Presented at the COMSOL Conference 2010 Boston

SELF-REFERENCED SURFACE PLASMON INTEFEROMETRY

- A WAY TOWARDS BIOSENSING -

Presented by
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Chaires de recherche du Canada

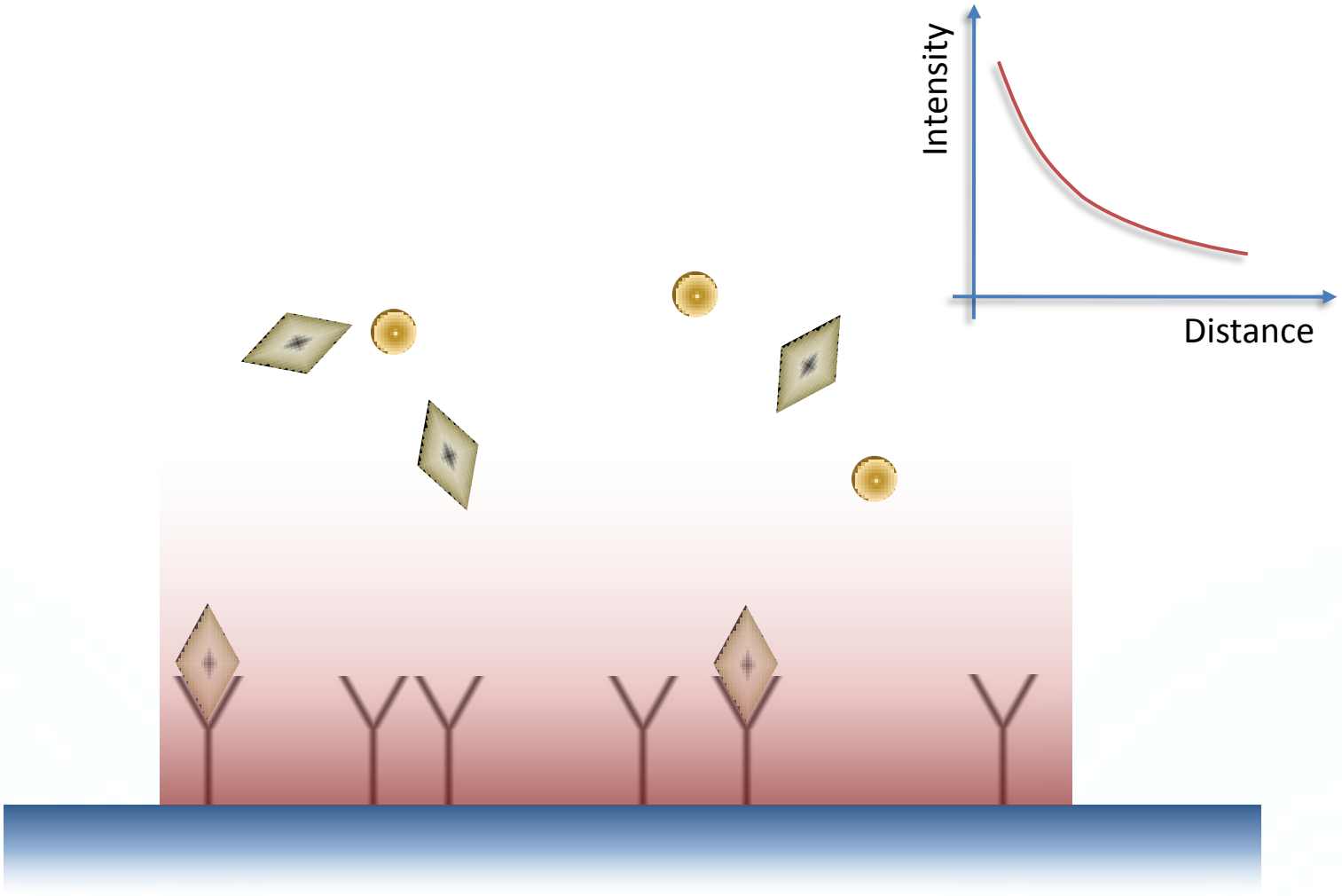
CRN2
Centre de recherche en nanofabrication et nanocaractérisation

