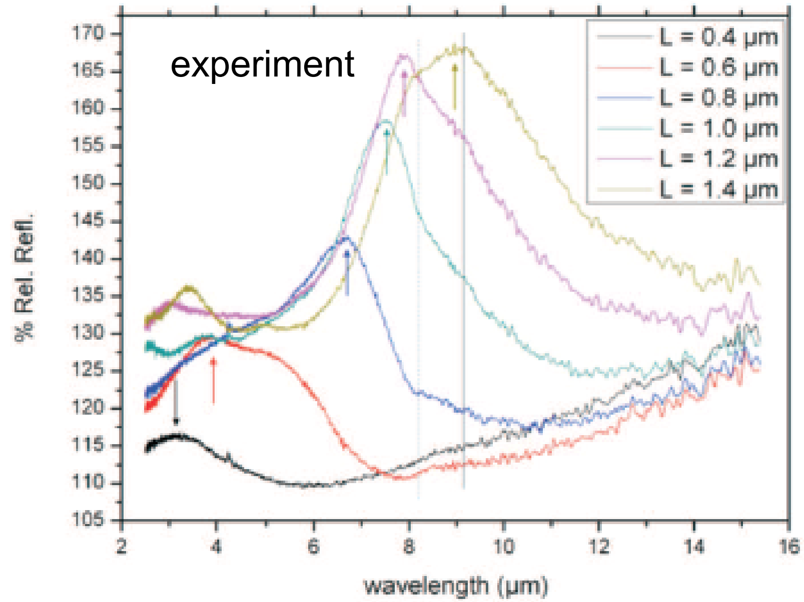
Spectra of plasmonic antennas in VIS and MIR

