ASTRON

Netherlands Institute for Radio Astronomy

A low noise Aperture Array tile

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ASTRON is part of the Netherlands Organisation for Scientific Research (NWO)

Tsys measurements on a low noise AA-tile

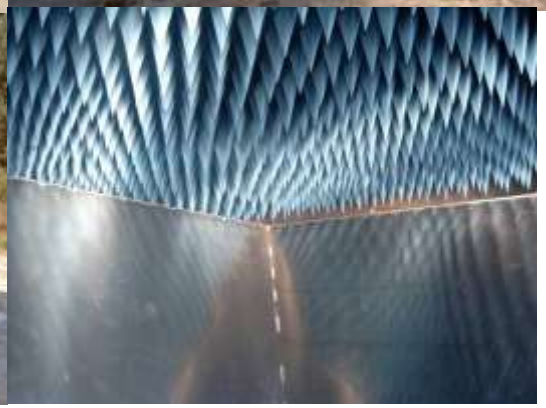
- Measurement method and systems
- Tsys results for broadside
- Validation of results
- Noise budget
- Array noise as a function of scan angle
- Results for two-dimensional scanning
- Future perspectives

Measurement method and systems

- Y-factor measurement
- Analog system: Apertif tile, analog beam former (4-, 16-elements), Agilent Noise Figure Meter 8970B
- Measurements at THACO and at the WSRT site
- Digital system: Apertif tile, Apertif receivers, digital beam forming at WSRT site