CONTENT

- Contextualization
- Concepts review
  - *Interferometry and SP interferometry*
- Study of the proposed architecture
  - *Models and modeling details*
  - *Spectral responses*
  - *Far field measurements*

Diagnostics & Biosensing

- http://delphi.com/
- http://www.toshiba-medical.eu/
- http://www.eurofins.com/


Intensity
Distance

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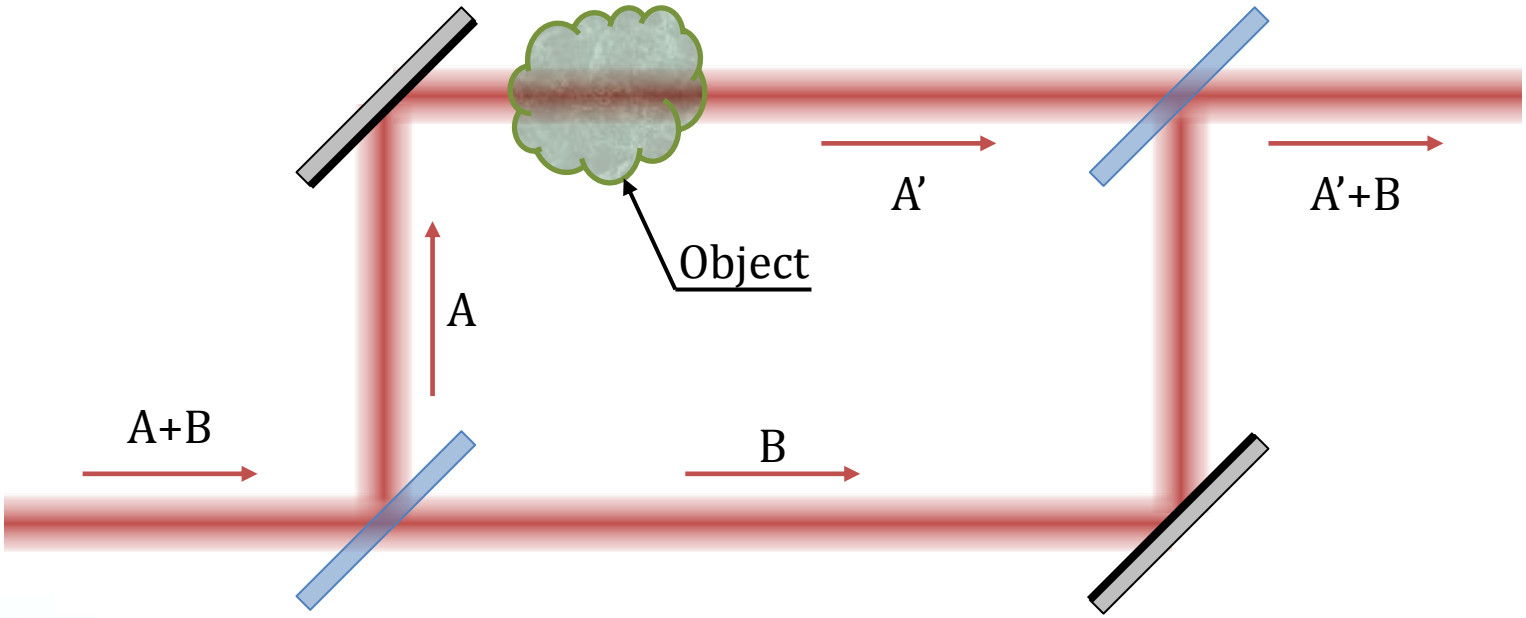
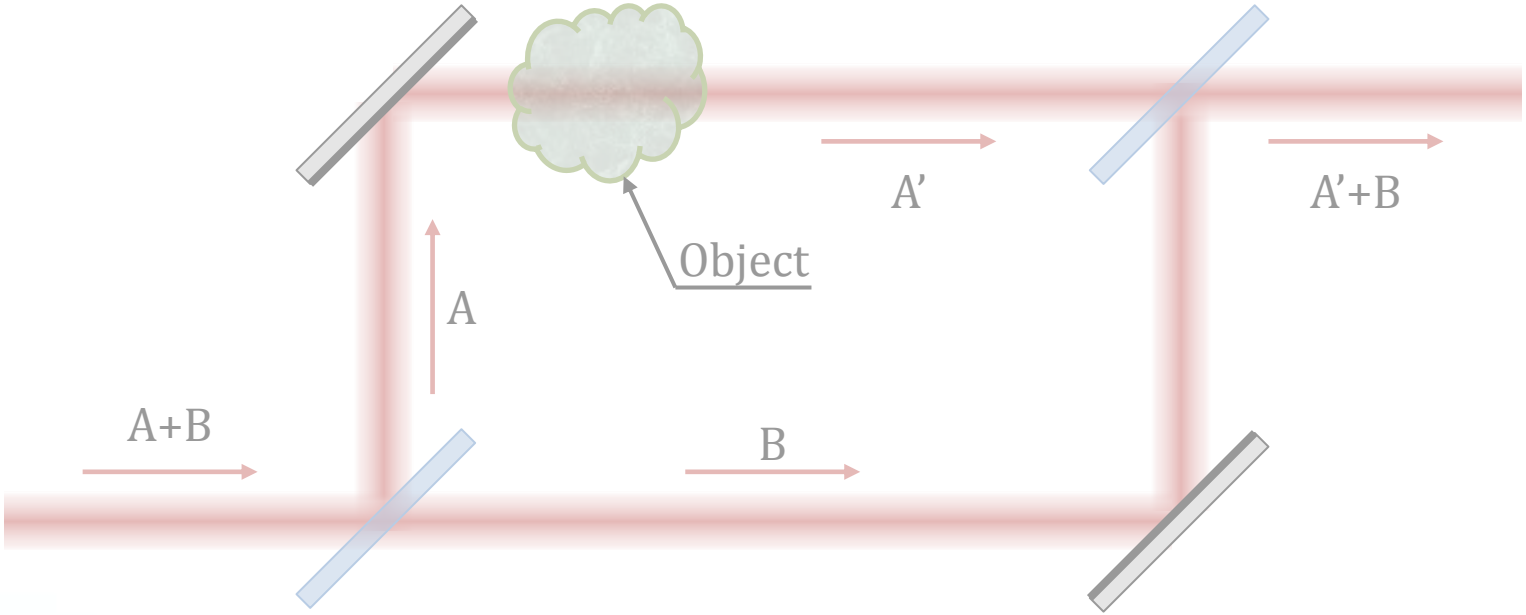