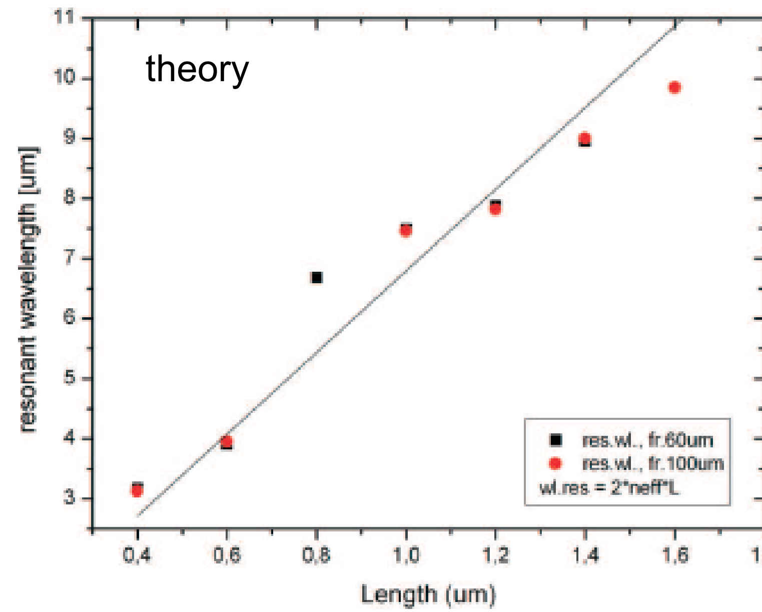
Reflection: peak

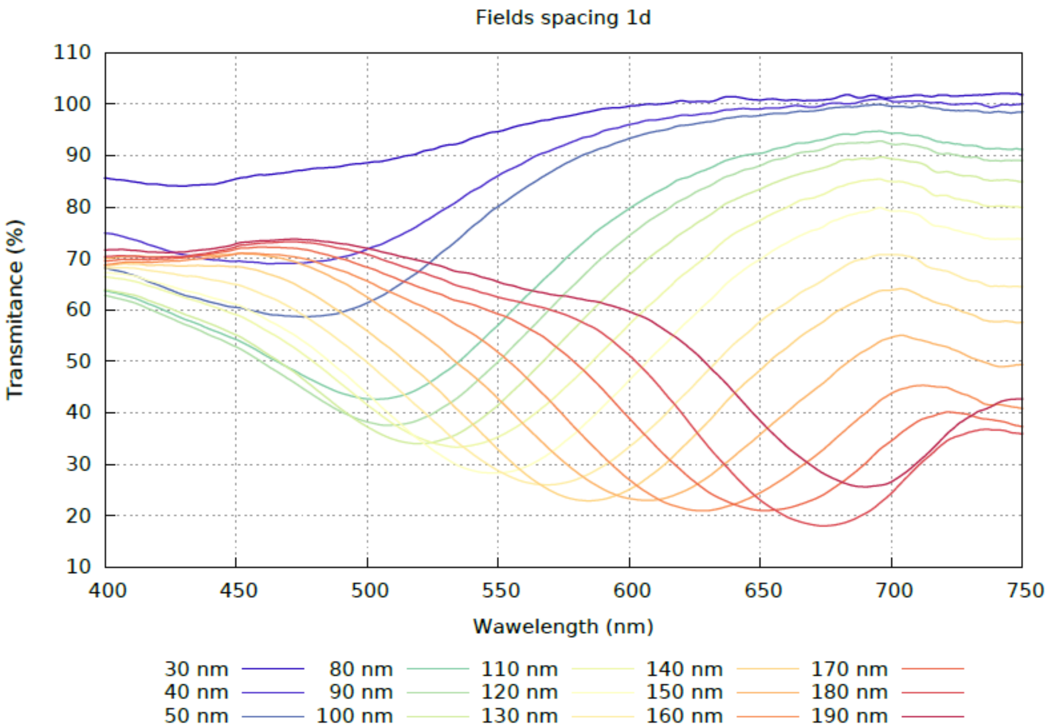
EBL rod-like antennas

increasing antenna length
→
red shift of the resonance

FTIR measurements - EBL antennas





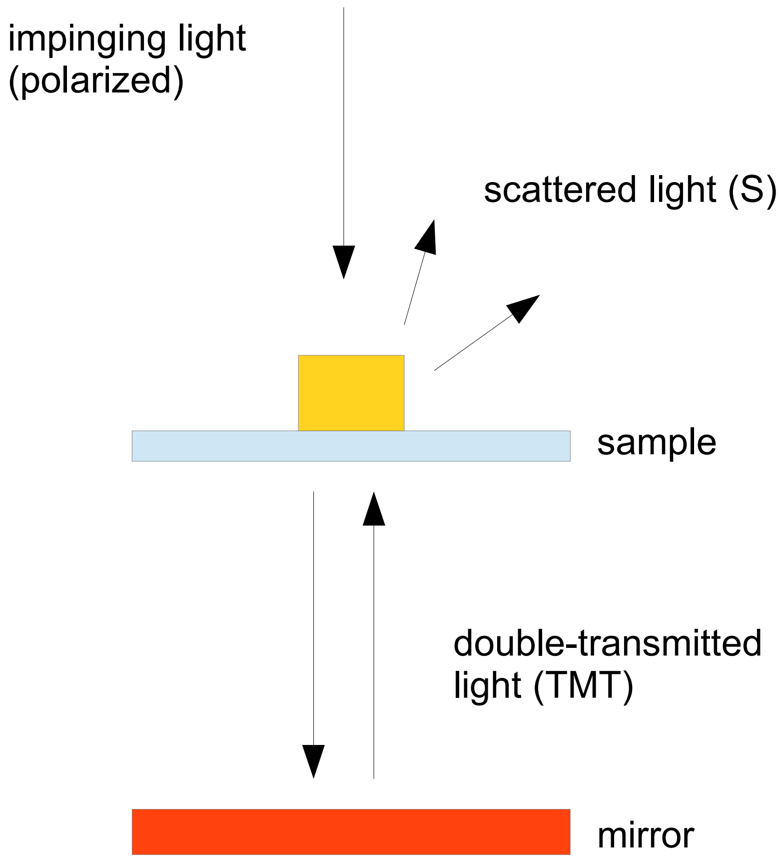


Transmission: dip

arrays of nanodiscs

red shift of the resonance wavelength with increased radius observed in the trasmission spectra

