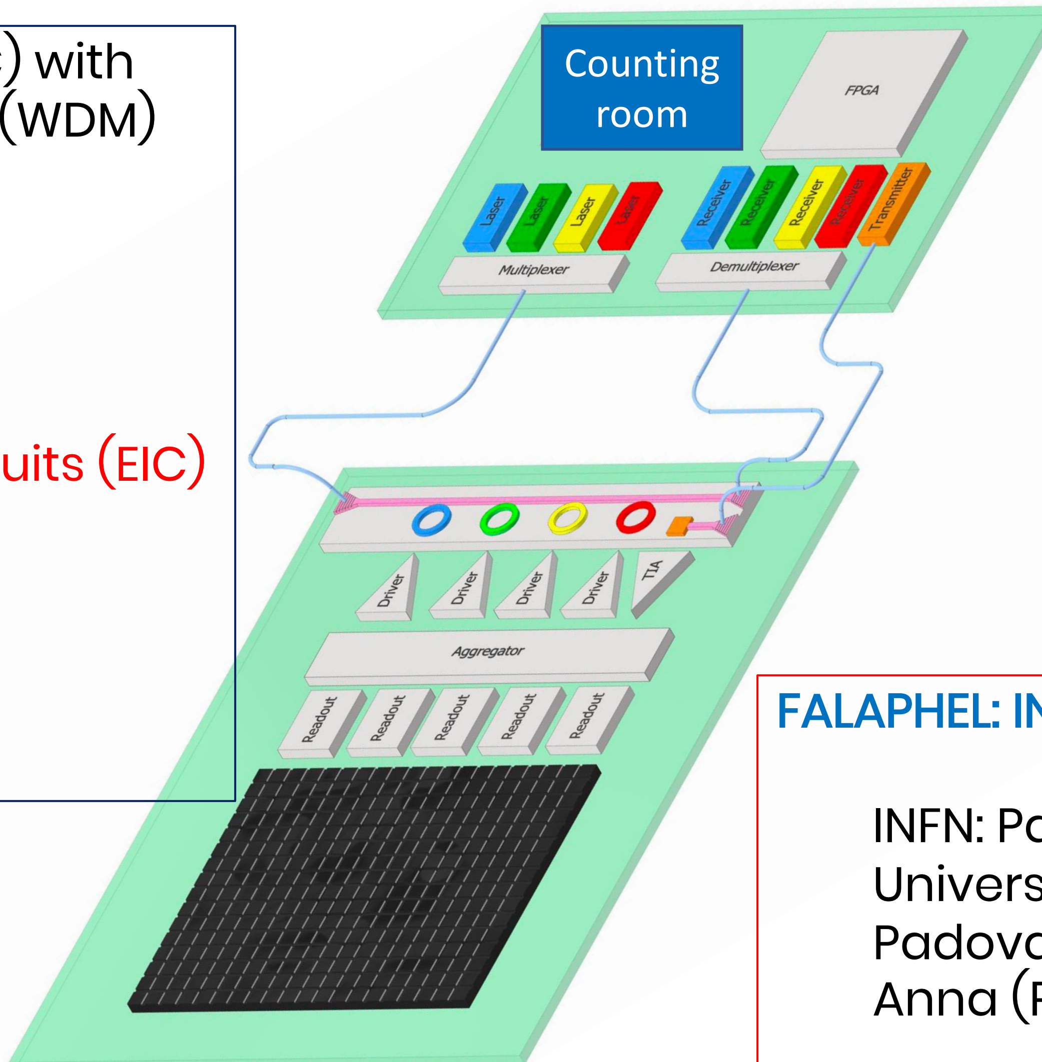
Photonics Integrated Circuits (PIC) with wavelenght division multiplexing (WDM)

Total 100 G = 4x 25G lanes

Radiation hard

Needs Electronics Integrated Circuits (EIC)

- Front-End
- Serialisers
- Drivers
- PLL



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FALAPHEL: INFN Call (2021-2023)

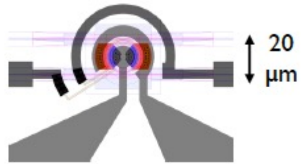
INFN: Padova, Pavia, Pisa
Universities: Bergamo, Milan, Padova, Pisa, Scuola Superiore S. Anna (Pisa)

