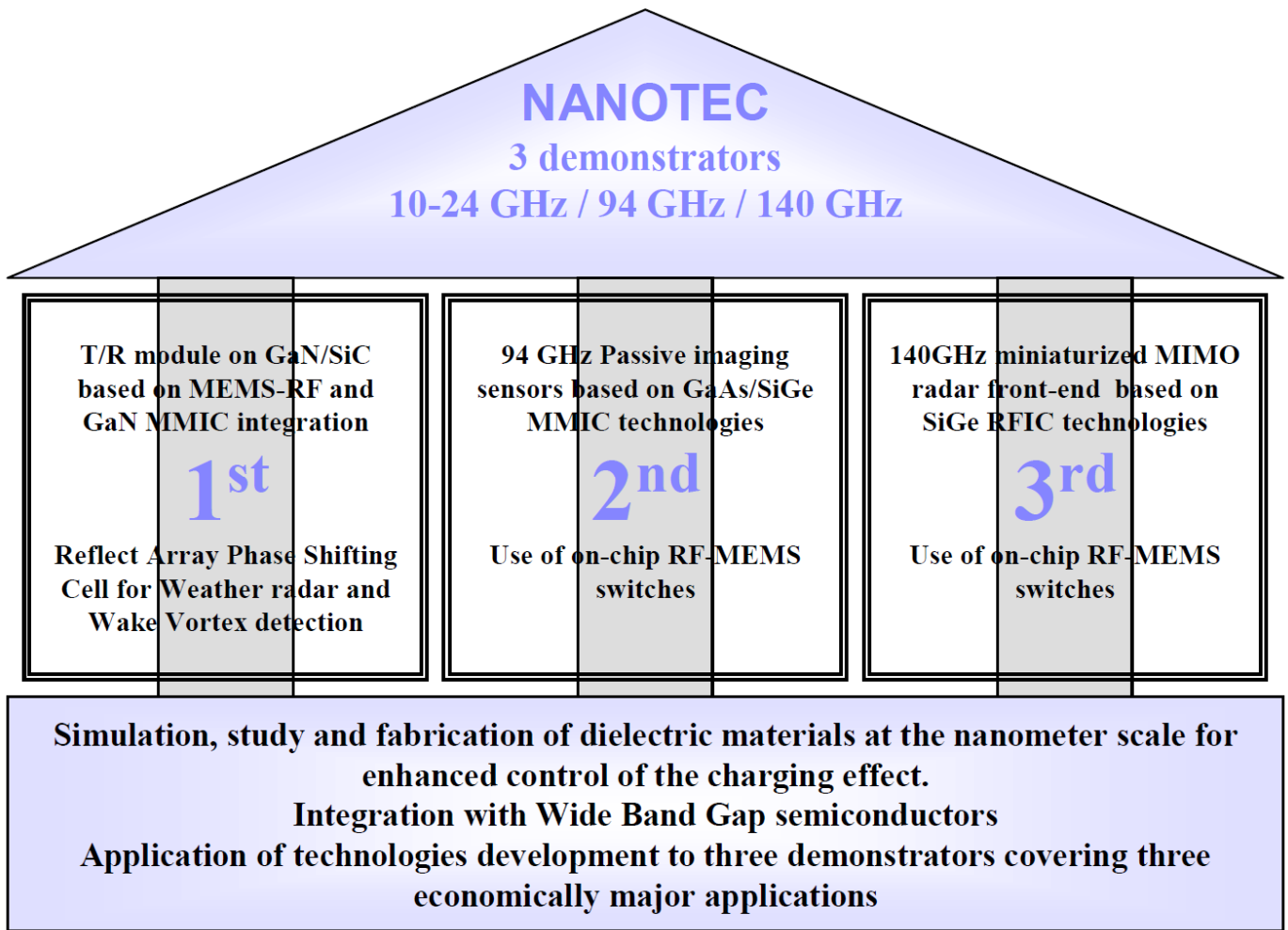


Nanostructured materials and RF-MEMS RFIC/MMIC technologies for highly adaptative and reliable RF systems