Setup in EPR spectrometer



Interference beating pattern

peak in S

dip in TMT (absorption)

coherent interference of both waves

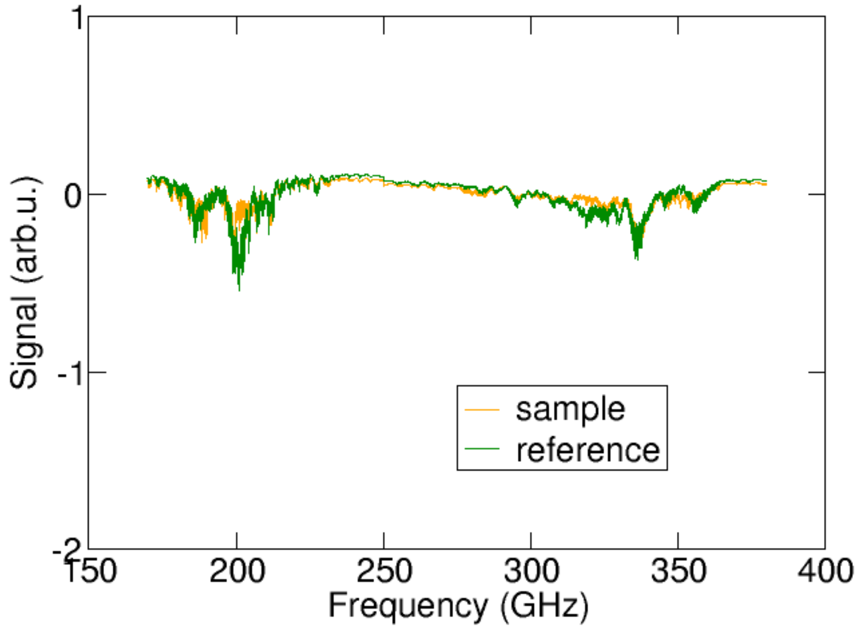
Polarization resolved measurements

detectors for co-polarized (bolometer) and cross-polarized (Schottky diode) component

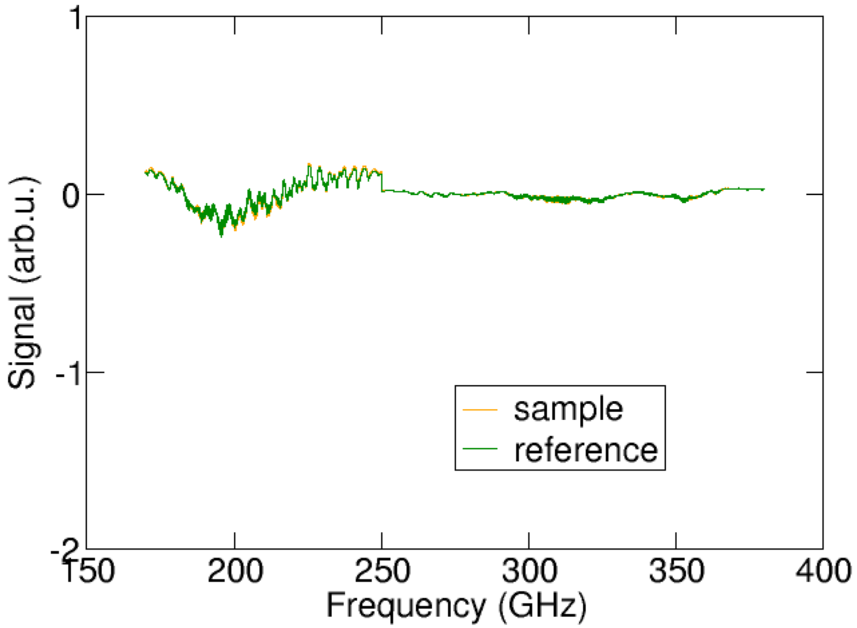
diabolo antennas: strong polarization dependence of response, not so pronounced cross-polarized component

Typical (best) raw spectra

co-polarized



cross-polarized



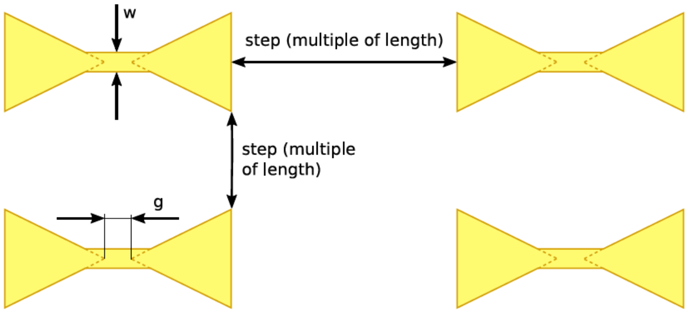
beating periods: 1.7 GHz (18 cm), 84 MHz (3.6 m)