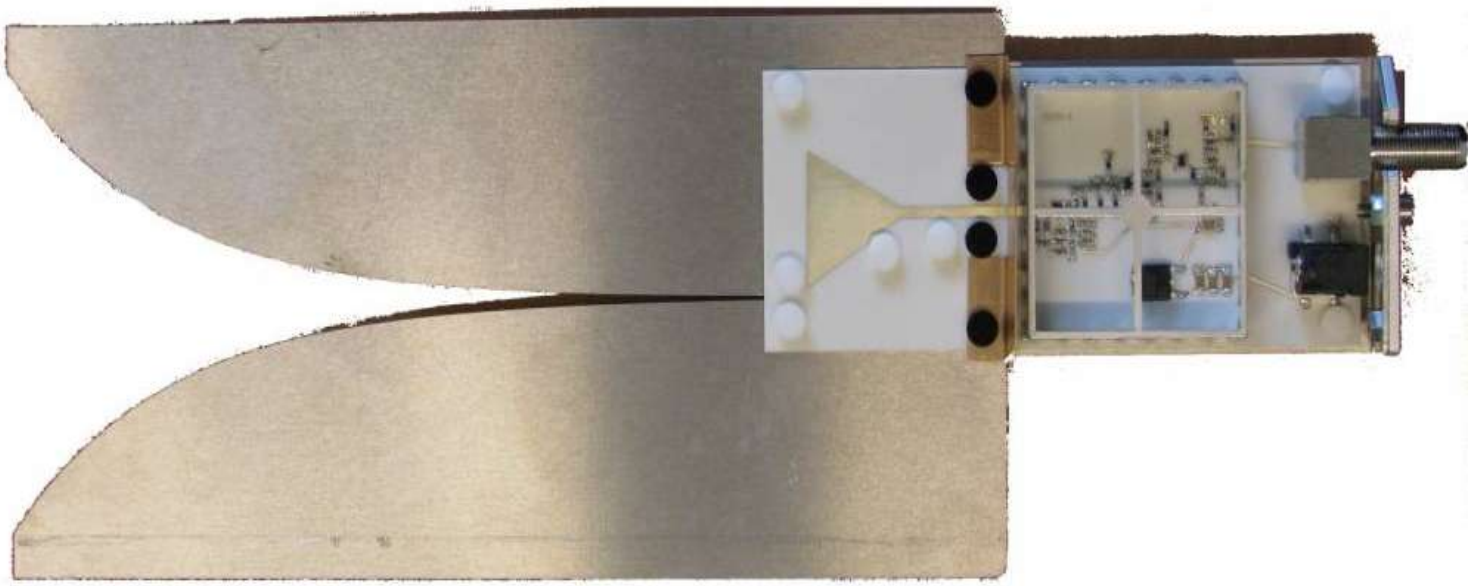
THACO: Hot/cold noise test facility

Y-factor measurement, using Thot from an absorber and Tcold from the sky

