OpenPICs: milestones & deliverables Bright

wp.task	Name	Type	Partner	Due Date(s)
WP 3.1	BB Design			
WP3.1.M0	Technology and Design Concept	Milestone	TU/e, Bright	Dec-16
WP3.1.R0	Analysis and Design	Report	TU/e, Bright	Jun-17
WP3.1.M1	Mask Design Tape-out I	Milestone	TU/e, Bright	Jun-17
WP3.1.R1	BB Results I	Report	TU/e, Bright	Mar-18
WP3.1.M2	Mask Design Tape-out II	Milestone	TU/e, Bright	Sep-18
WP3.1.R2	BB Results II	Report	TU/e, Bright	Jun-19
WP 3.4	Design Environment			
	Execution Flow			
WP3.4.EF.R0	Exectution Flow document	Report	Bright	May-17
WP3.4.EF.M0	Implementation of an Execution DB	Milestone	Bright	Mar-18
WP3.4.EF.R1	Final Execution Flow document	Report	Bright	Sep-19
WP 3.5	Demonstrator Design			
WP3.5.M1	Fiber Sensing Chip Design	Milestone	Bright	Sep-18

Bright Photonics Open Innovation goals

- Developing a PIC design flow for
- Enabling a generic BB methodology via hierarchical design
- BB development by foundries and end-users with IP-block protection
- High-quality, closed-end-user-loop mask assembly and DRC.

- Building block development prototypes
- BB specification
  - Low linewidth tuneable laser (specs defined by Technobis)
  -Tuneable filter (specs defined by the low linewidth tuneable laser)

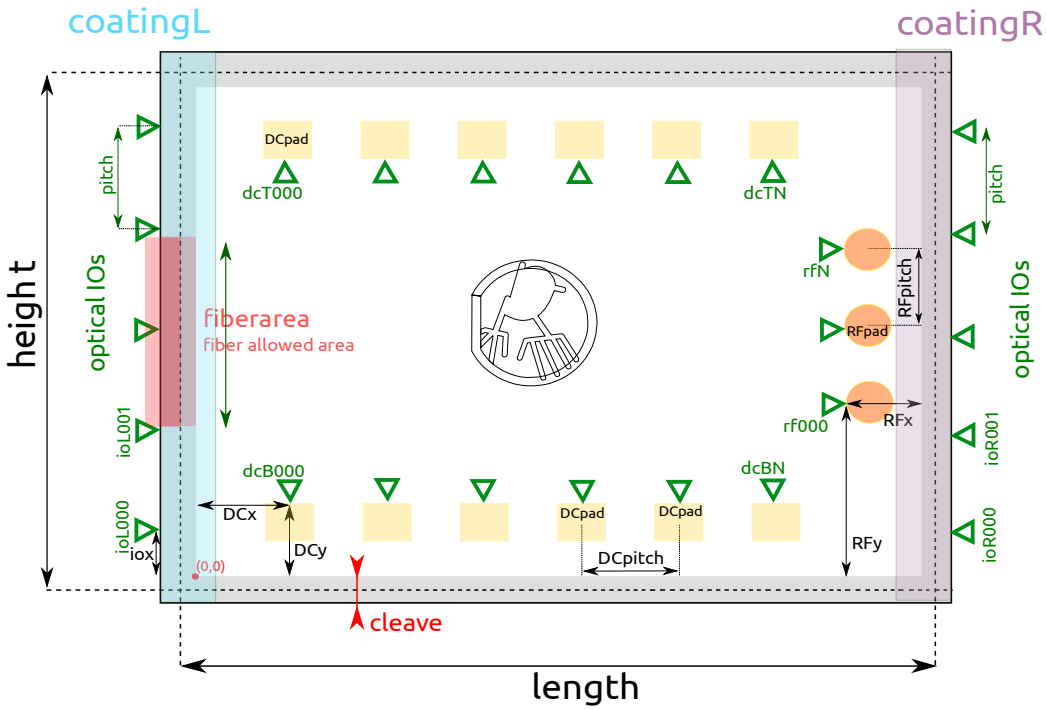
- Data model development
- Collect, organize and store PIC related data (implement database)
- Develop data sharing methodologies for statistical analysis and mature