September 2014
 Newsletter #3

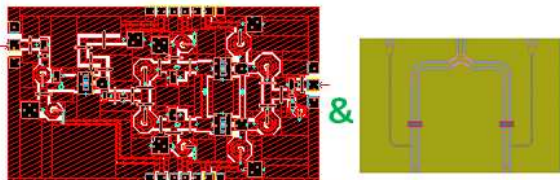


WORK PROGRESS DURING THE 3rd YEAR: KEY ISSUES

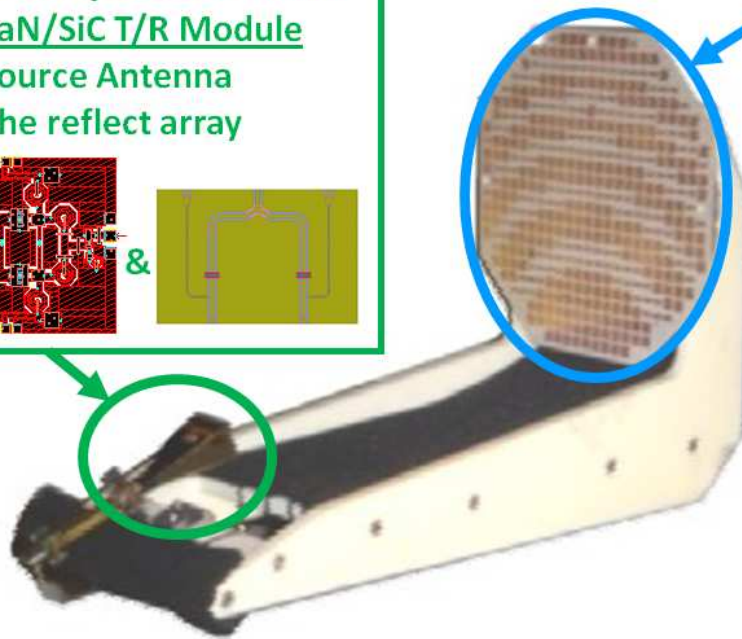
Demonstrator # 1: 10-24 GHz Applications

Reflect Array Antenna for Wake Vortex Detection Radar

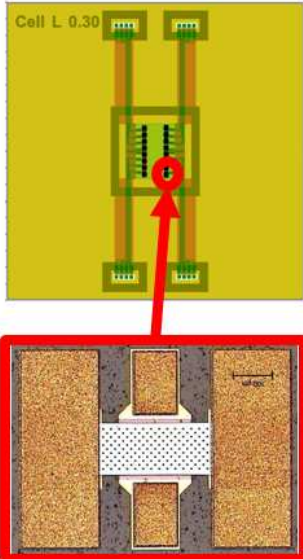
Monolithic or Hybrid RF-MEMS based GaN/SiC T/R Module
-> Source Antenna for the reflect array



The image shows a microscopic view of a complex RF-MEMS based GaN/SiC T/R module on the left, with various components and interconnects visible. To its right is a schematic diagram of a feed antenna structure, showing a central feed point connected to a larger rectangular area.