A'
A'+B
Object
A
A+B
B


A'
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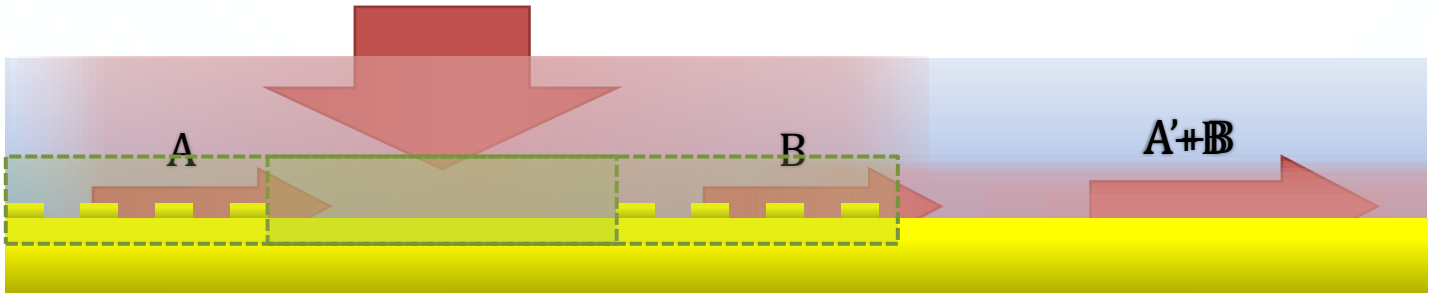
A
B
A'+B

