POLITECNICO DI BARI

PLASMONIC ANTENNA FOR WIRELESS COMMUNICATIONS ON-CHIP

Giuseppe PIACENZA

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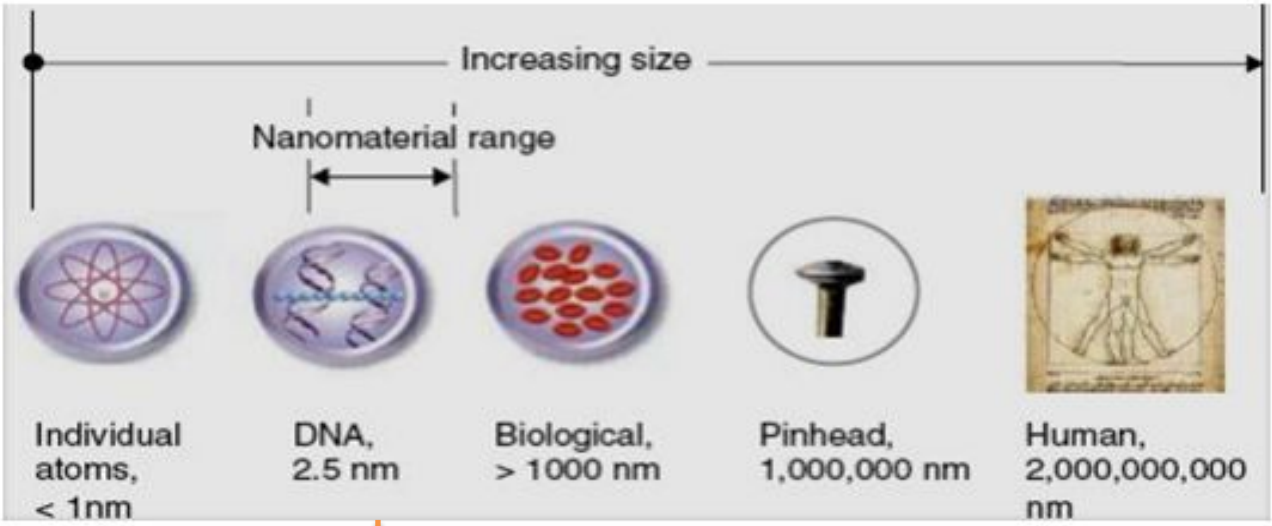
NANOMATERIAL AND THEIR PROPERTIES

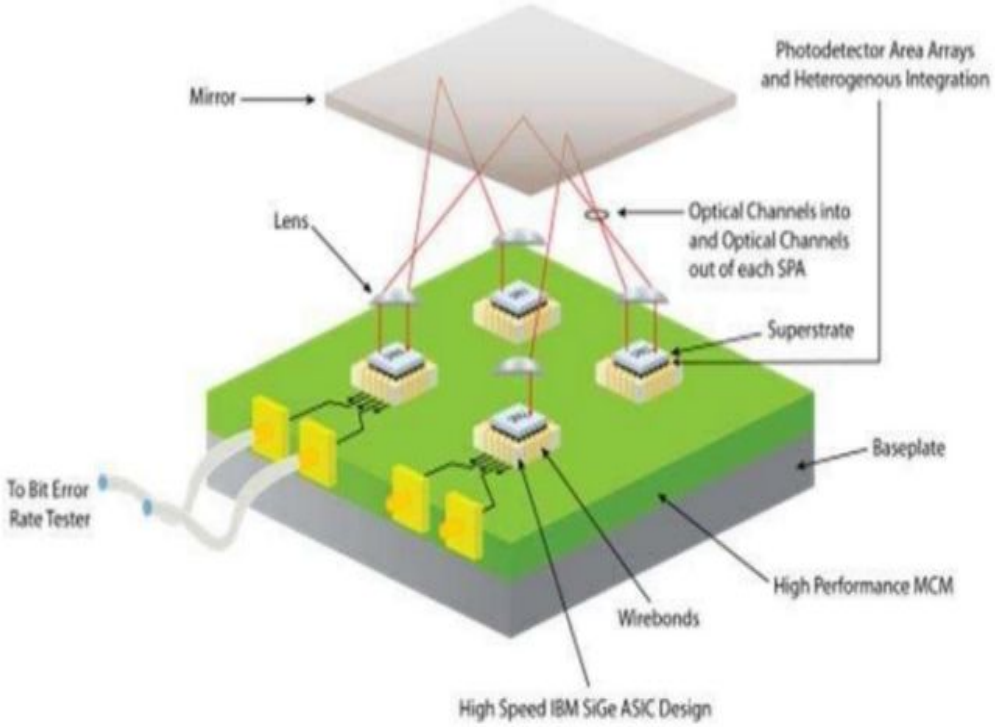


1 nm – 100 nm

Localized Surface Plasmon Resonance (LSPR):

Resonation of the material to the illumination with visible light due to the excitation of the surface plasmon localized on the structure.