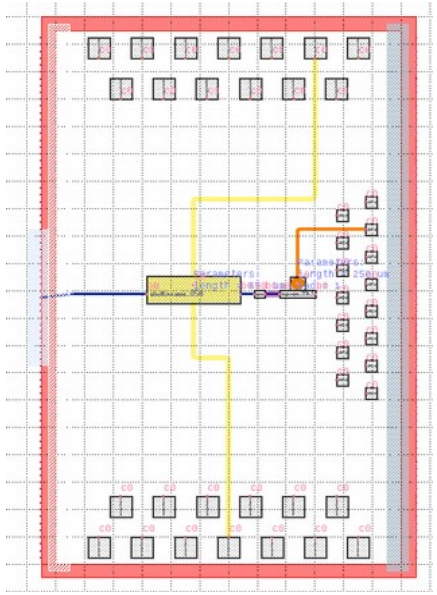
WP3 Developing a PIC design flow

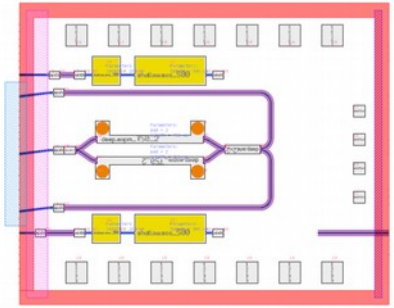
NAZCA: open Photonic IC design:
- open access
- open innovation
- open source

78% of companies
run open-source...