P.I. Fabrizio Palla

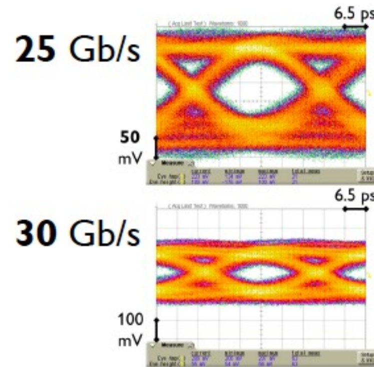
PIC Technology: iSipp50G by IMEC

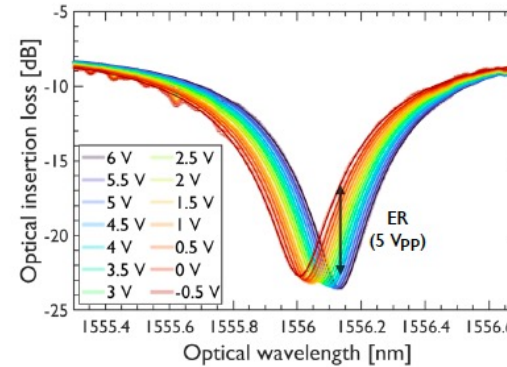
Ring Modulator – RM7

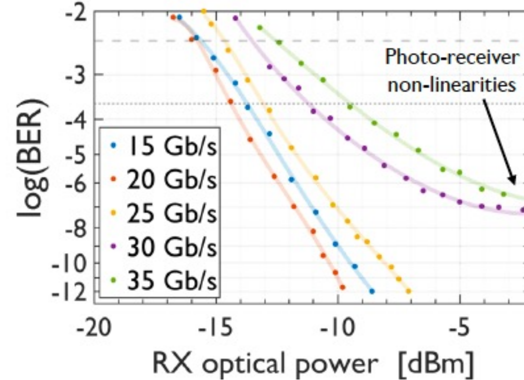
- Ring modulators (**RMs**): light intensity modulation is achieved via resonance shifts produced with a PN phase shifter.
- Testing conditions: λ = 1556.16 nm, Vbias = 1.7 V, Vpp ~ 5 V, T = 21.3 °C, P_{tls} = 13 dBm, $OSNR_{1nm}$ = 28.5 dB



FWHM	~ 790 pm
Quality factor	~ 2000
Modulation depth	~ 15 dB
Modulation efficiency	~ 25 pm/V







5 mm x 5 mm chip

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Electronics Integrated Circuits (28 nm TSMC)