Sample 27

designed resonance **350 Ghz**

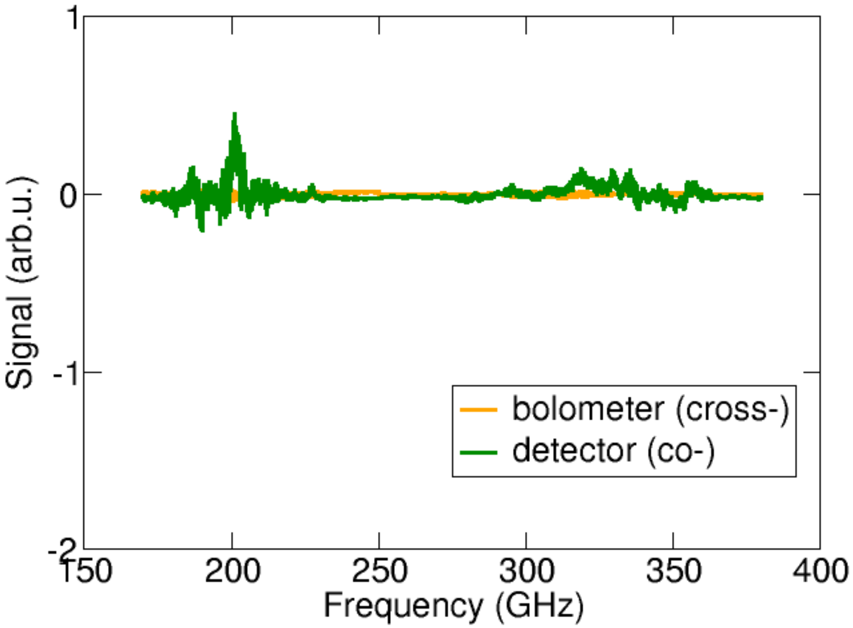
bridge: 1 × 2 μm

array 1.3 × 1.3 mm, step 2 × length

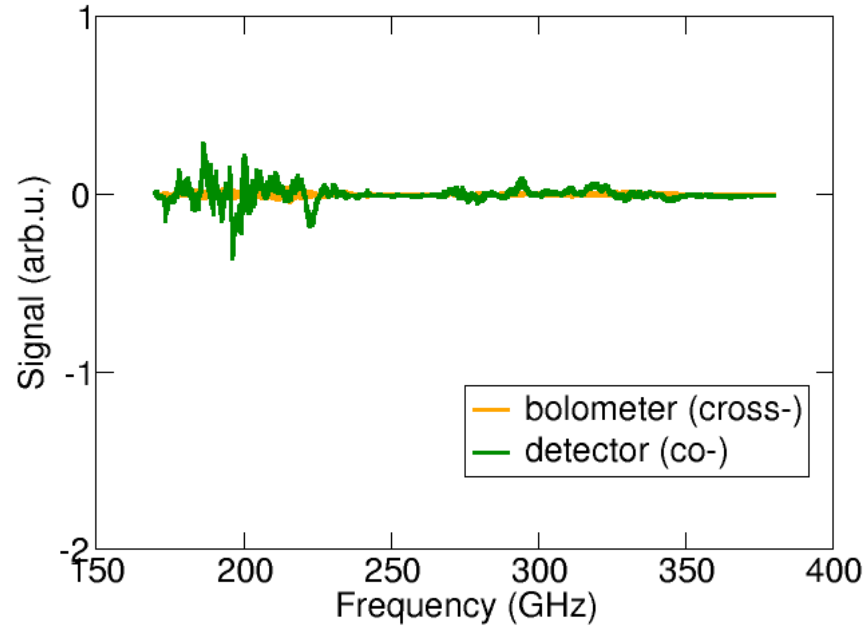


Typical (best) processed spectra

Sample 27: 350 GHz



Sample 25: 210 GHz



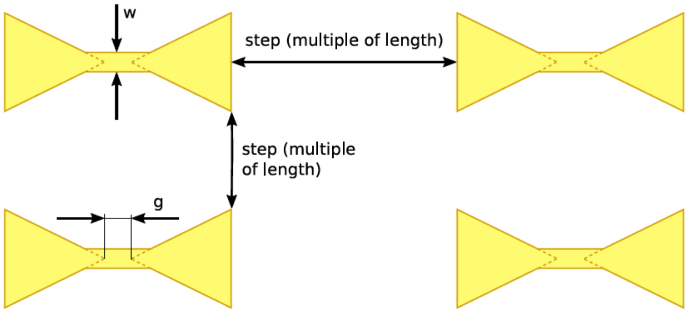
beating period (sample 25): ~5 GHz (6 cm)