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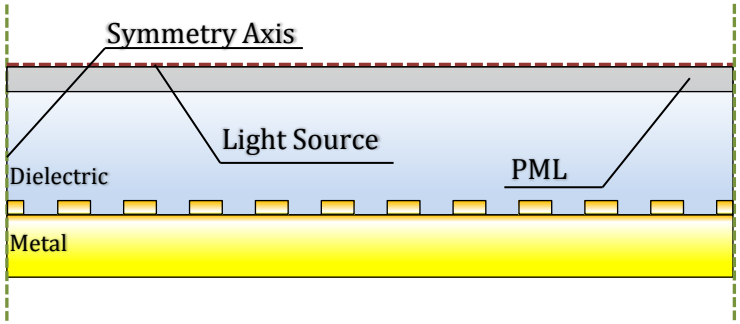
A)



Simulation Module:

RF Module

Application Mode:

In-Plane TM waves

Analysis type:

Scattered Harmonic Propagation

Typical number of elements:

100k – 275k (quadratic)

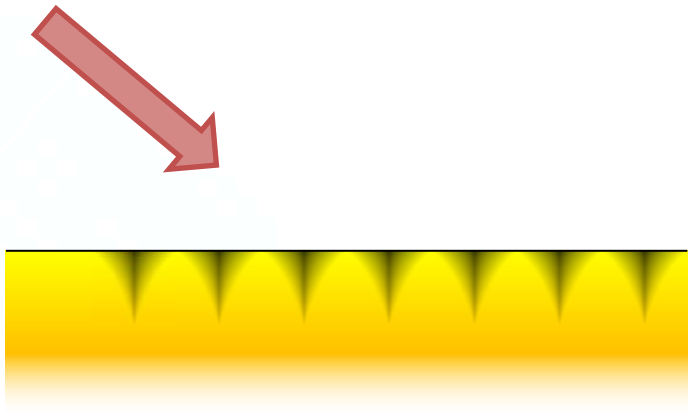
Typical dimensions:

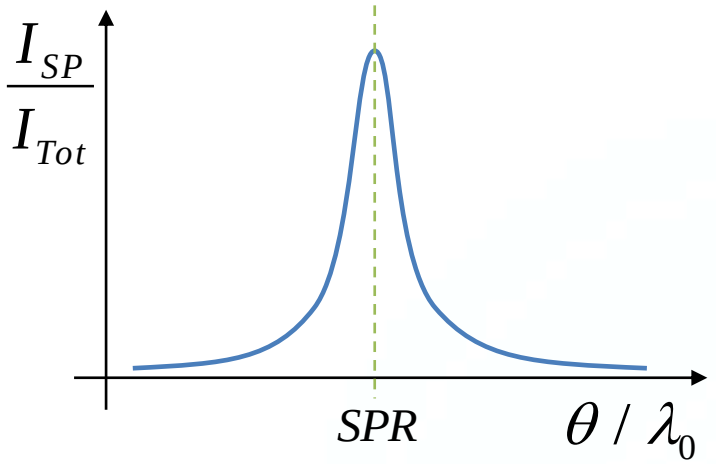
Height: 5um

Width: 50-75um

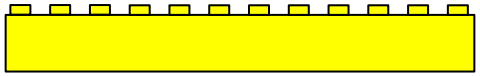
Definition of “Spectral Response”:

Relative efficiency to transfer power from the incident light to the plasmon mode, function of the incident angle or energy