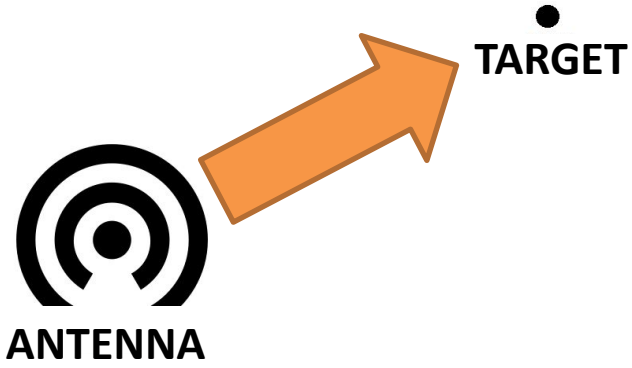
COMMUNICATIONS ON-CHIP



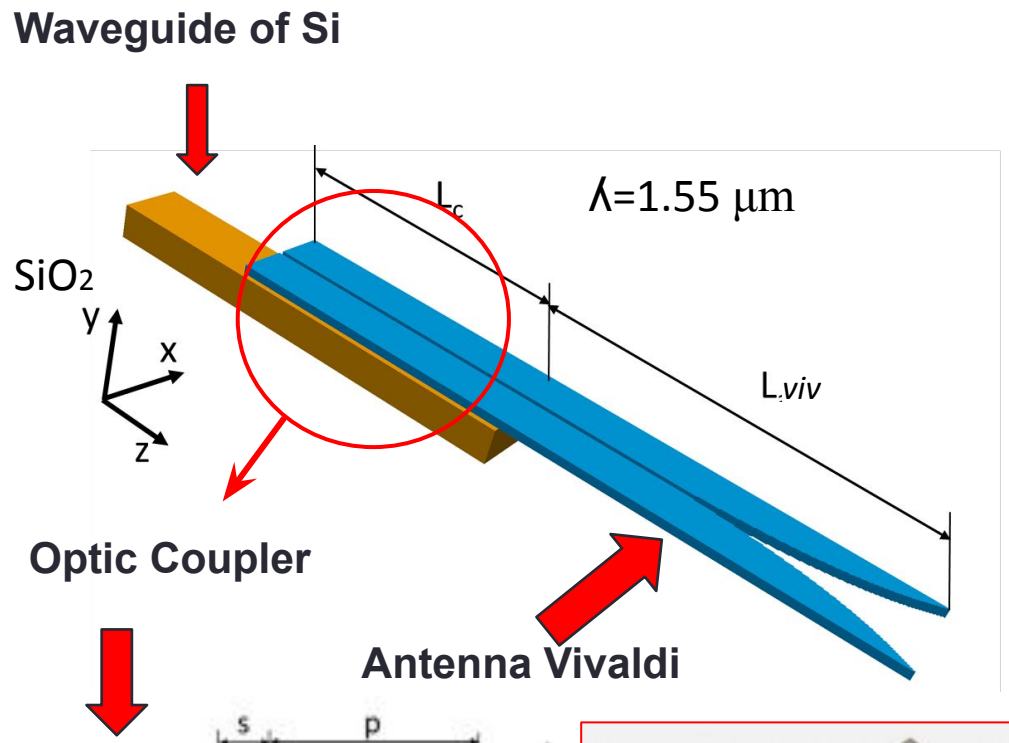
- **Latency reduction**
- **Less consumption**
- **No signal conversion losses**

