



Silicon modulators for high speed optical telecommunications



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C2N Outline

- Motivation
- Simplified modeling of phase modulators and validation
- **Experimental results**
- Perspectives

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Conclusions



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Silicon Photonics play a key role in wide variety of applications



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Motivation

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C2N Operation principles



the material (refractive index) Optical modulation is achieved by changing the optical properties of





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Soref, Richard A.; Bennett, B.R., "Electrooptical effects in silicon," Journal of Quantum Electronics , vol.23, no.1, pp.123-129, Jan 1987





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Phase shifters







Simplified modeling of phase modulators and validation

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 $IL_{\pi}(dB)$



Error below 10%



C2N Lateral PN junction based modulator







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Experimental results

universite Paris-saclay

c2N Fabricated wafer

300mm CMOS pilot line in Crolles Modulators were fabricated by STMicroelectronics



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Test bench



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Test bench



R2 – Static Measurements

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Among first demonstrations of Push-Pull modulation in the O-Band



C2N MZM 1mm – Eye diagram (10Gbps)

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Perspectives







Conclusions

Conclusion

- Simulations of modulators demand normally huge computational efforts.
- Simplified models of silicon modulators are a key tool in design stage.
- We have presented a model providing a reduction of computational effort up to two order of magnitude.
- Open eye diagrams at 25Gbps has been obtained with extinction ratio 8dB



Experimental results are in good agreement with model results.

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