Sample 27

designed resonance **350 Ghz**

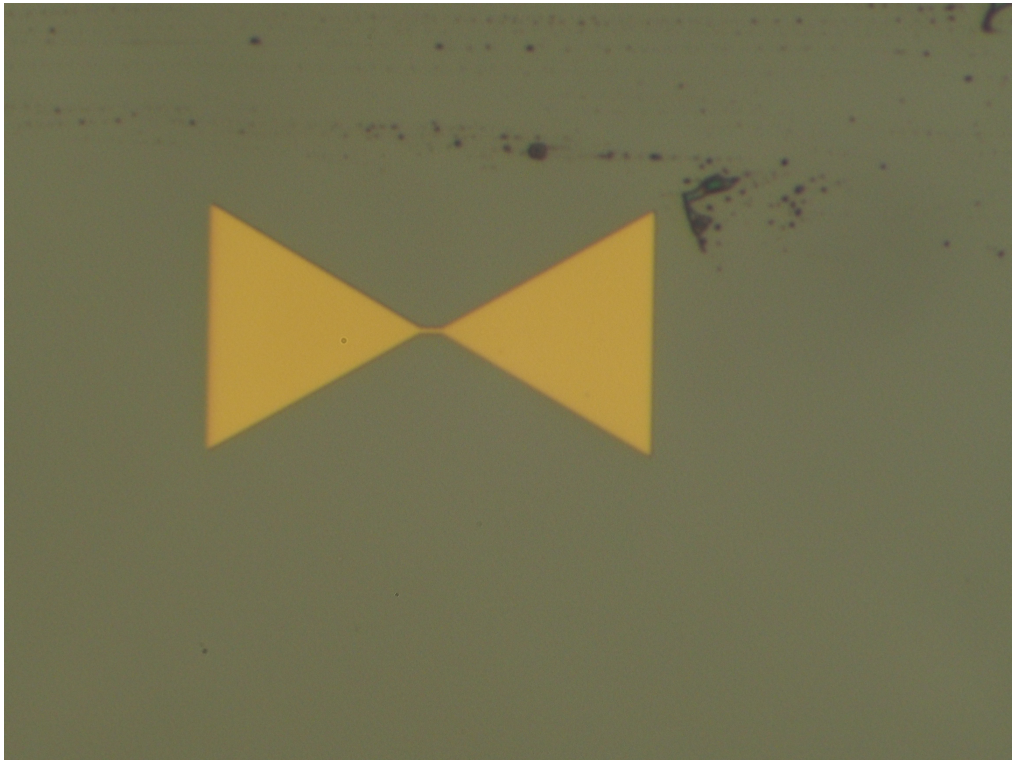
bridge: 1 × 2 μm

array 1.3 × 1.3 mm, step 2 × length



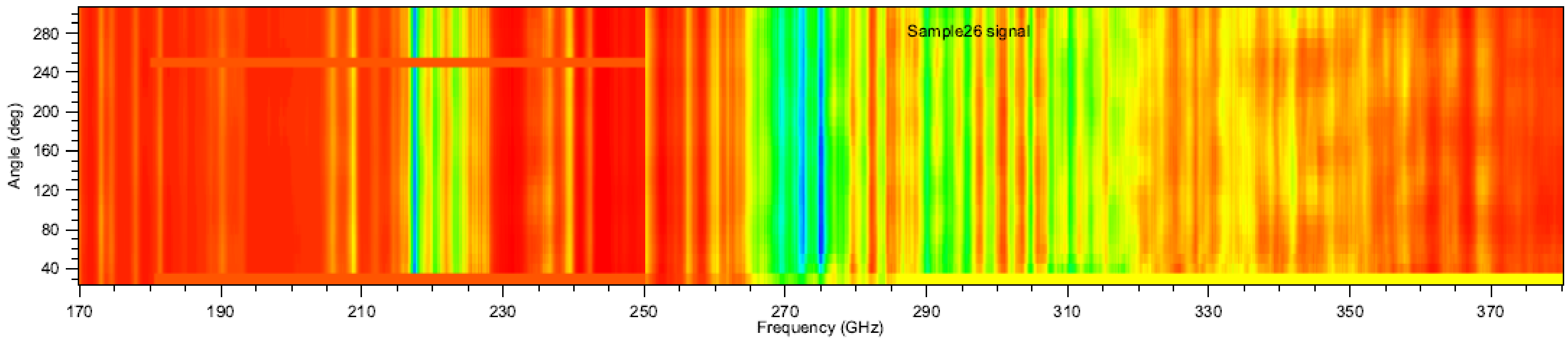
Samples after the measurements

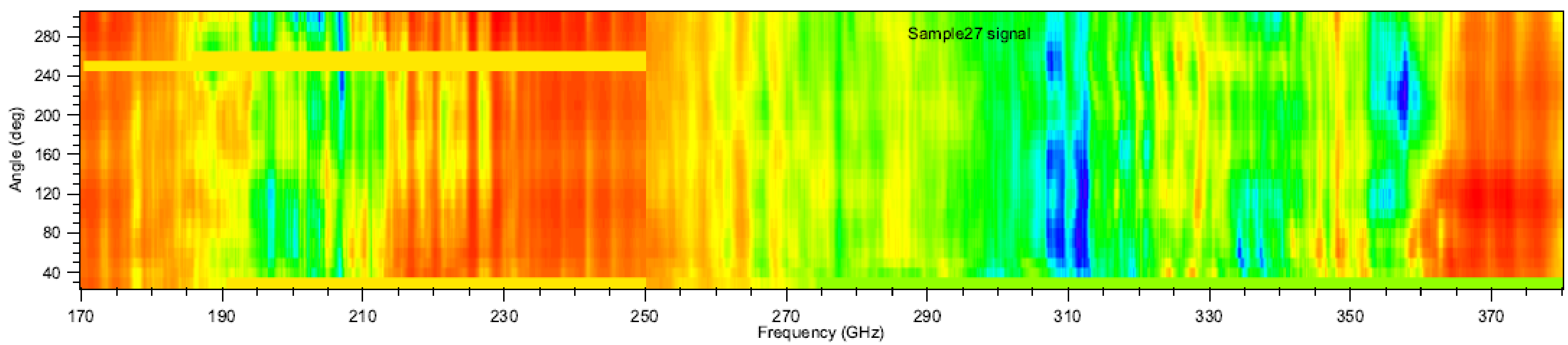
optical microscopy – bridges are intact

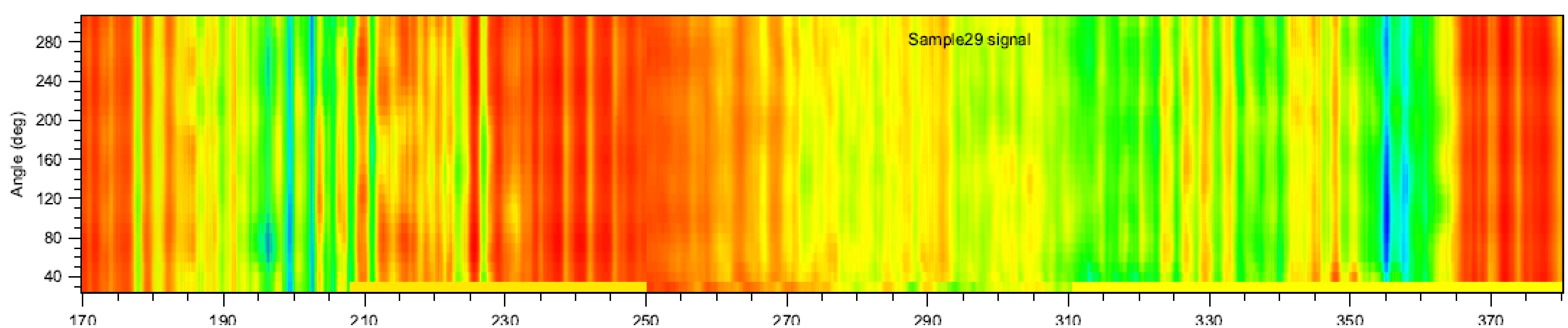