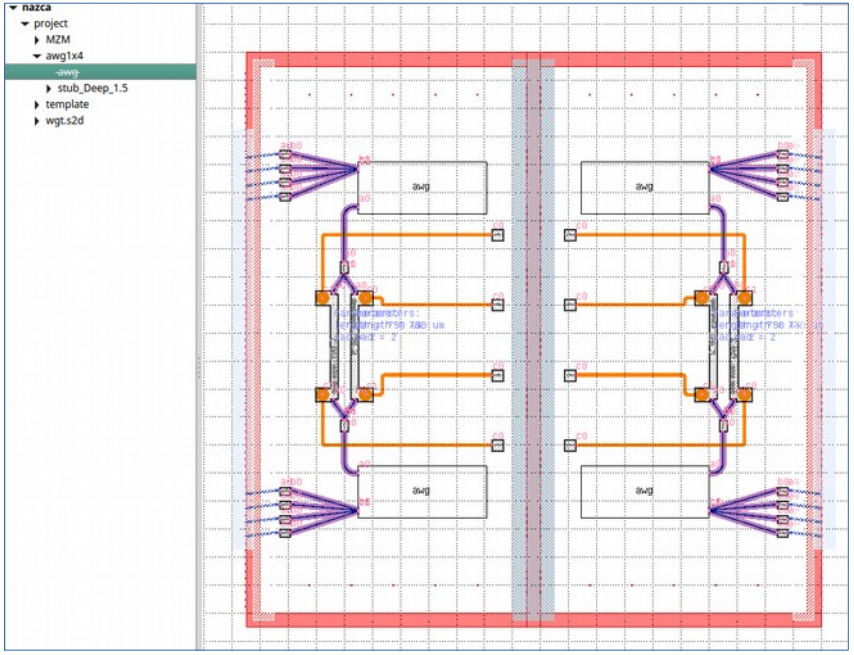
Foundry and package templates, PDK

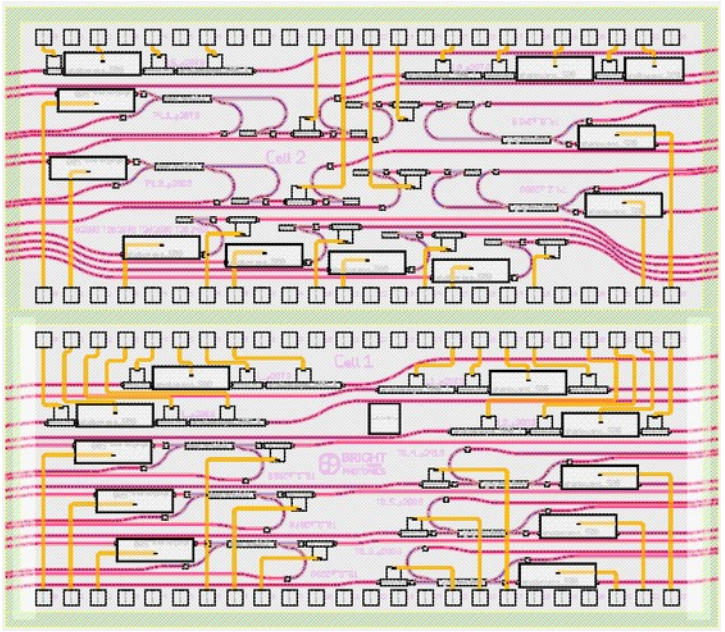






Die and package templates, PDK, hierarchy, mask assembly

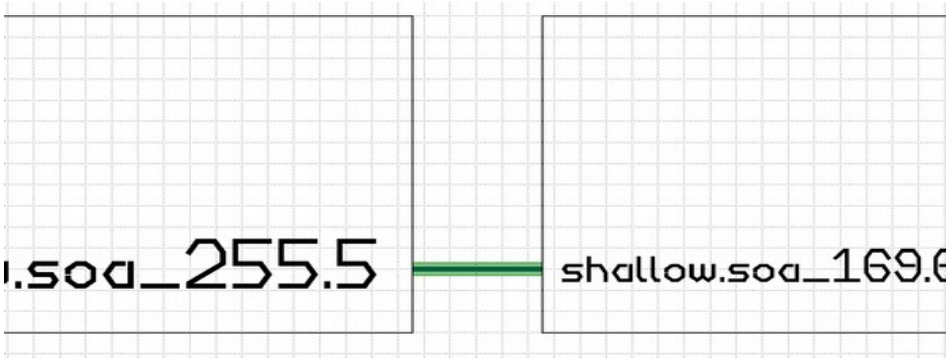




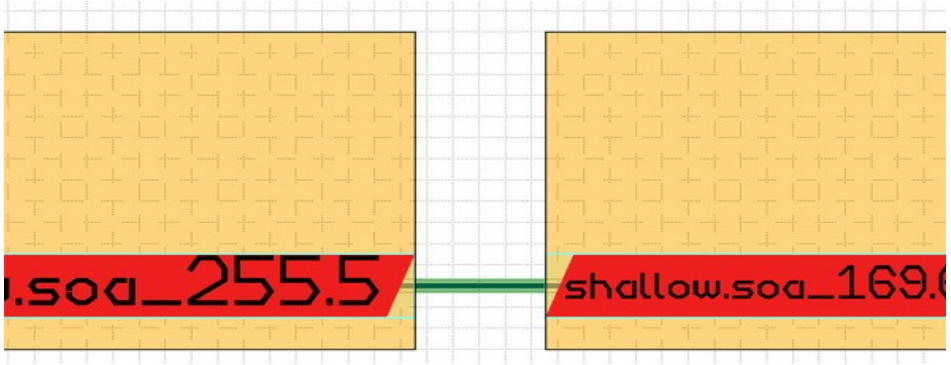
Discussing with PHX compatiblity
Nazca – OptoDesigner

SP20 MPW cell has been divided into two mini projects via packaging templates.