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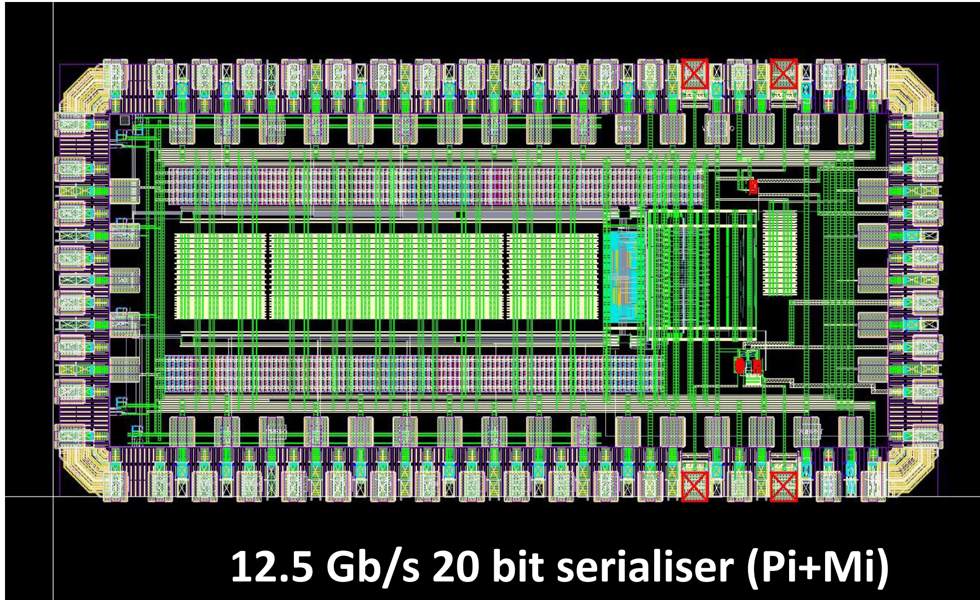
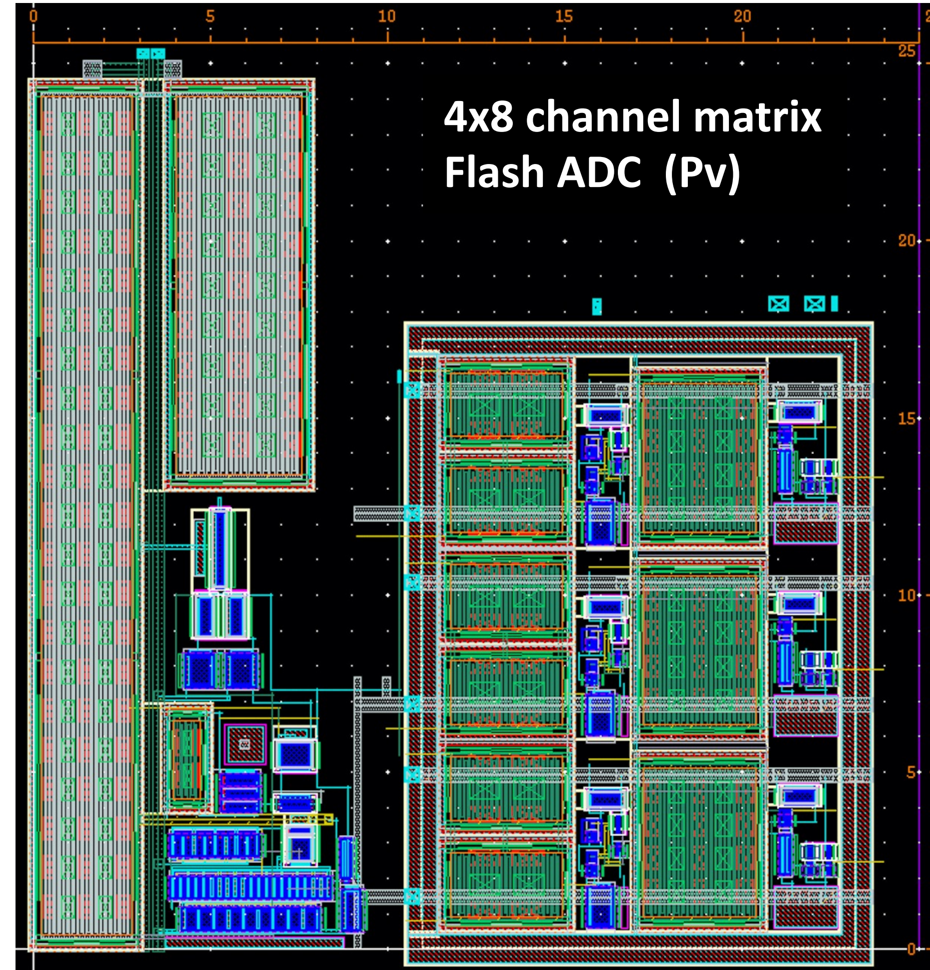
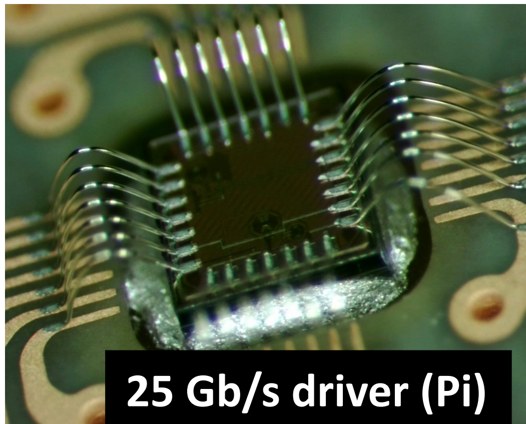
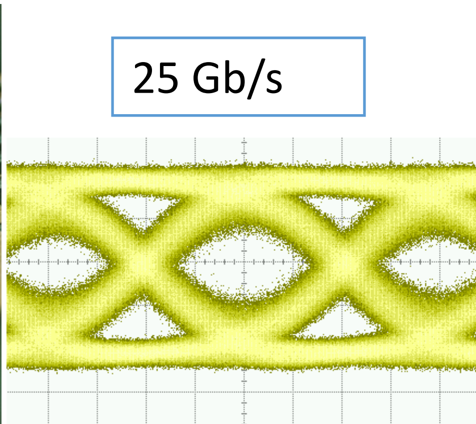