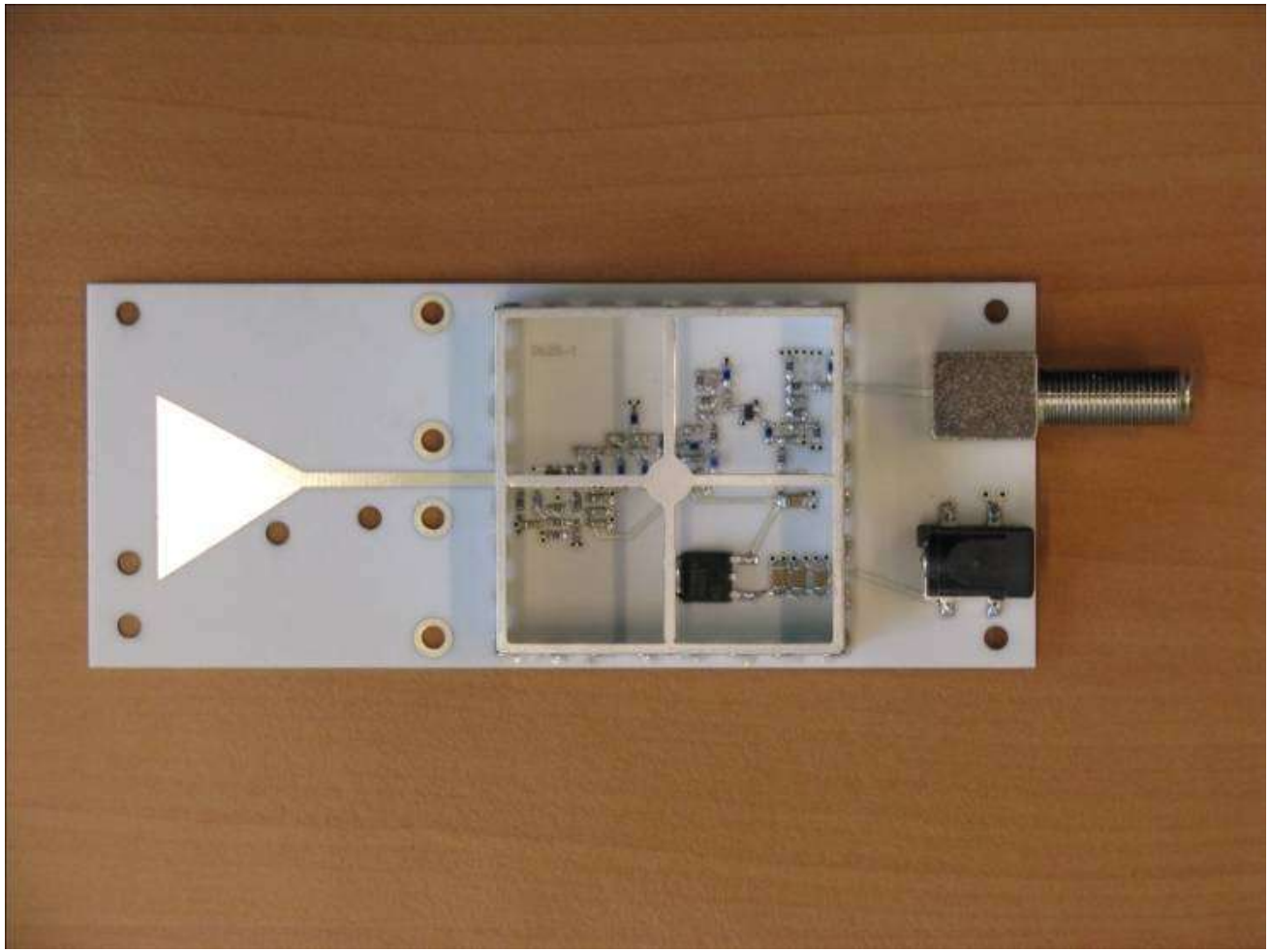


SKA-AAVP

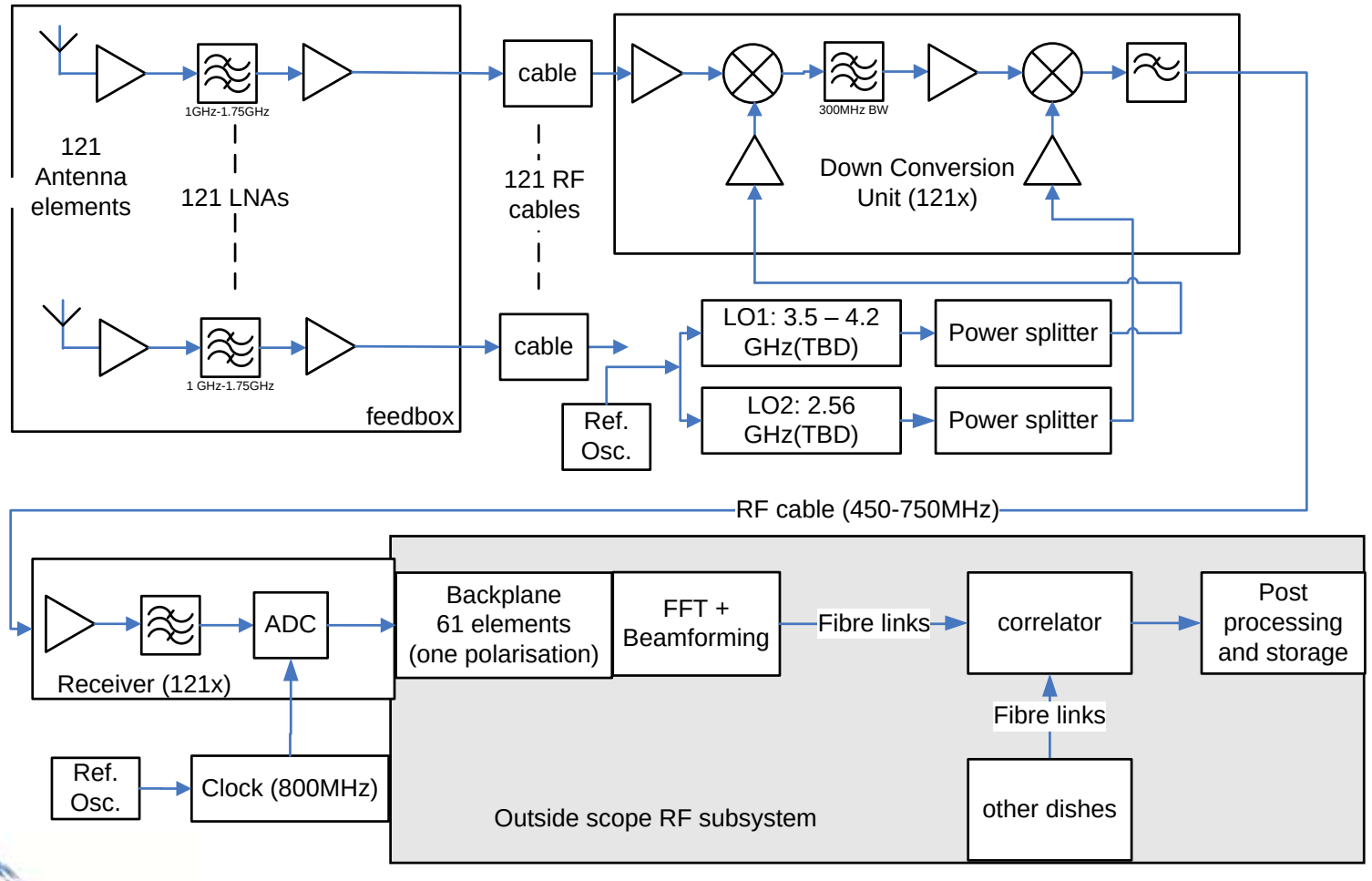
Antenna element and LNA