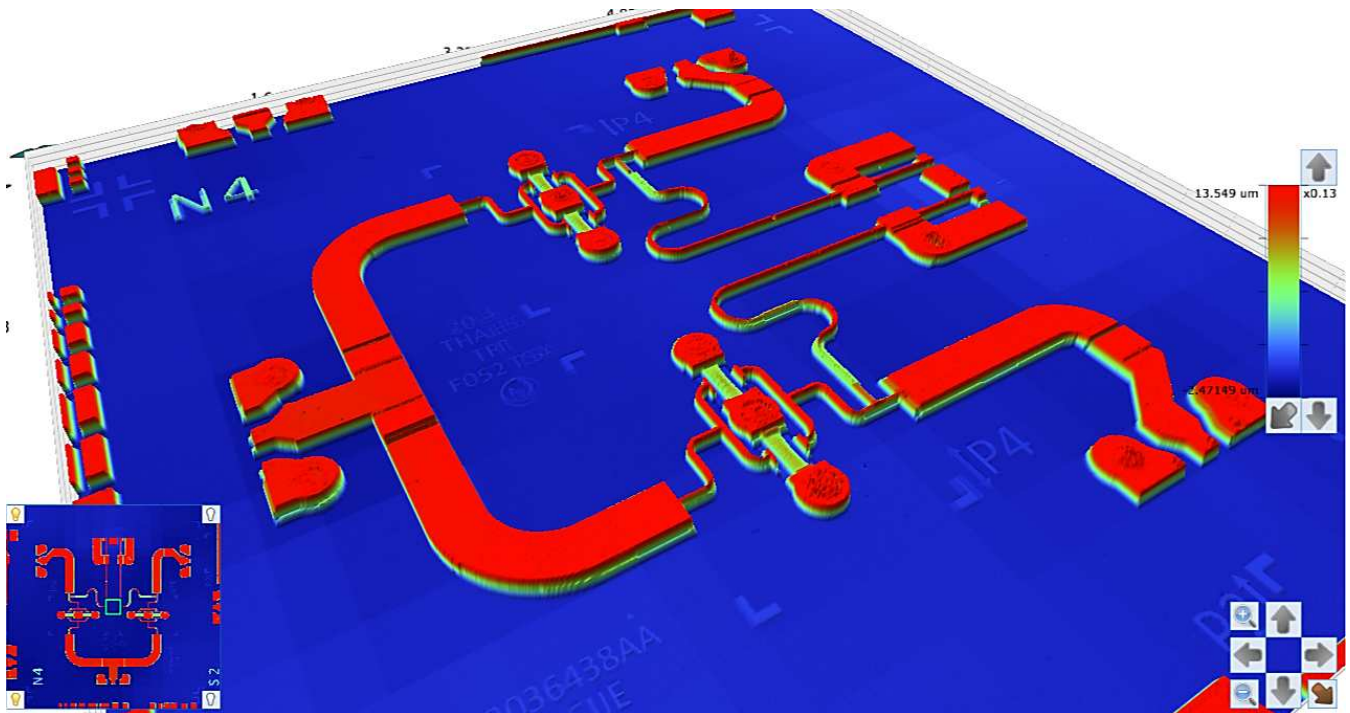
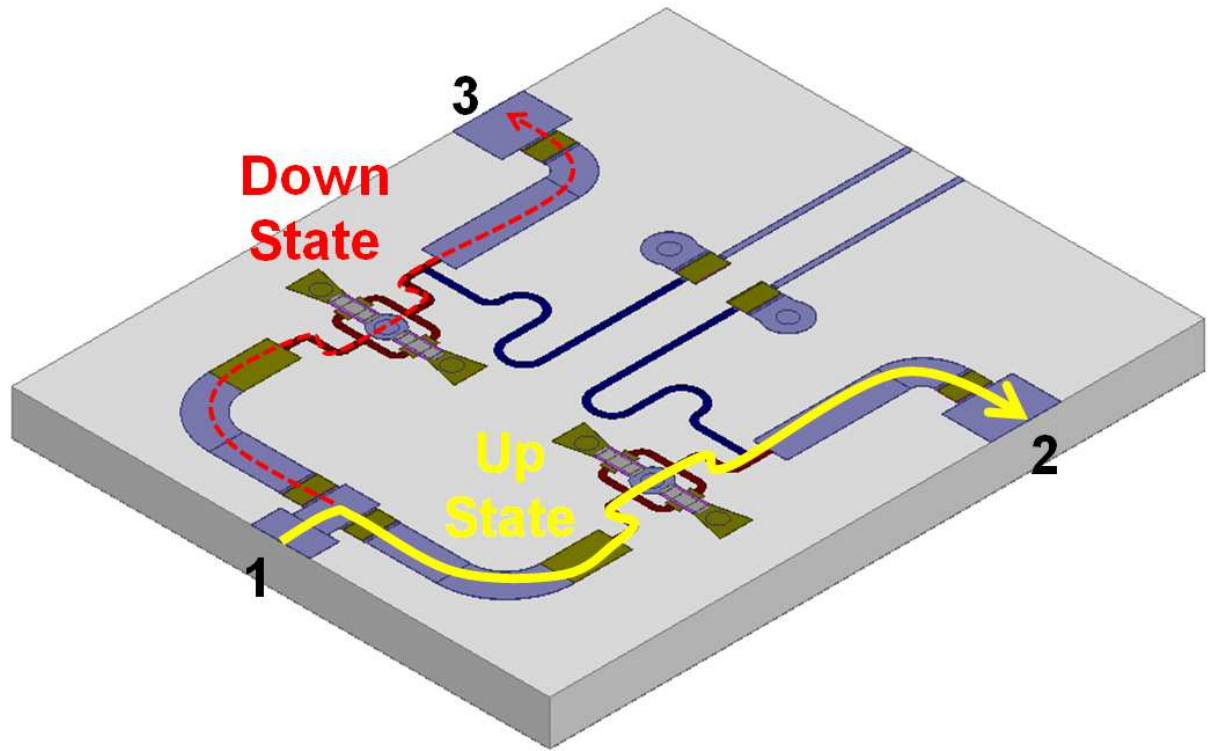