IP Building Block replacement

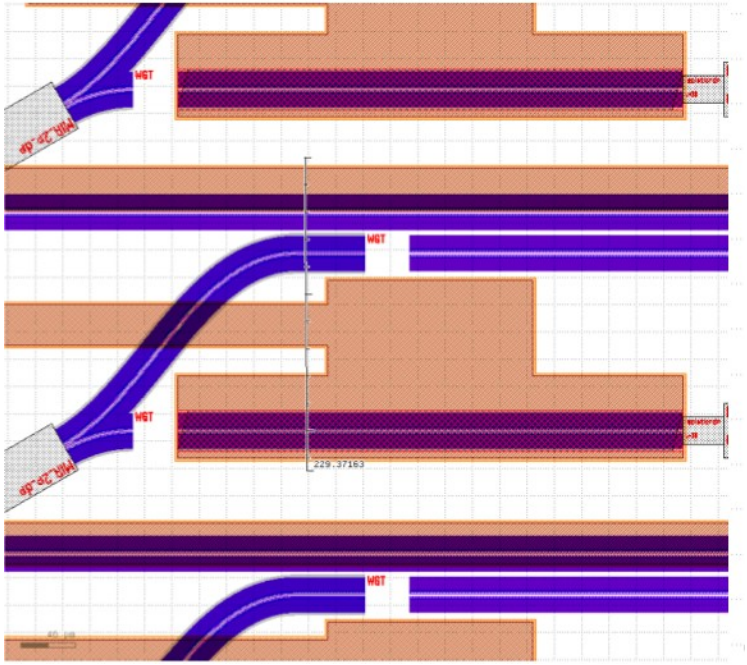


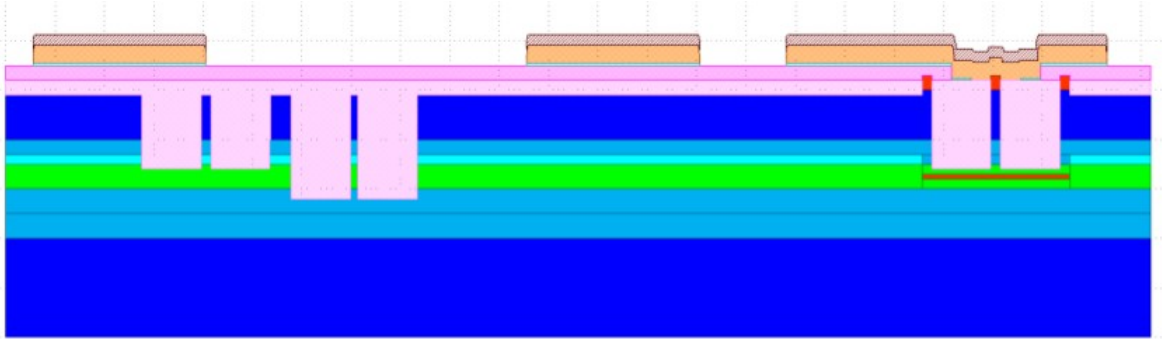
“black” box: IP-protected



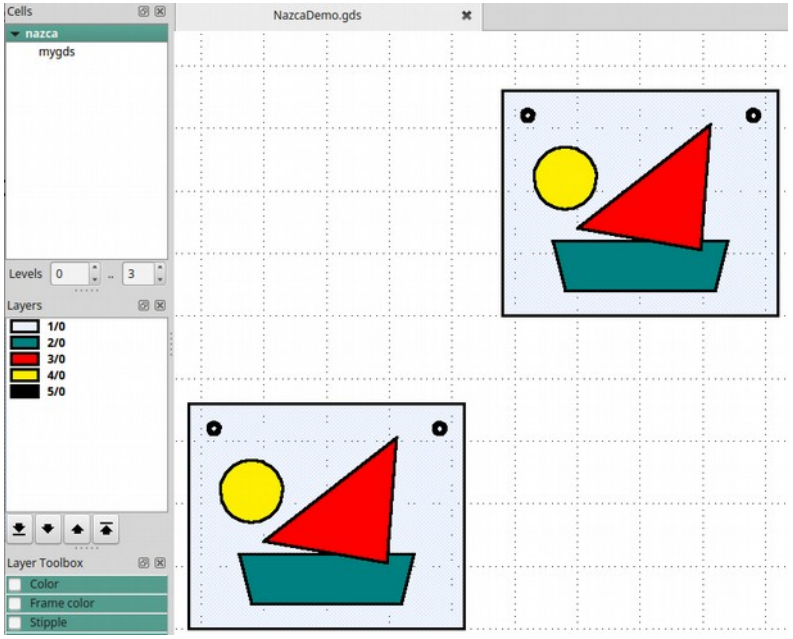
“white” box for manufacturing