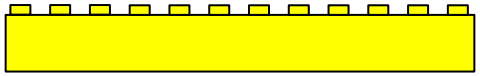


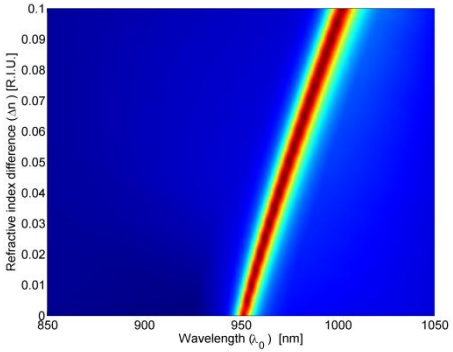


Infinite grating

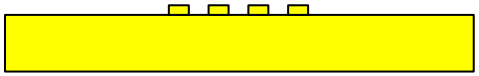


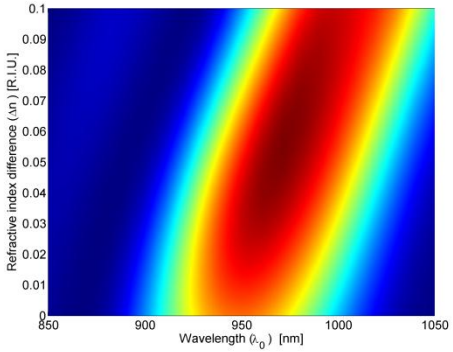
Infinite grating



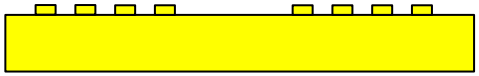


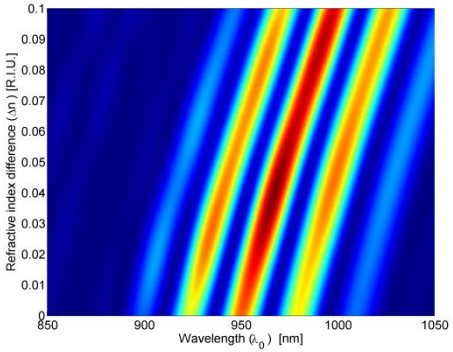
Finite grating

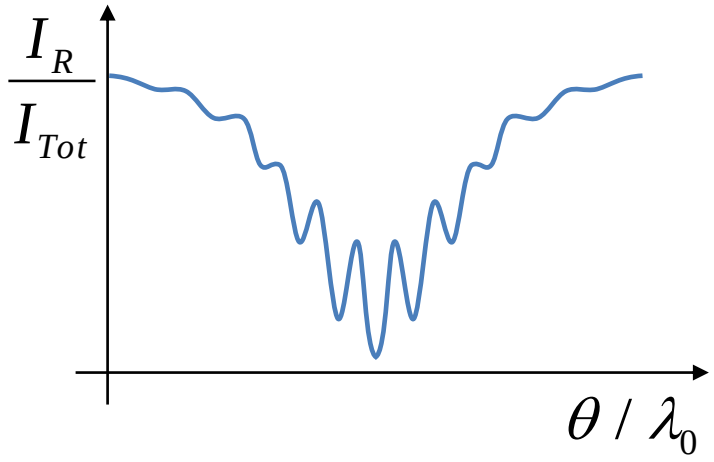