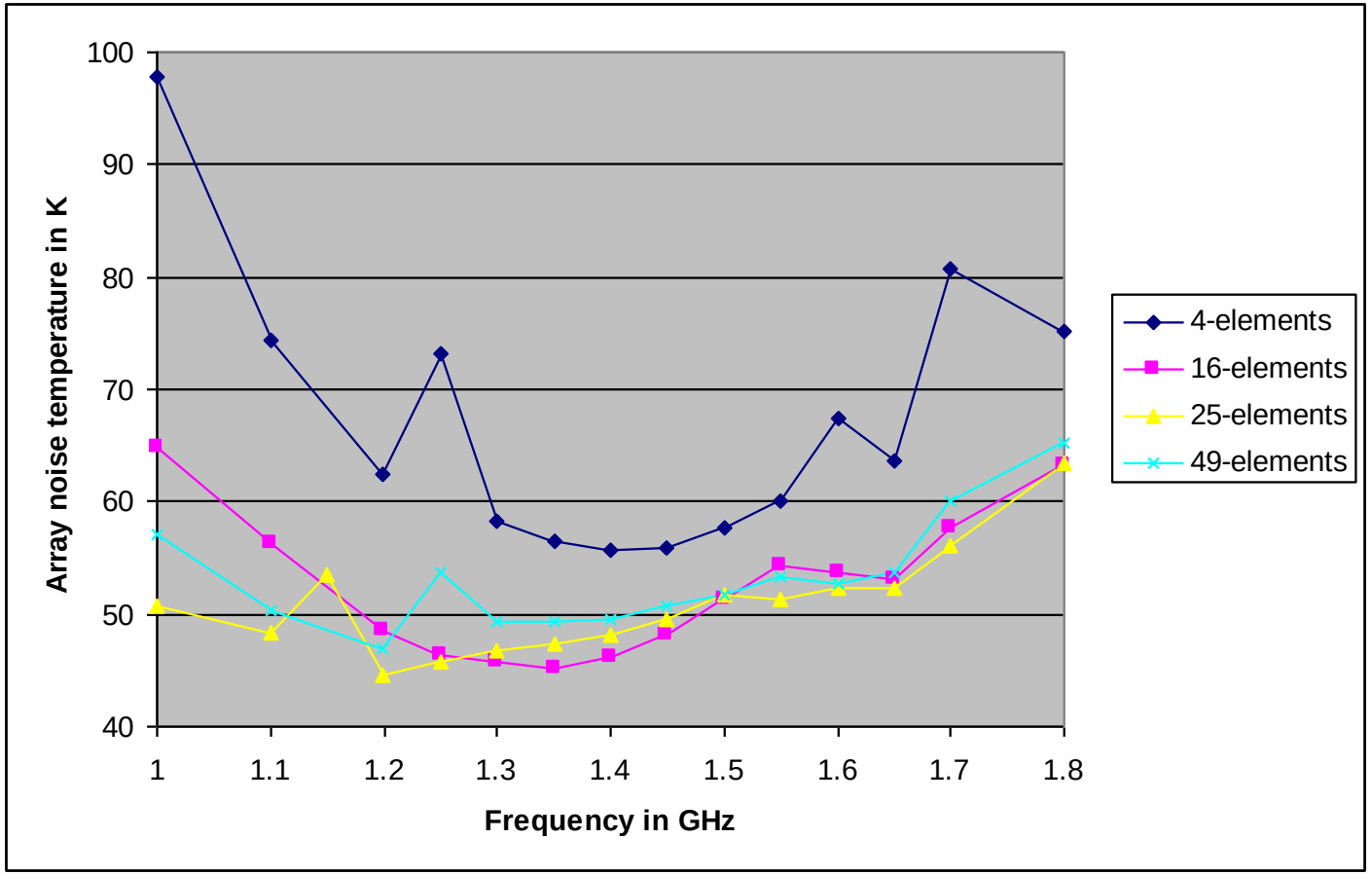
The present APERTIF LNA (with the ATF54143)



Functional diagram of digital measurement system (APERTIF)