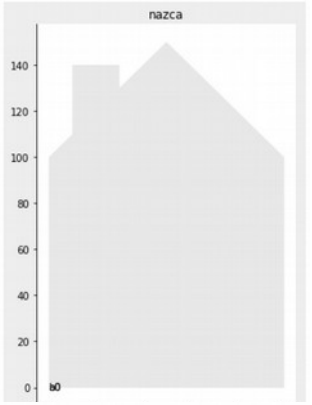
Cross section view, KLayout

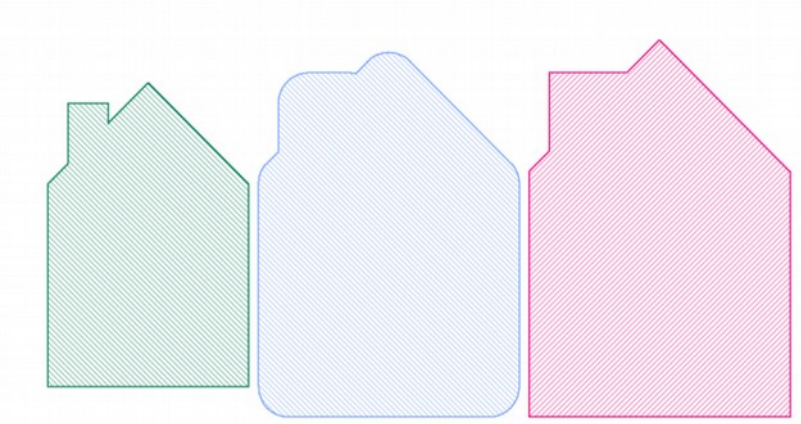




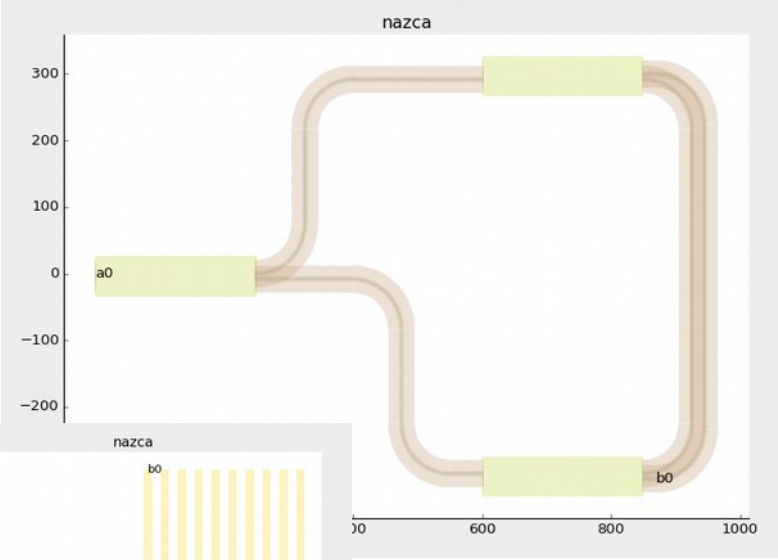
Polygons, polylines, annotations, control of GDS