RF-MEMS based Phase Shifter Cells Reflector Plan for Electronic Beam Steering



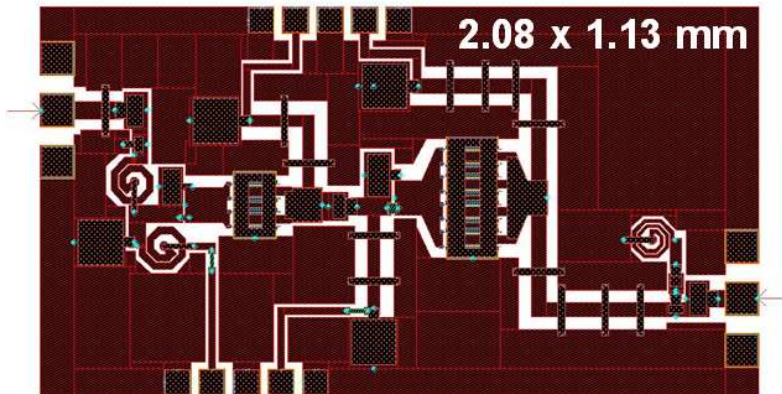
The image shows a schematic of a phase shifter cell. The top part is a 2D layout of the cell, labeled "Cell L 0.30", showing a central feed point connected to two vertical lines. A red circle highlights the central feed point. Below this is a 3D cross-sectional view of the cell, showing a central feed point connected to two vertical lines, with a red arrow pointing from the schematic above to this view.