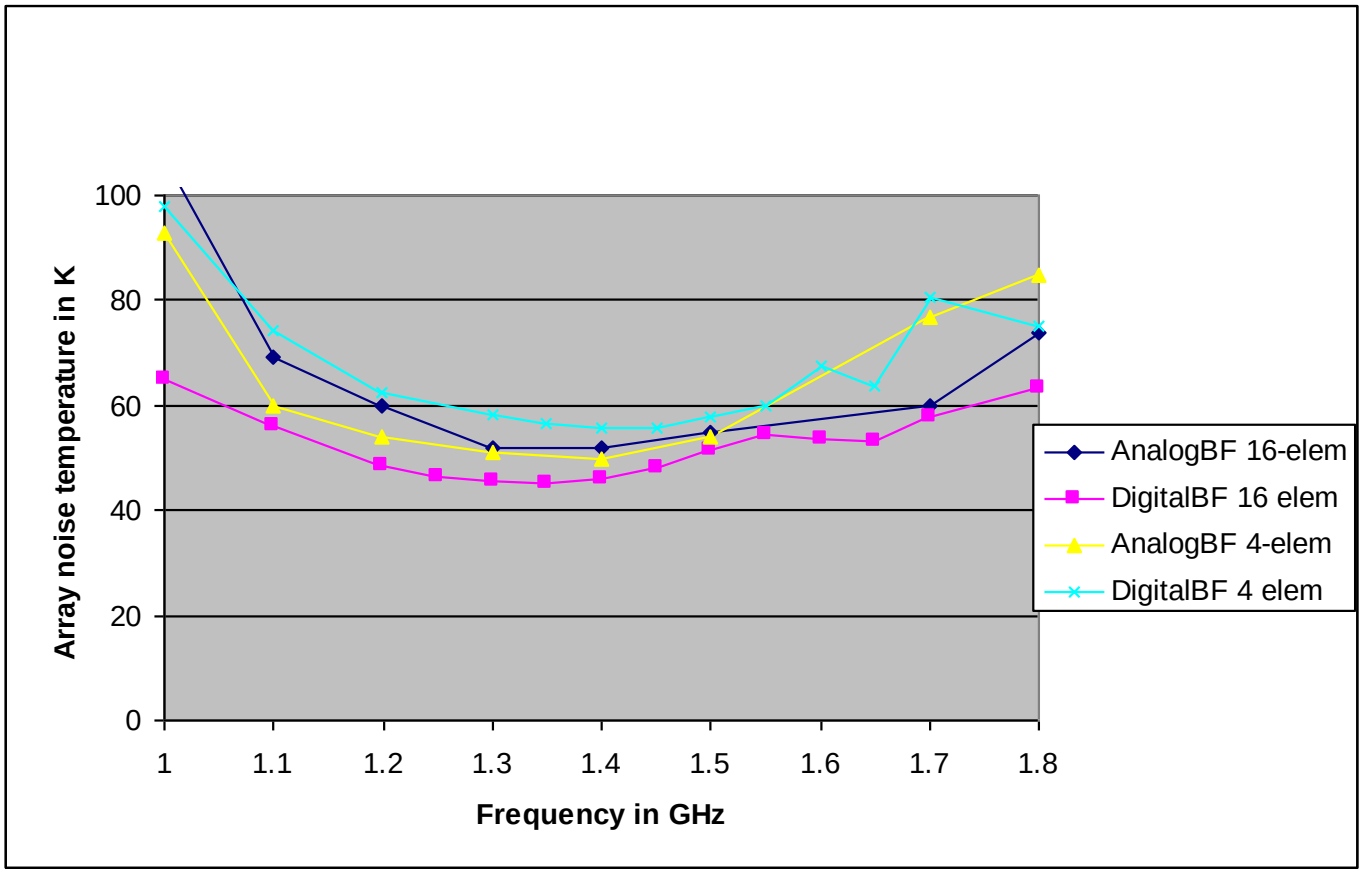


Tsys results at broadside for arrays with various active elements



Validation of results

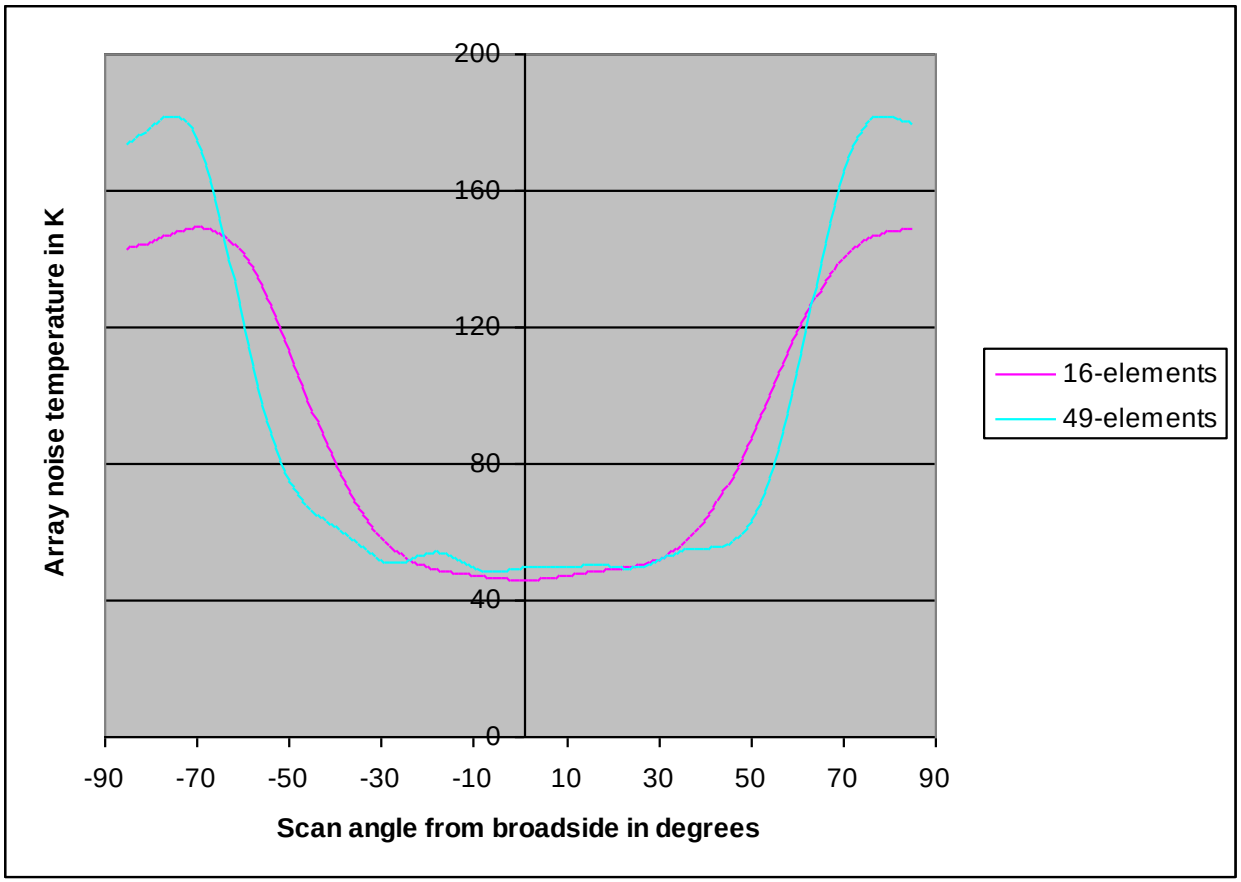