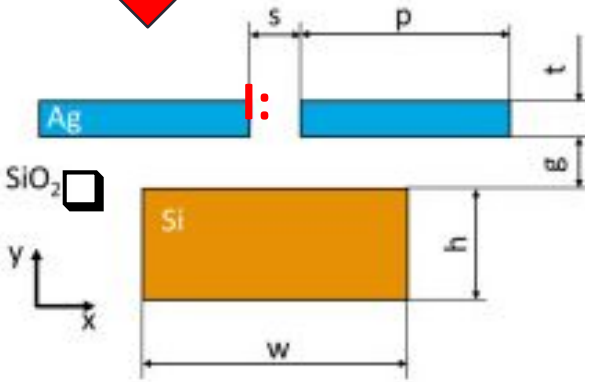
OBJECTIVE:

High Gain Antennas



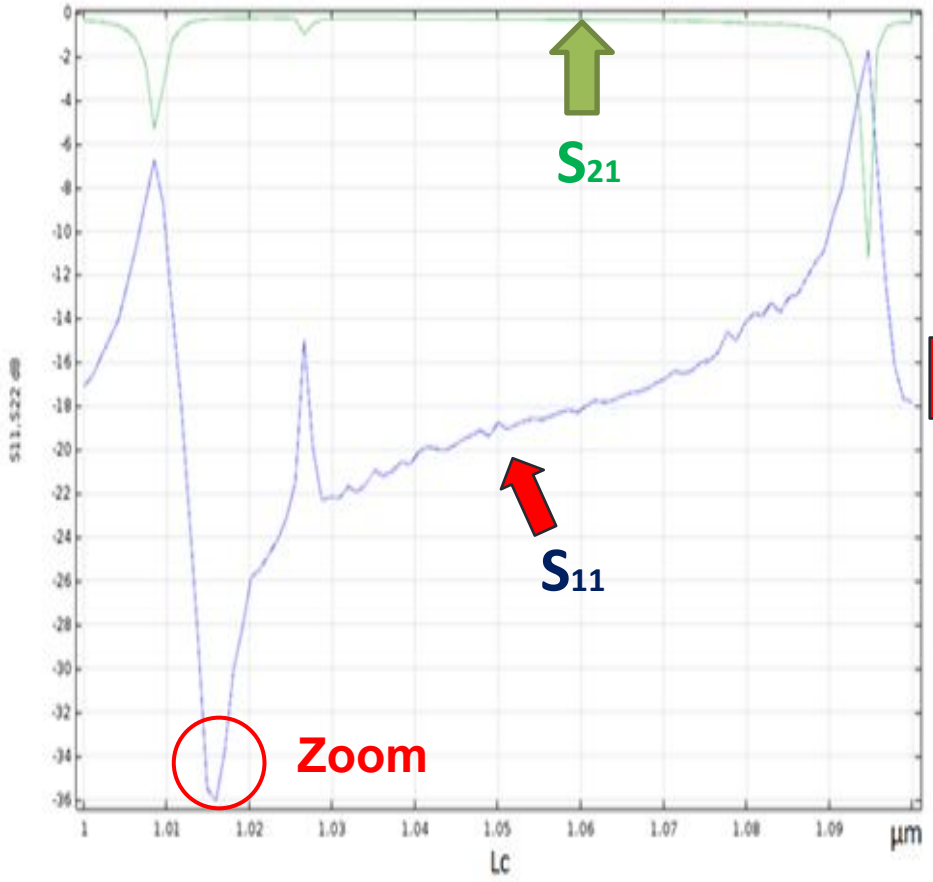
MODEL GEOMETRY

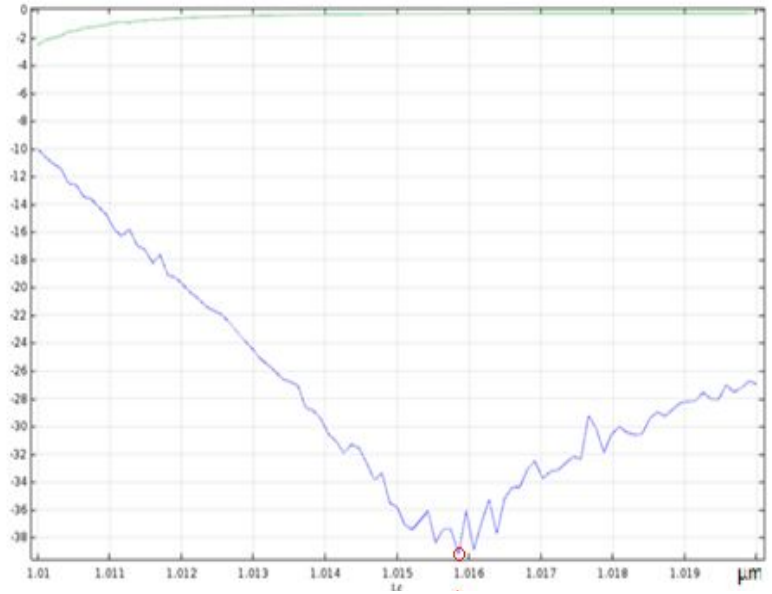




- Optical coupling between guides
- Propagation of the LSP
- Wave transmission

COUPLER:
Optimization of the length of coupling section (L_c)