RF MEMS Design and Fabrication



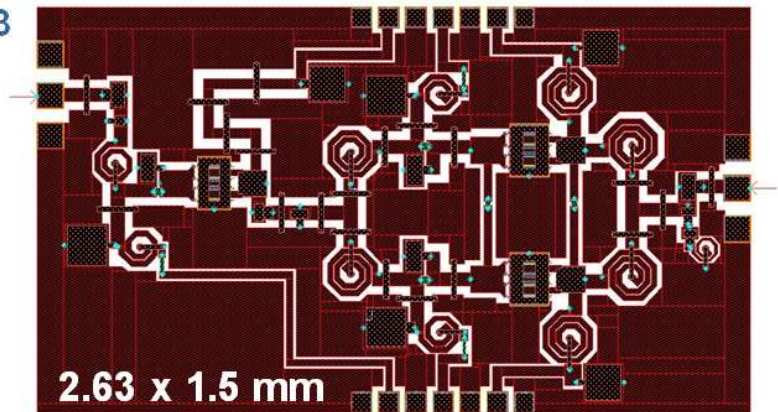
HPA design

HPAs 1&2



HPA Lay-outs have been finalised

HPA 3

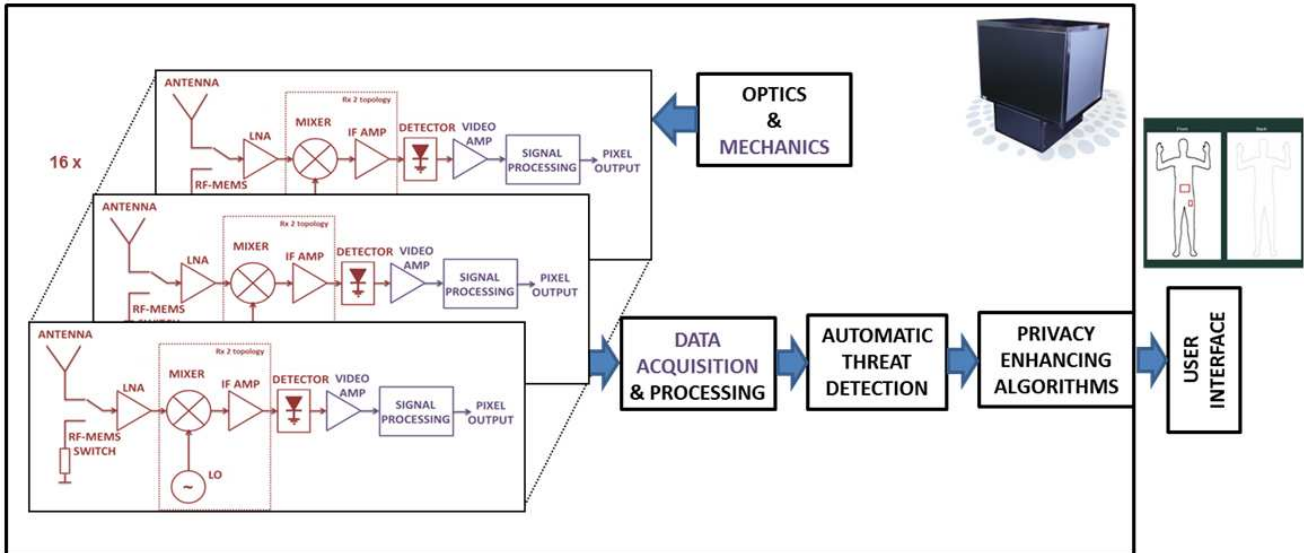


Demonstrator # 2 : 94 GHz applications

DEM#2: 94 GHz single-chip RF-MEMS switched receiver front-end

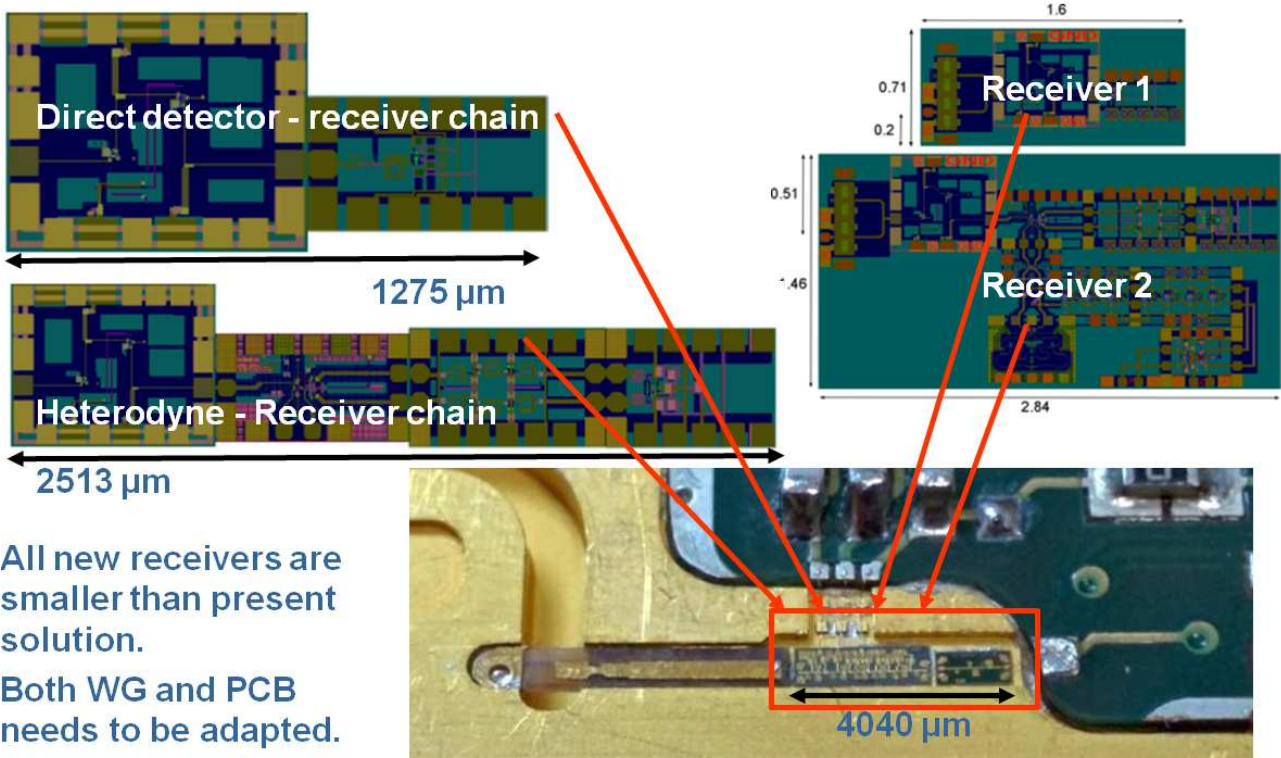
⇒ improved sensitivity and potentially enabling lower cost