Analog and digital beam forming show similar results
for 4- and 16-element beams



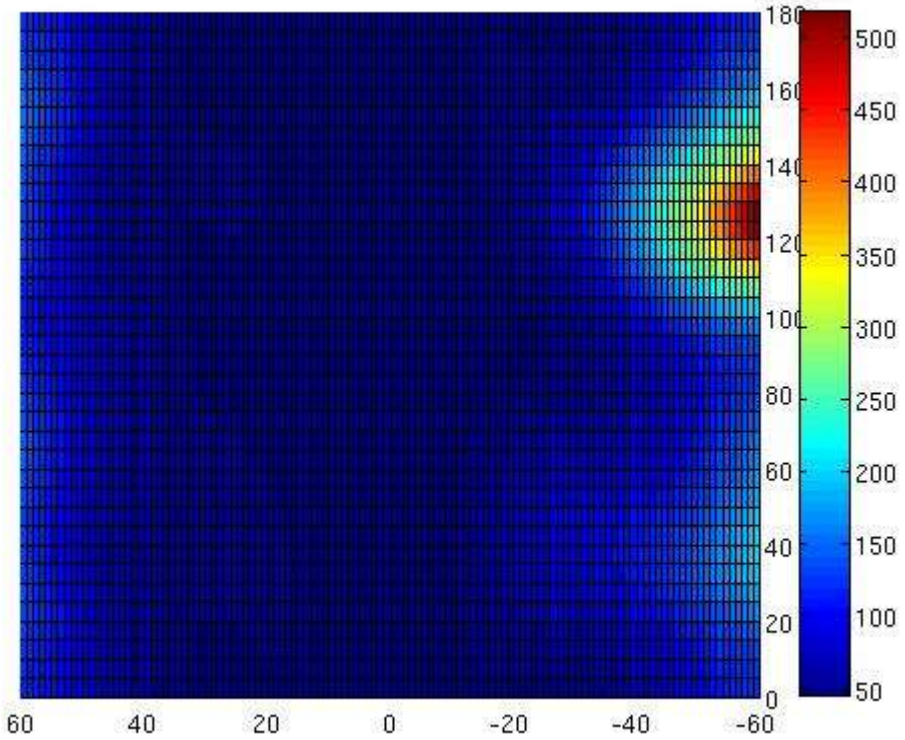
Tsys noise budget @ 1400 MHz (49-element array, broadside)