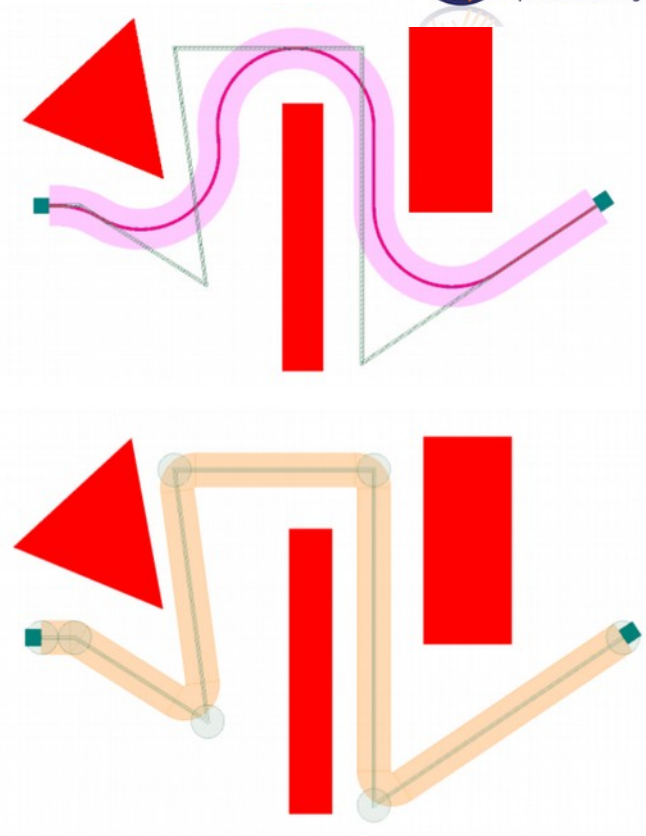






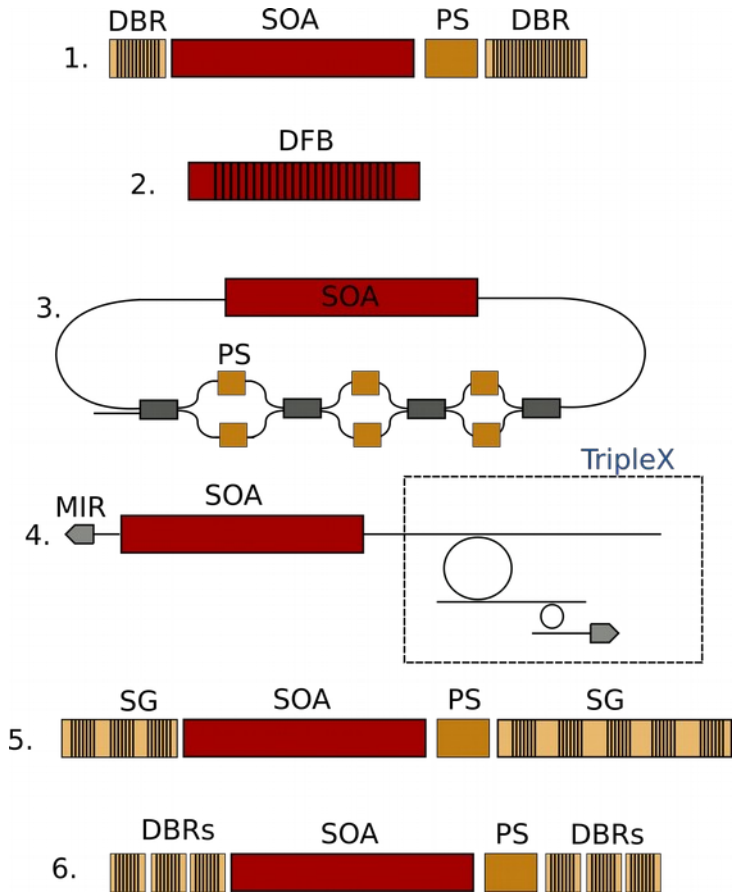
Advanced interconnects





WP3 BB development and designed masks

Low linewidth tuneable lasers



1. DBR based laser
2. DFB laser
3. Extended cavity laser (with MZIs based or other configuration based filter)
4. External cavity laser
5. Sampled grating tuneable lasers
6. Digital supermode laser