⇒ to be tested in an existing passive mm-wave imaging system



— New Developments: 94 GHz single-chip RF-MEMS switched receiver front-end

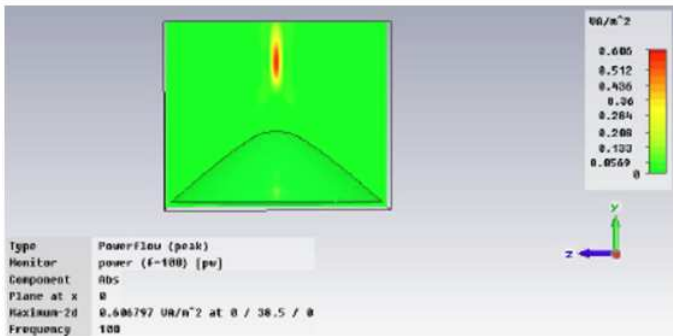
— Adaptations / Modifications



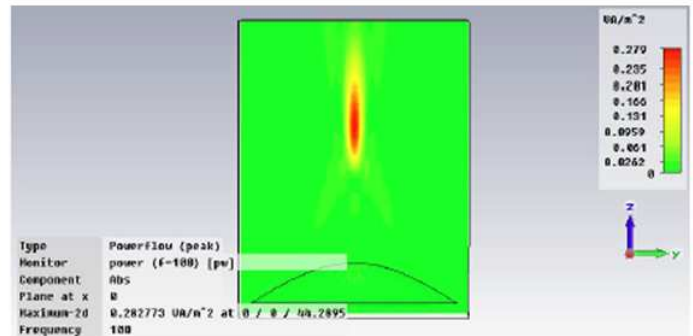
All new receivers are smaller than present solution.

Both WG and PCB needs to be adapted.