Antenna loss	6 K
LNA (incl. 2-nd stage)	35-38 K
Noise coupling (simulation)	6 K
Spill-over	0 K
Sky noise	3 K
Total	50-53 K

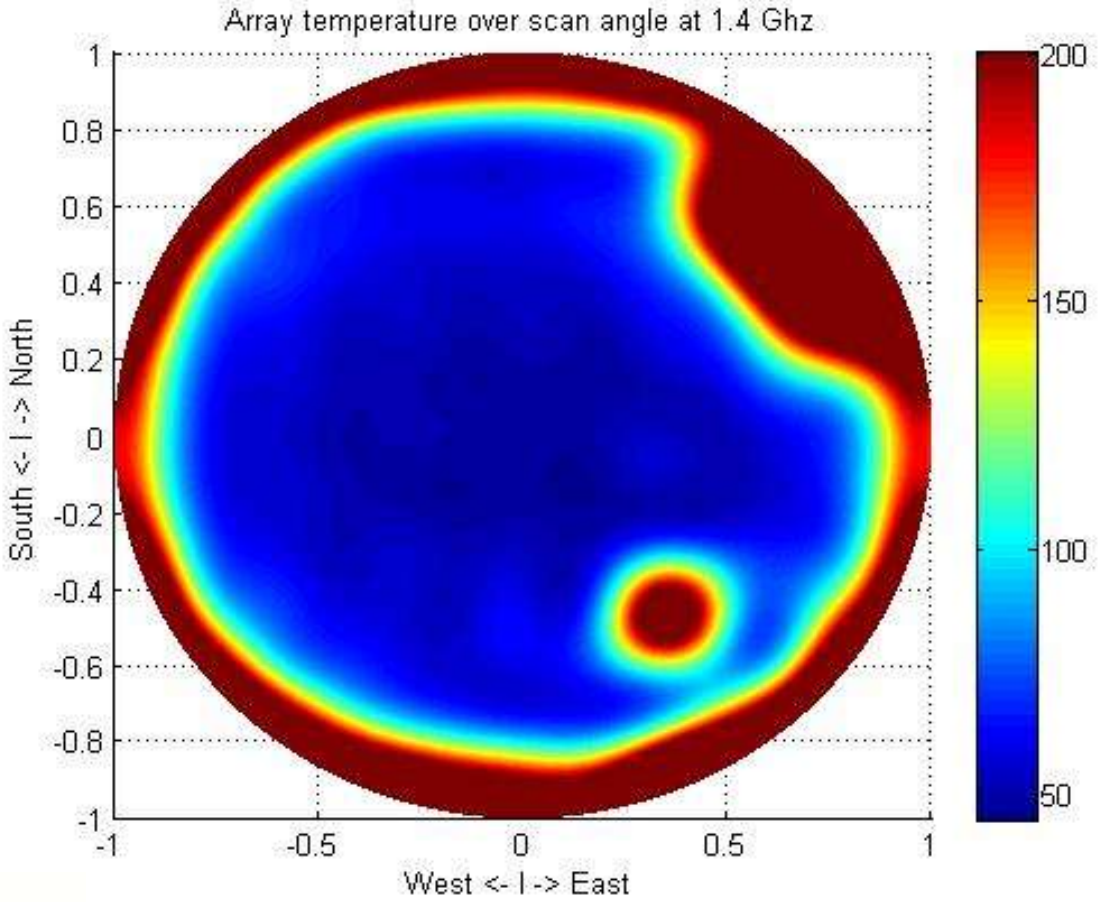
Array noise at 1400 MHz as a function of scan angle for arrays of 16 and 49 active elements