Low linewidth tuneable lasers (literature)

Lasers	Depth of modulation	Modulation frequency	Tuning range	Linewidth	Optical power	Technology
Simple DBR			*		**	Smart MPW
DFB					**	Custom Smart
SG DBR					**	Smart MPW
DS DBR					**	Smart MPW
MZI based						Smart MPW
Hybrid external cavity						Smart+TriPlex
Array of lasers						

Must
Should
Could

** Info taken from literaure (havent been proved in existant Smart platform)

Low linewidth tuneable lasers (literature)

SP 20

SP + TripLeX

Lasers	Depth of modulation	Modulation frequency	Tuning range	Linewidth	Optical power	Technology
Simple DBR			*		**	Smart MPW
~~DFB~~					**	Custom Smart
SG DBR					**	Smart MPW
DS DBR					**	Smart MPW
MZI based						Smart MPW
Hybrid external cavity						Smart+TriPlex
Array of lasers						

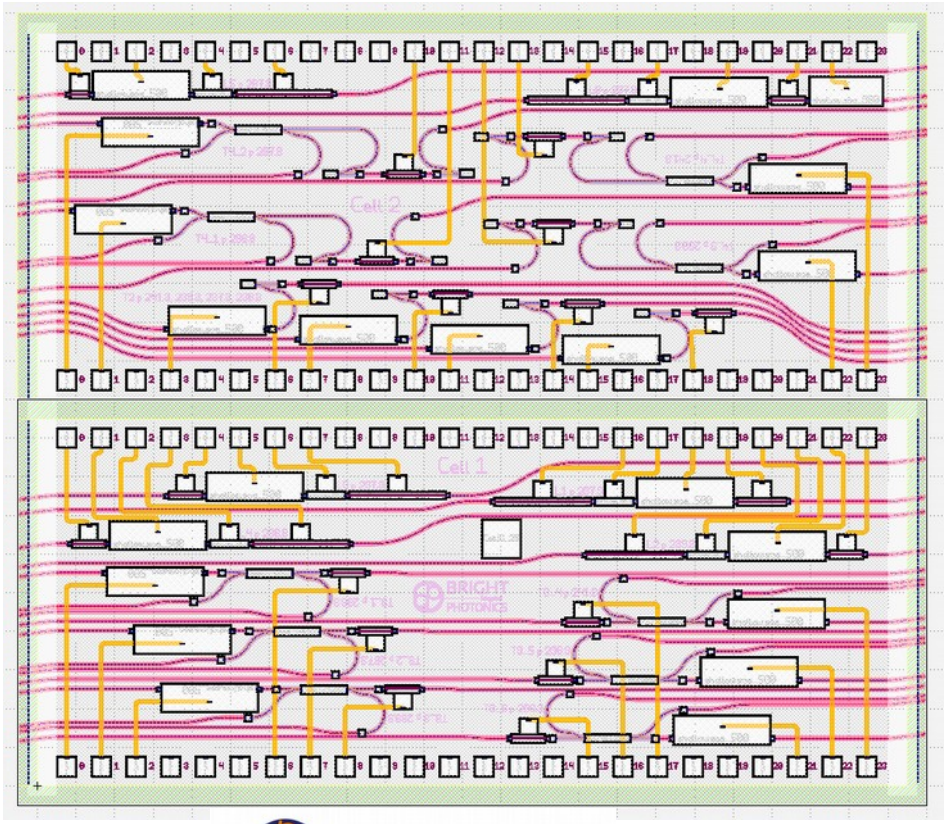
Must
Should
Could

** Info taken from literature (haven't been proved in existent Smart platform)

DBR based laser and DBR grating test structures (Smart Photonics 20)