25 Gb/s



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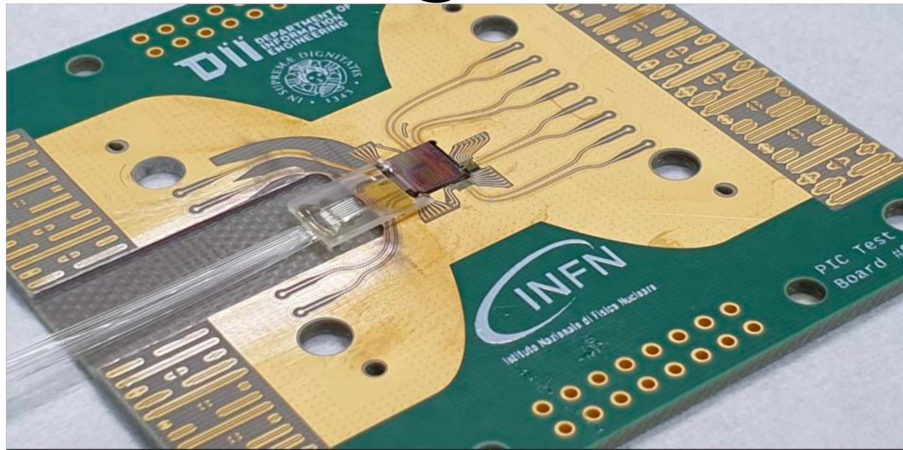
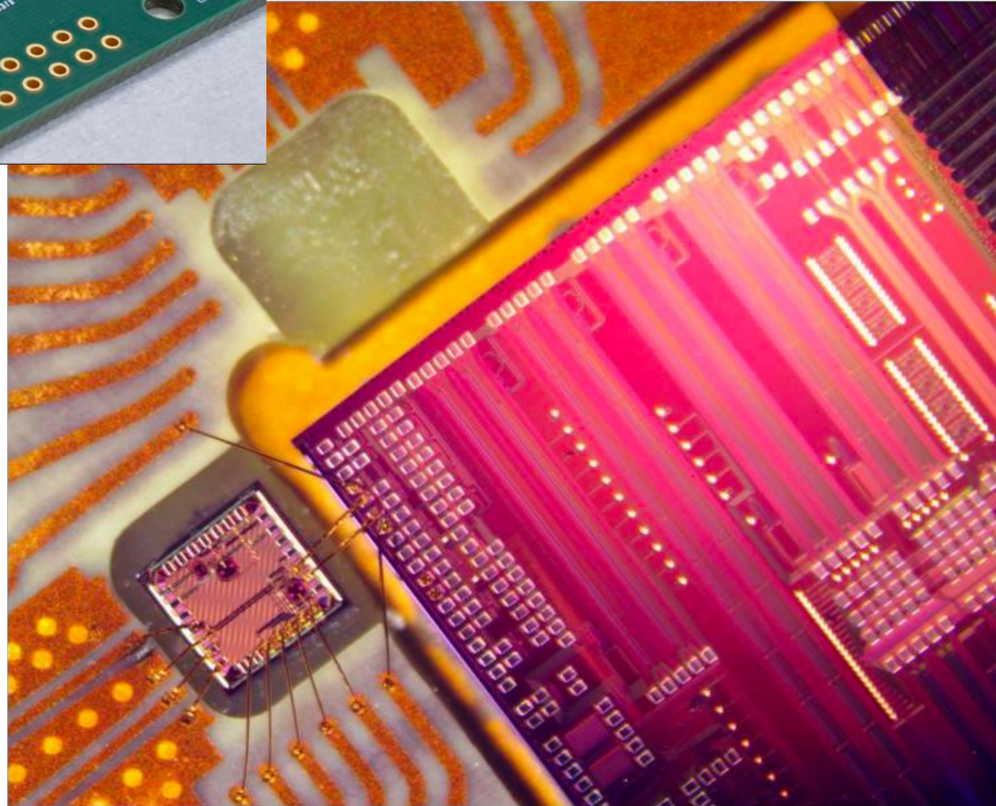
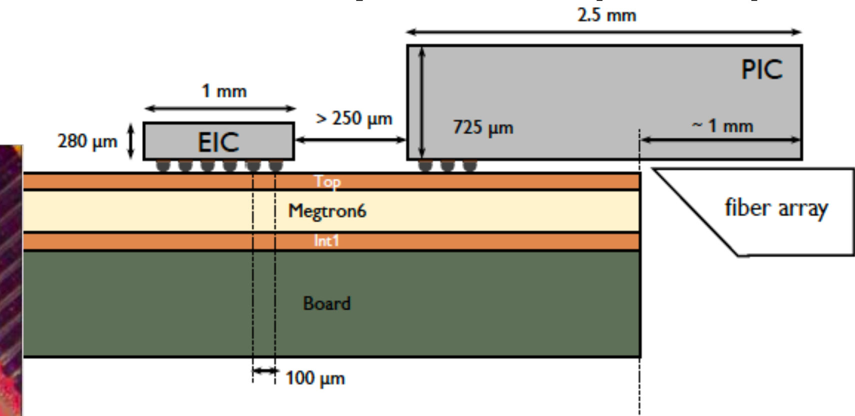
Integration PIC + EIC



- Wire bond integration at Camgraphic (Pisa)



- Future: study PCB flip chip



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