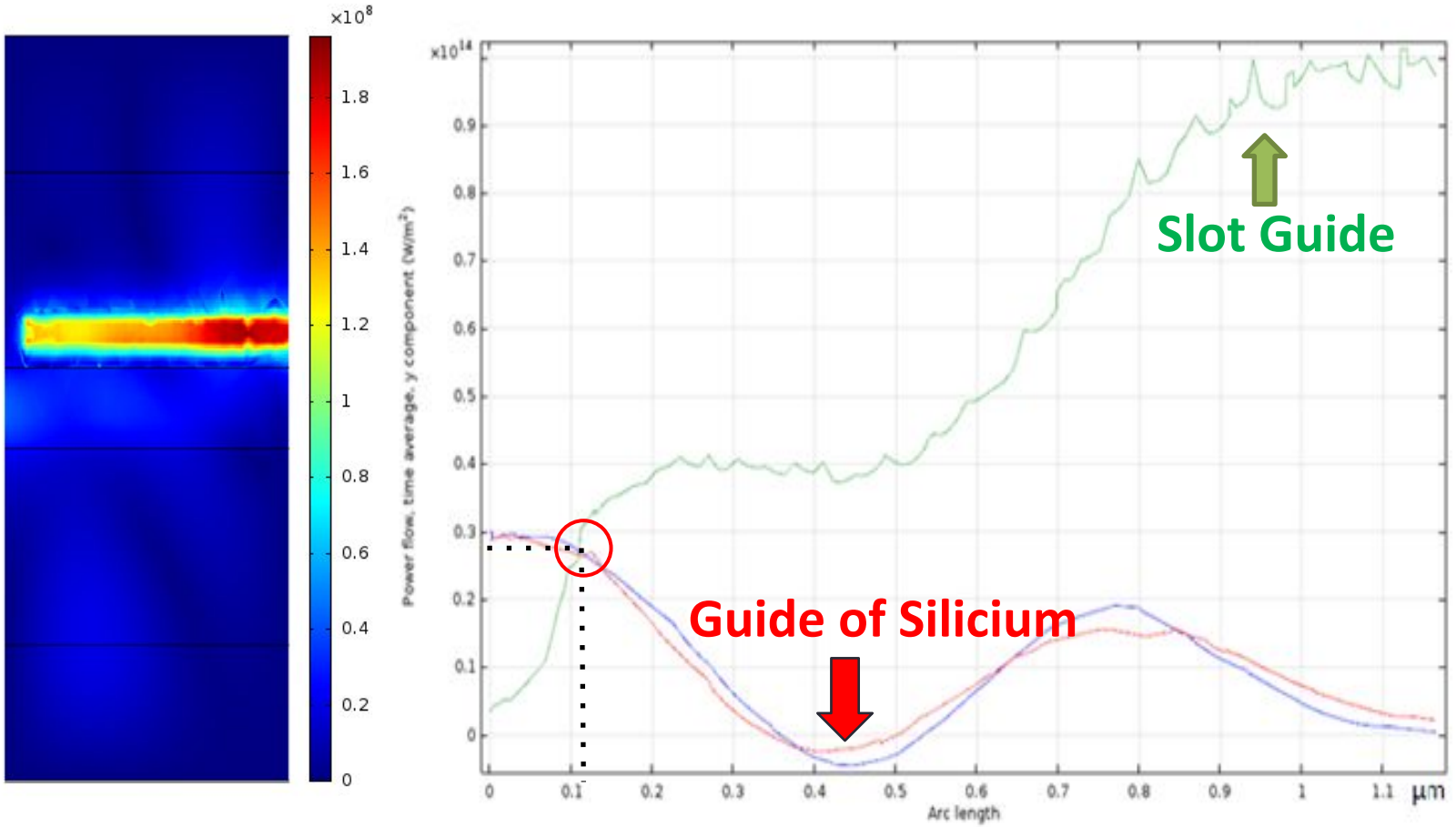




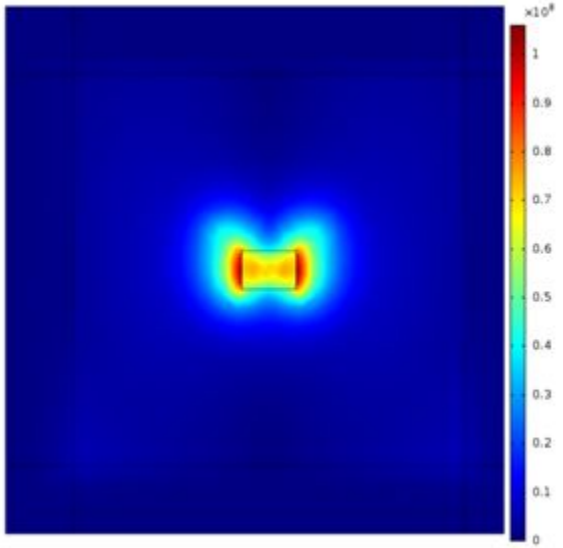
L_c = 1016 nm

S_{11} = -36 dB

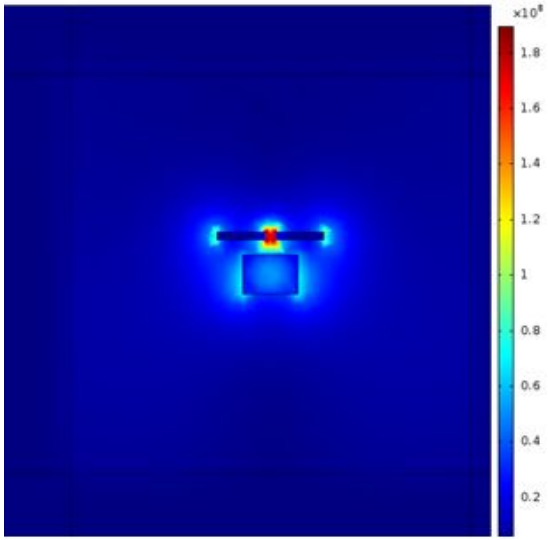
COUPLER:
Performances of the device (1/2)



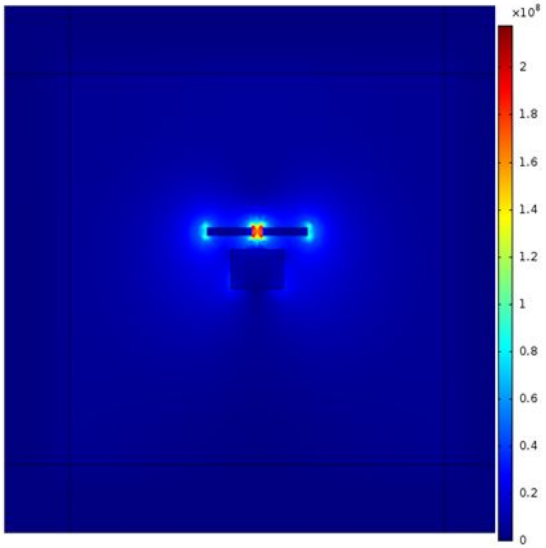
COUPLER:
Performances of the device (2/2)