Design

1. Series of tuneable DBR lasers with different grating pitch and reflectivity
2. Test structures for tuneable DBR gratings of different pitch

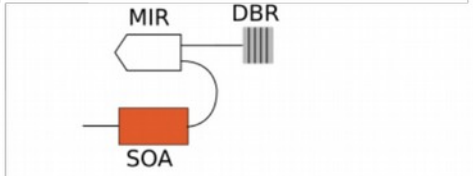


Nazca design
photonic IC design framework

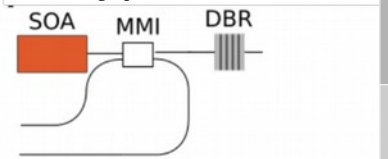
DBR gratings test structures and lasers in SP 20

Test structures for tuneable DBR gratings of different pitch

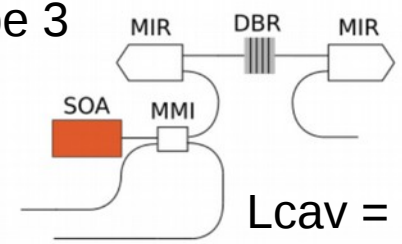
Type 1, Lcav = 380um



Type 2

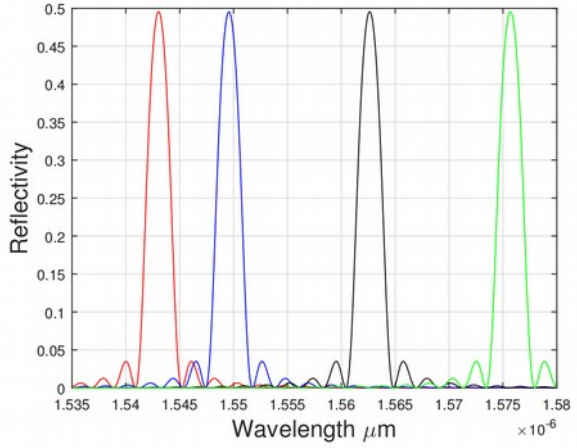


Type 3



Lcav = 750um

Type1	p1,p2,p3,p4	R = 50%
Type2	p1,p2,p3,p4	R = 50%
Type3	p1,p2,p3,p4	R = 50%

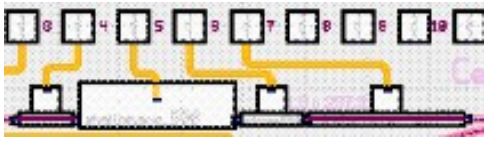


1. Broad source measurements
2. Tuneable laser measurements

DBR gratings test structures and lasers in SP 20

Series of tuneable DBR lasers with different grating pitch and reflectivity

Name	Pitch	R(dbr)	L(SOA booster)	Contacts
DBRL 1	p1	50%	-	
DBRL 2	p2	50%	-	
DBRL 3	p3	50%	-	
DBRL 4	p1	21%; L(dbr) = 100 μm	-	
DBRL 5	p1	70% L(dbr) = 250 μm	-	
DBRL 6	p1	50%	380 μm	



1. DBR-SOA-PS-DBR
2. SOA-DBR-SOA-PS-DBR

Measurements

1. LI curves
2. Tuning characteristics (depth, speed)
3. Linewidth, linewidth variation with tuning

Planning

BBs:
- 17Q4: SP 20 measurements and analysis of the experimental data
- 17Q4: Design of TriPlex based ring filters and hybrid tuneable laser

Design flow
- 17Q4: Full releasing of new python-based design environment into OpenPICs project

Data model:
- select data implementation model
- consolidate collected data