Two finite grating



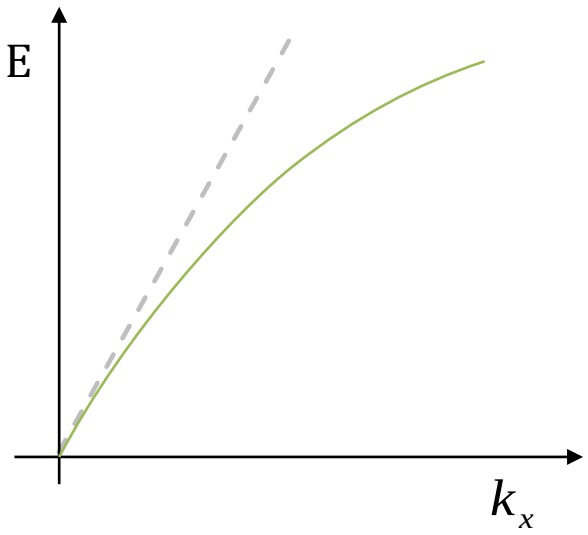


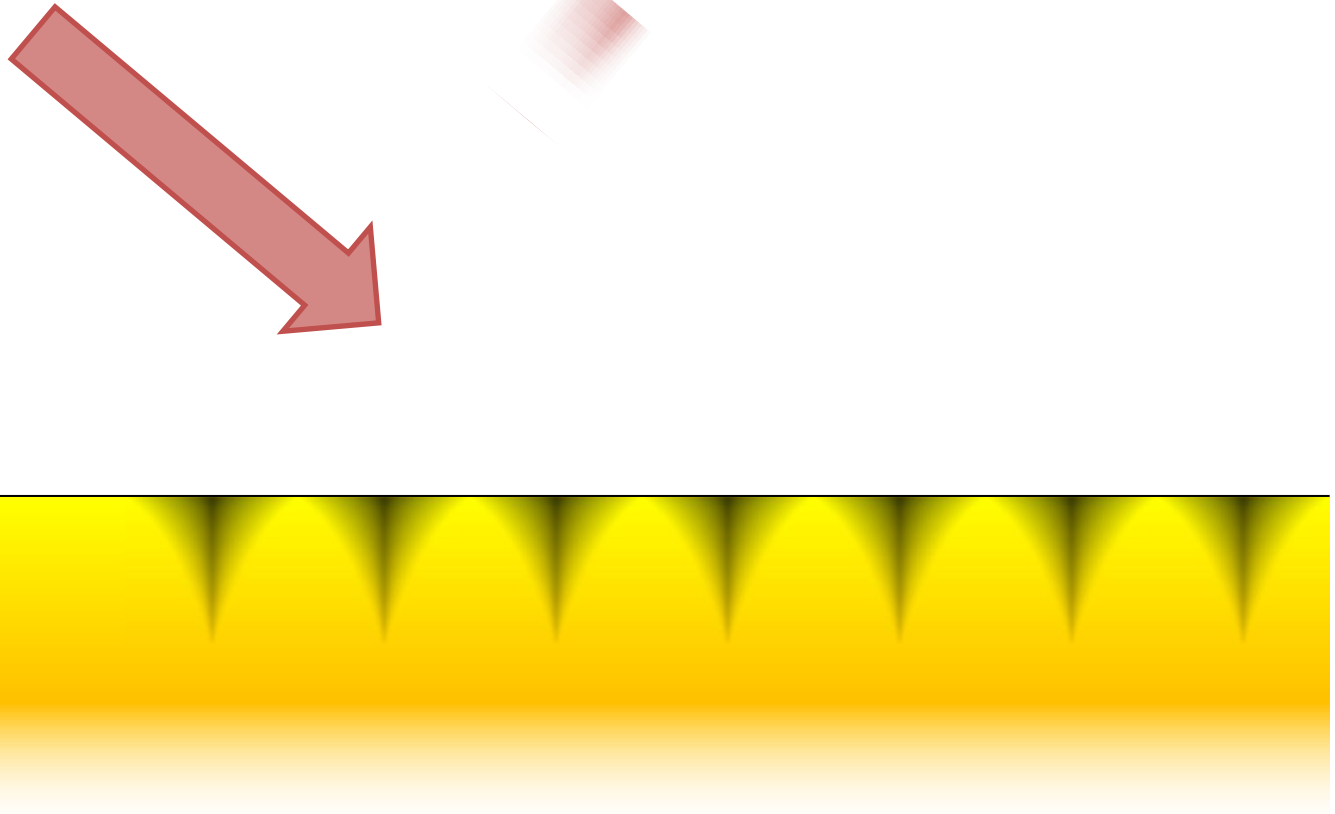

$\frac{I_R}{I_{Tot}}$
θ / λ_0

Conclusions

- Demonstration of an integrated interferometer was successful
- The interferometer multiplies the SPR signal's characteristics, providing:
  - An increase of the measurement accuracy