INPUT FIELD

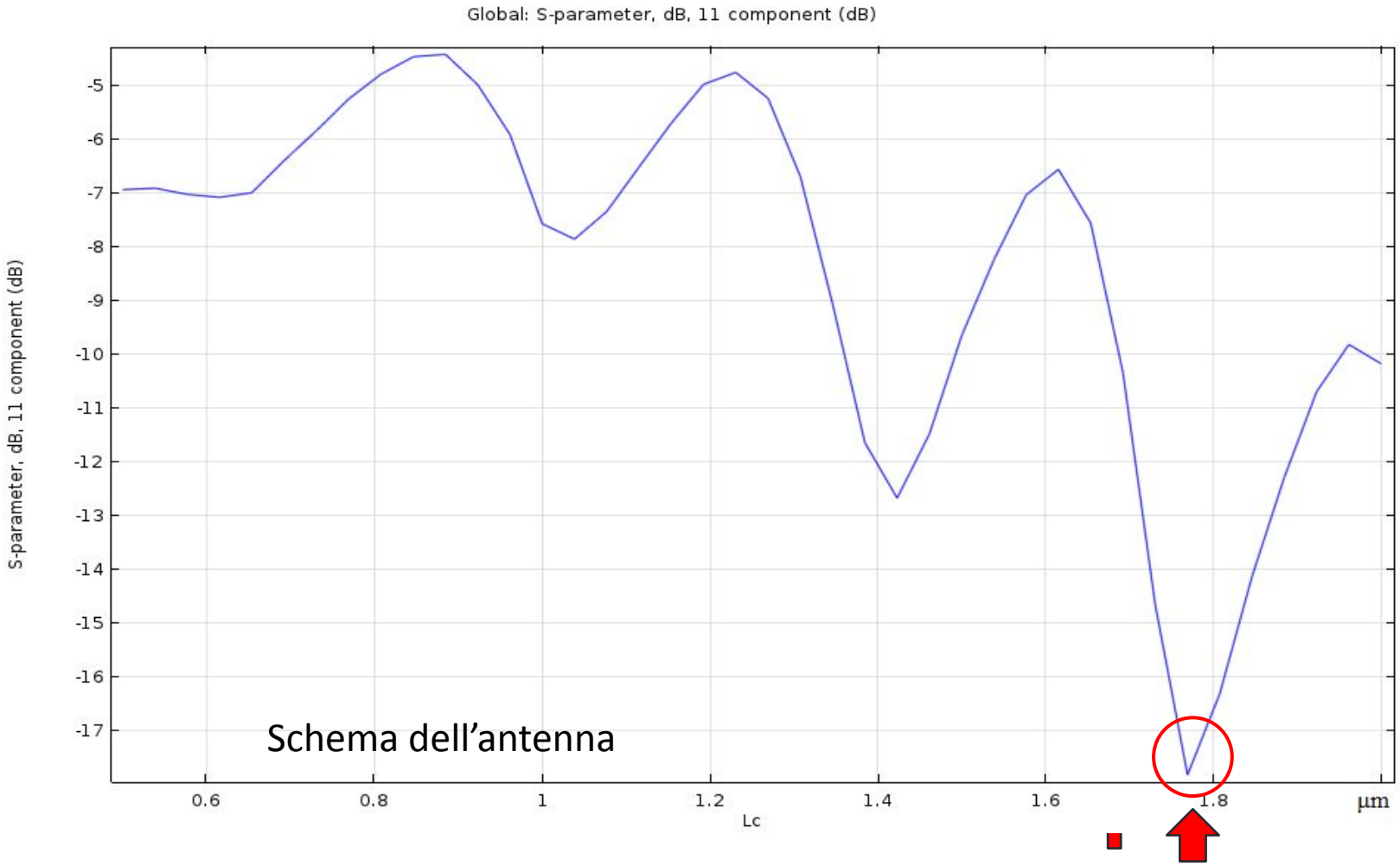


HALF STRUCTURE FIELD



OUTPUT FIELD

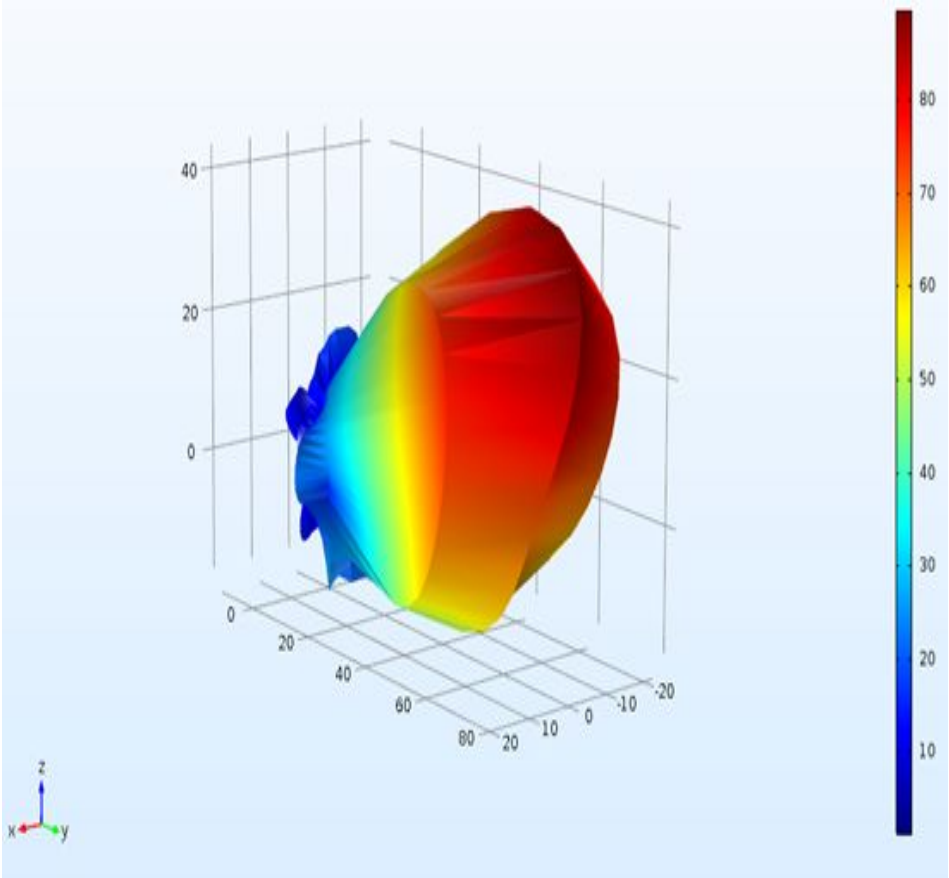
ANTENNA VIVALDI:
Optimization of the length of the radiating horn (L_{viv})