PET lens design & characterization



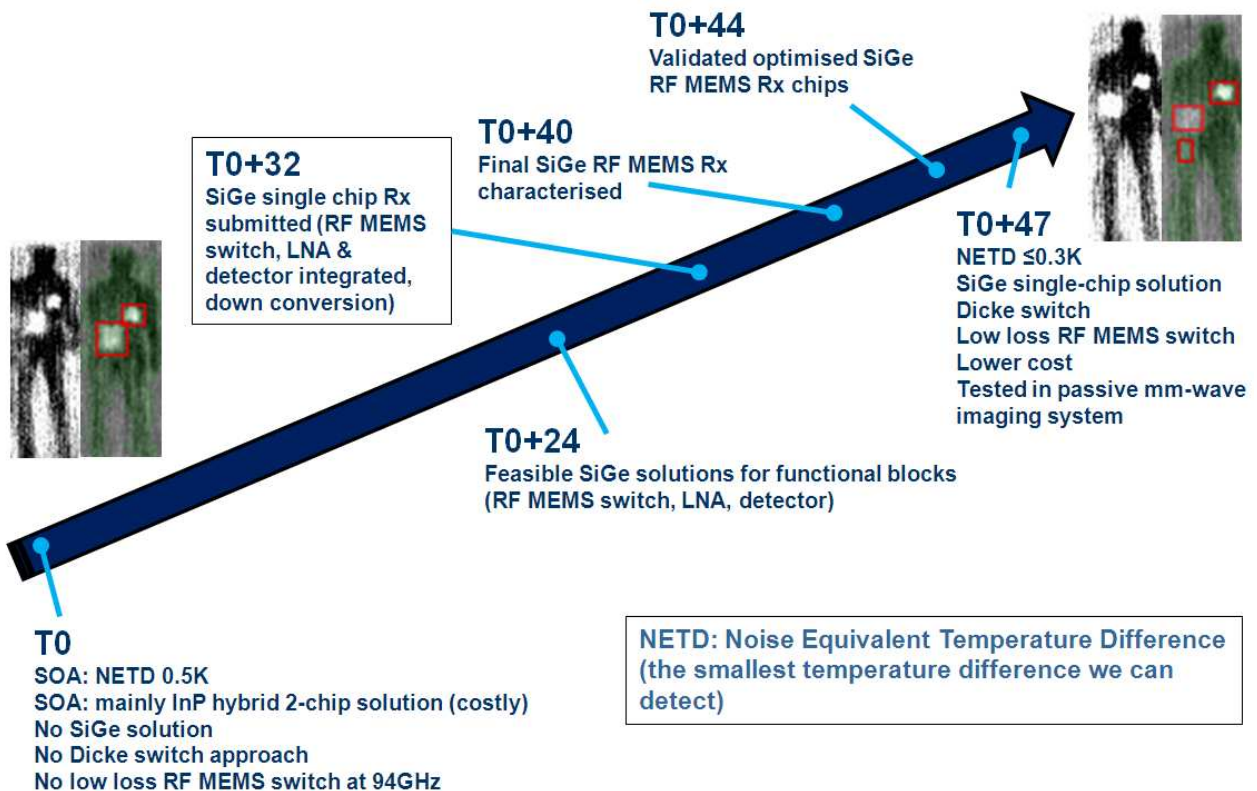
Polyethylene lens with focus 20 mm



Polyethylene lens with focus 50 mm

- ▶ Preliminary tests demonstrate 20 dB reduction of the insertion loss (-40dB vs. -60dB)
- ▶ Further tests with single antenna and manifold antennas planned at ALFA

