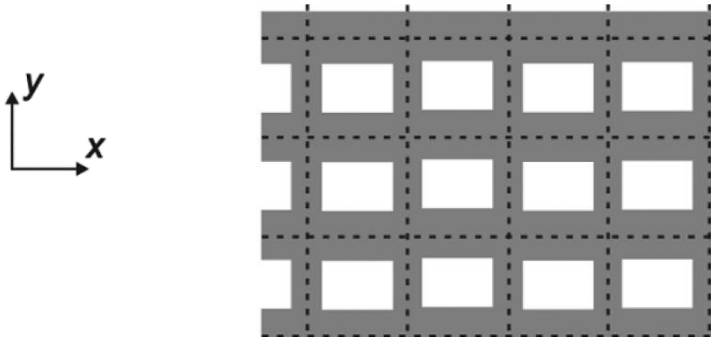
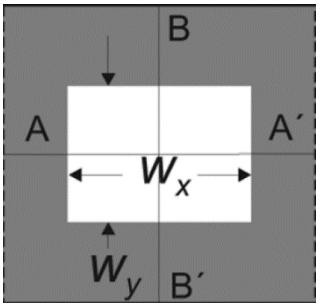
<u>First experiment</u>: Transmittance through a periodic grid

The objective of this lab consists of analyzing the transmittance through a periodic grid as represented below.





with:

- $a_x = a_y = 24.17$ mm
- $w_x = 10.5$ mm
- $w_y = 2.42$ mm

The structure is excited by a plane wave incident along the z direction (normal to the disk plane), and polarized along the y direction.

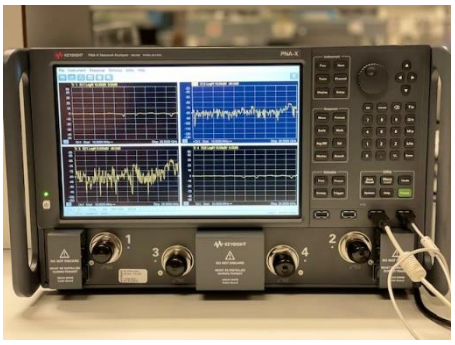
During the precedent previous class, you learned how to compute numerically the transmittance of the grid as a function of the frequency.

In the present lab, the transmittance will be experimentally measured, and compared with the numerical prediction.

For that purpose, two antennas will be used (one in emission and one in reception). The first one is a crossed log periodic antenna (“Rohde and Schwarz HL024 A1”) as represented below.

The second antenna is a quad ridge horn antenna (“Satimo QH800”).

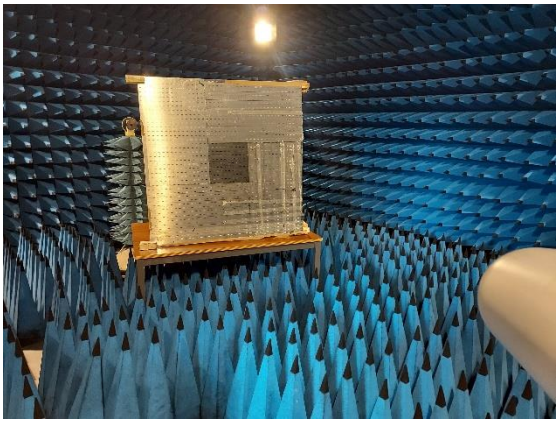
Those two antennas will be connected to a Vector Network Analyzer (VNA), which will serve to measure the transmittance (S12) between the antennas.



Task:

1- Measure the Free-space transmittance between the two antennas in the frequency band [7: 15] GHz.

2- Place the grid in the axis between the two antennas as illustrated below.



3- Measure the transmittance in the presence of the grid

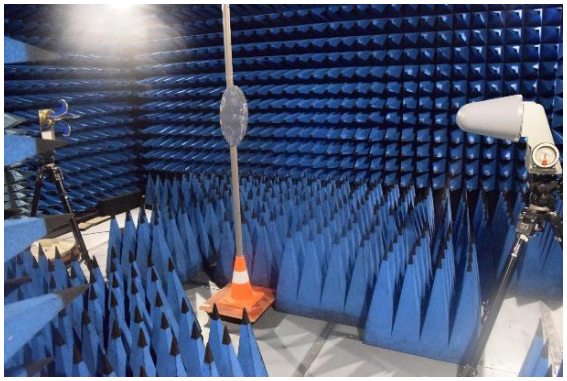
4- From the two previous measurements, deduce the transmittance of the grid.

5- Compare it with the numerical prediction.

6- What interesting observation do you make?

<u>Second experiment</u>: Experimental demonstration of the Arago Spot

Keep the same setup as before and place a circular metallic disk between the antennas as represented below. The disk should be placed more or less in the axis between the antennas and normal to this axis.



1- Measure the transmittance between the antennas

Move the disk in the direction z, normal to the axis between the two antennas. Measure and represent the transmittance as a function of the position of the disk on the z axis.