L_{viv}= 1695 nm

S_{11}= -7.6 dB HIGH!

ANTENNA VIVALDI:
Performances of the device (1/2)

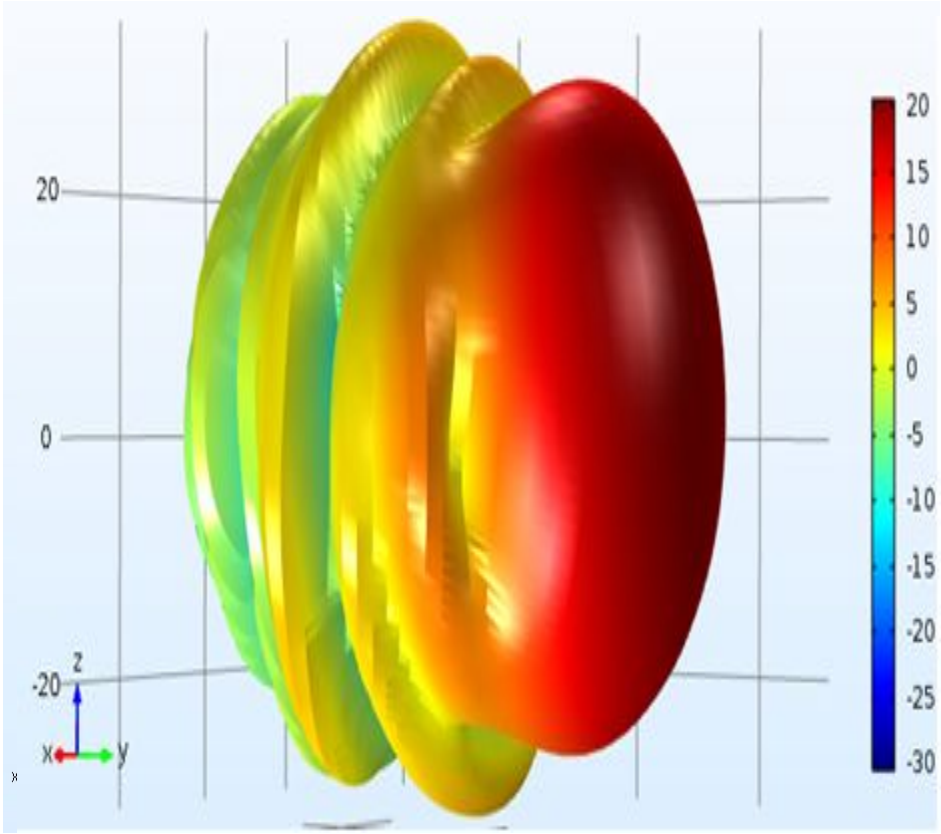


DIRECTIVE

MONODIRECTIONAL

|E| ≃ 80 V/m

ANTENNA VIVALDI:
Performances of the device (2/2)



Gain:

G=100

G(dBi)=20 dBi

CONCLUSION

- Model Implemented in COMSOL
- Optimized the coupling section
- Optimized the length of the Vivaldi Antenna
- Maximized the Gain

Thank you!