Roadmap



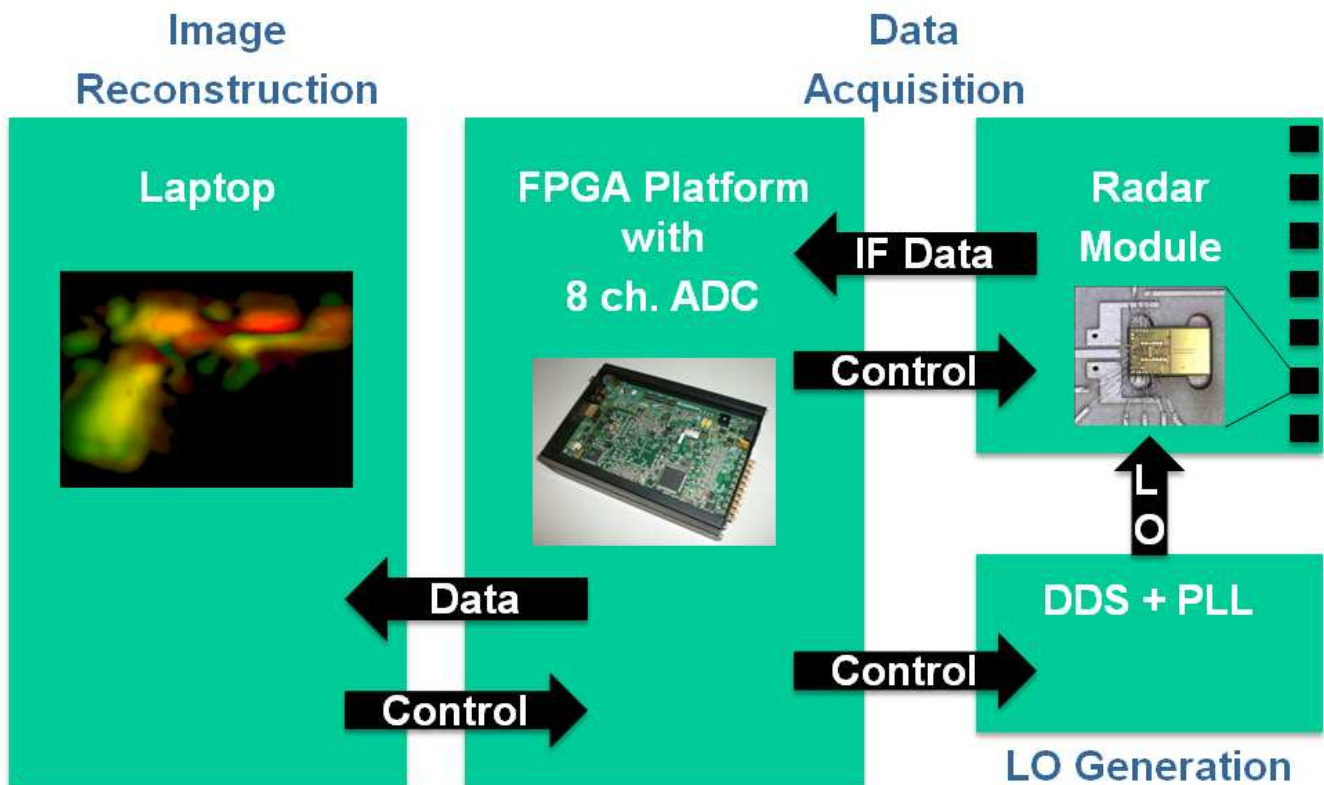
Demonstrator # 3 : 140 GHz applications

Scenario: Handheld screening of unattended luggage



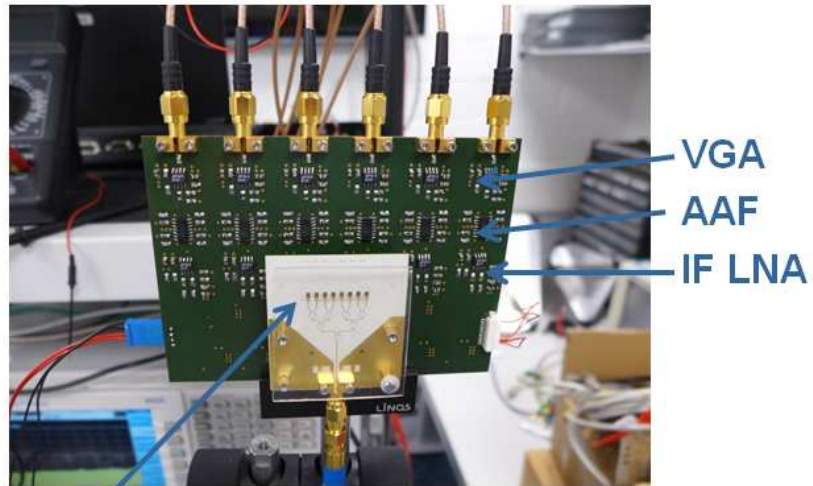
Handheld device → High frequencies
Low-cost imaging system → MIMO radar

Building blocks of the demonstrator



Construction of 1D Line Array

- Construction of 1st 140 GHz MIMO line array finished
- 2 TX and 6 RX chips
- First 2D images (range and cross-range)



RF Frontend

Roadmap