Polarization-resolved spectra

co-polarized response







polarization dependence
→
plasmonic reponse

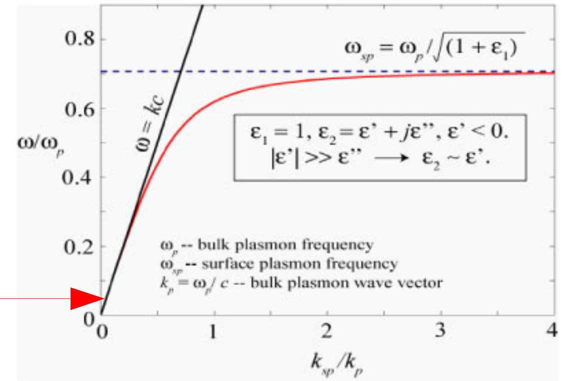
Increase the size

Linear part of the dispersion
plasmon energy ~ 1/size

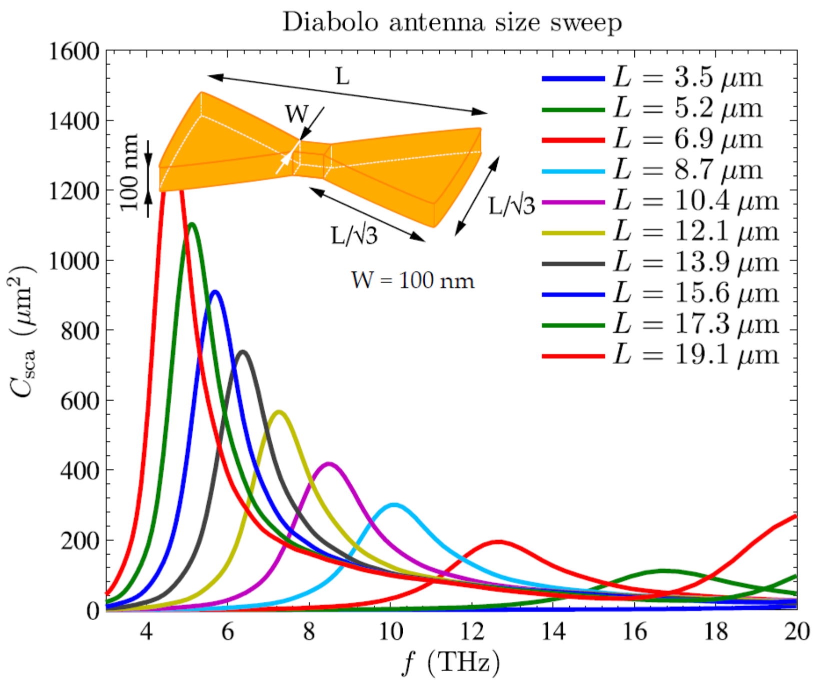
But: very little plasmonic character, mostly surface electromagnetic wave