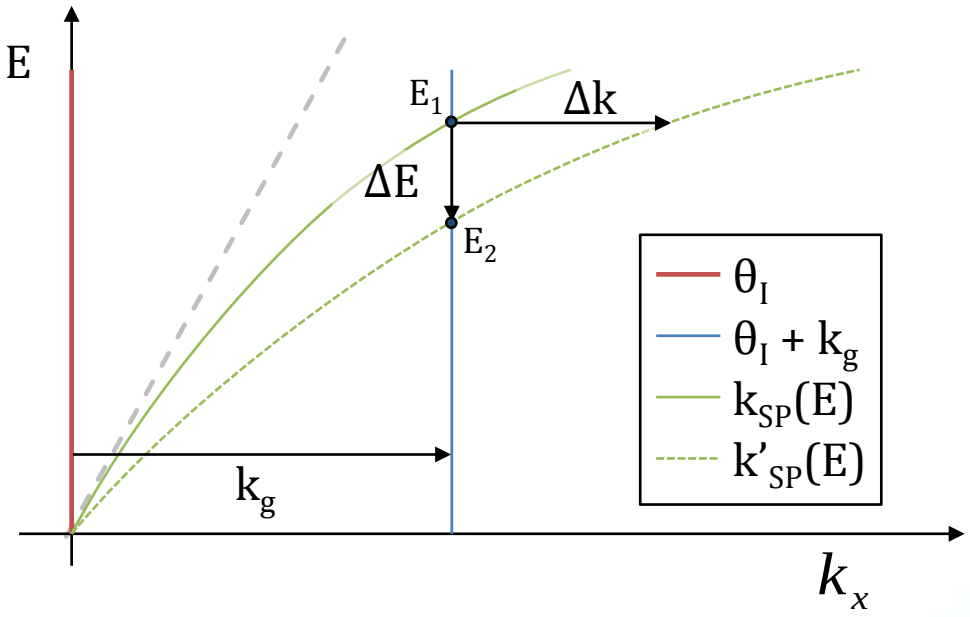
Thank you


E
k_x

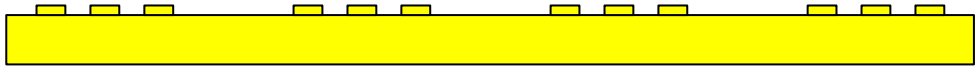


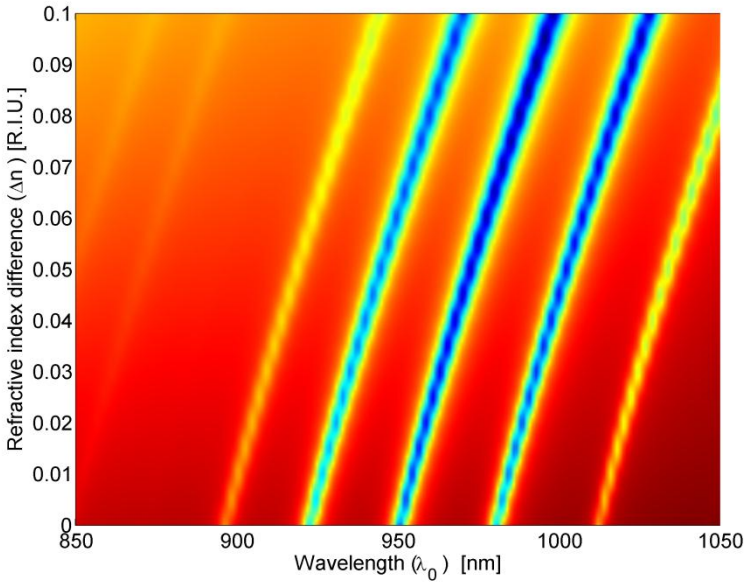
Surface Plasmon Resonance

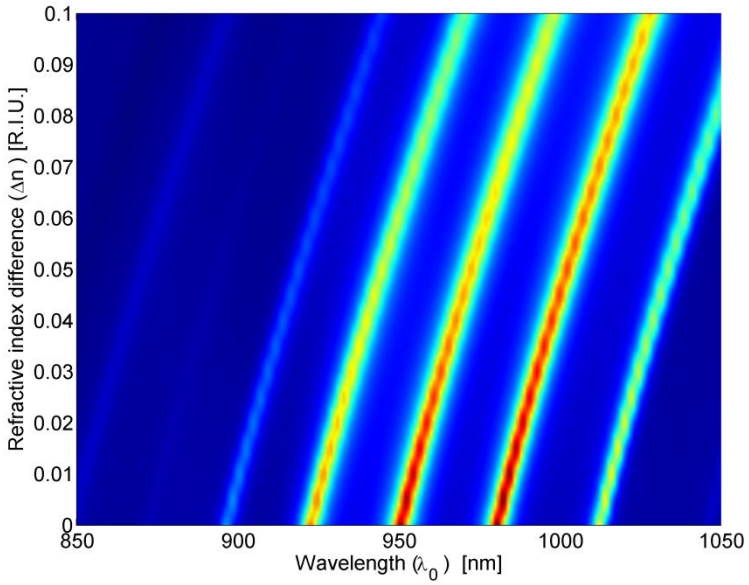
Dispersion Relation



JUXTAPOSITION DE RÉSEAUX FINIS







- Mise en contexte
- Révision des concepts
  - *Plasmons et SPR*
  - *Interférométrie et interférométrie par SP*
- Étude de l'architecture proposée
  - *Résonance spectrale*
  - *Utilisations*