It is not clear how efficient will be the EM wave focusing and enhancement

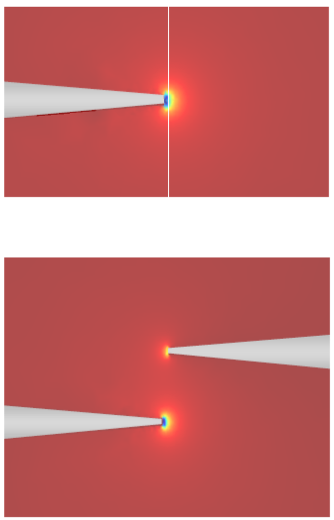
Simulations (MH) are promising

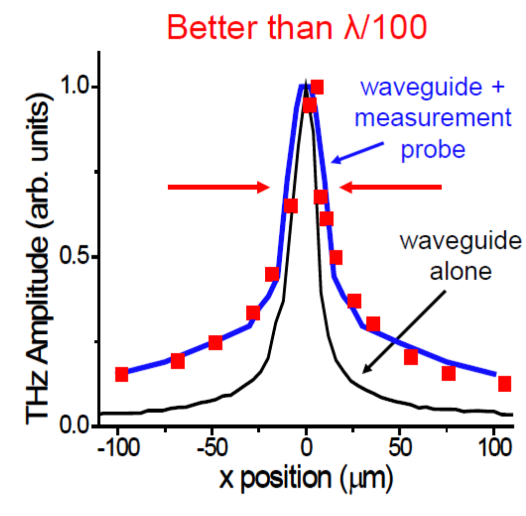


Simulated diabolo antenna



Experiments with tapered gold waveguide





Astley et al., *Appl. Phys. Lett.* (2009)