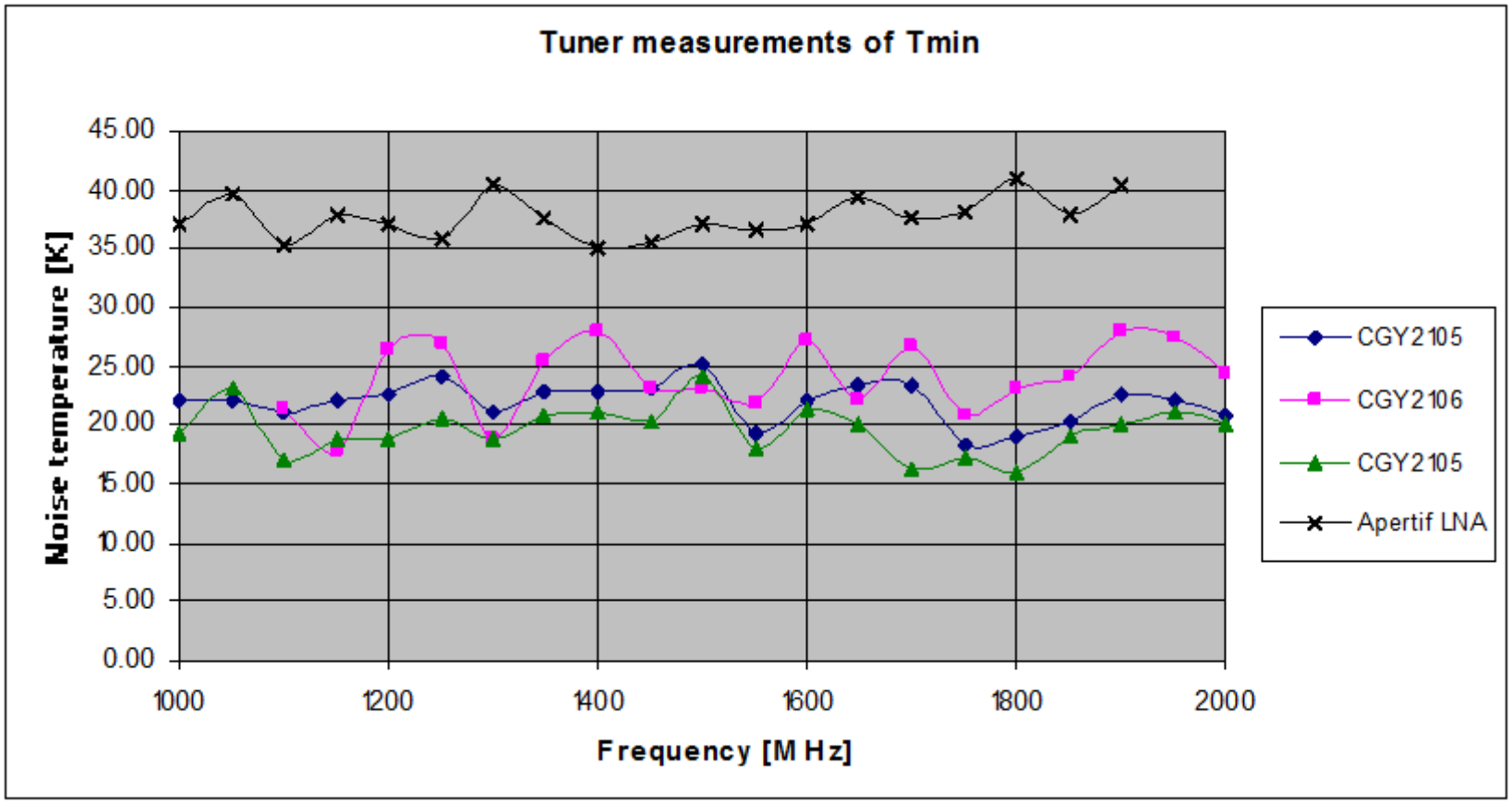
Results for two-dimensional scanning 16 elements, 1400 MHz



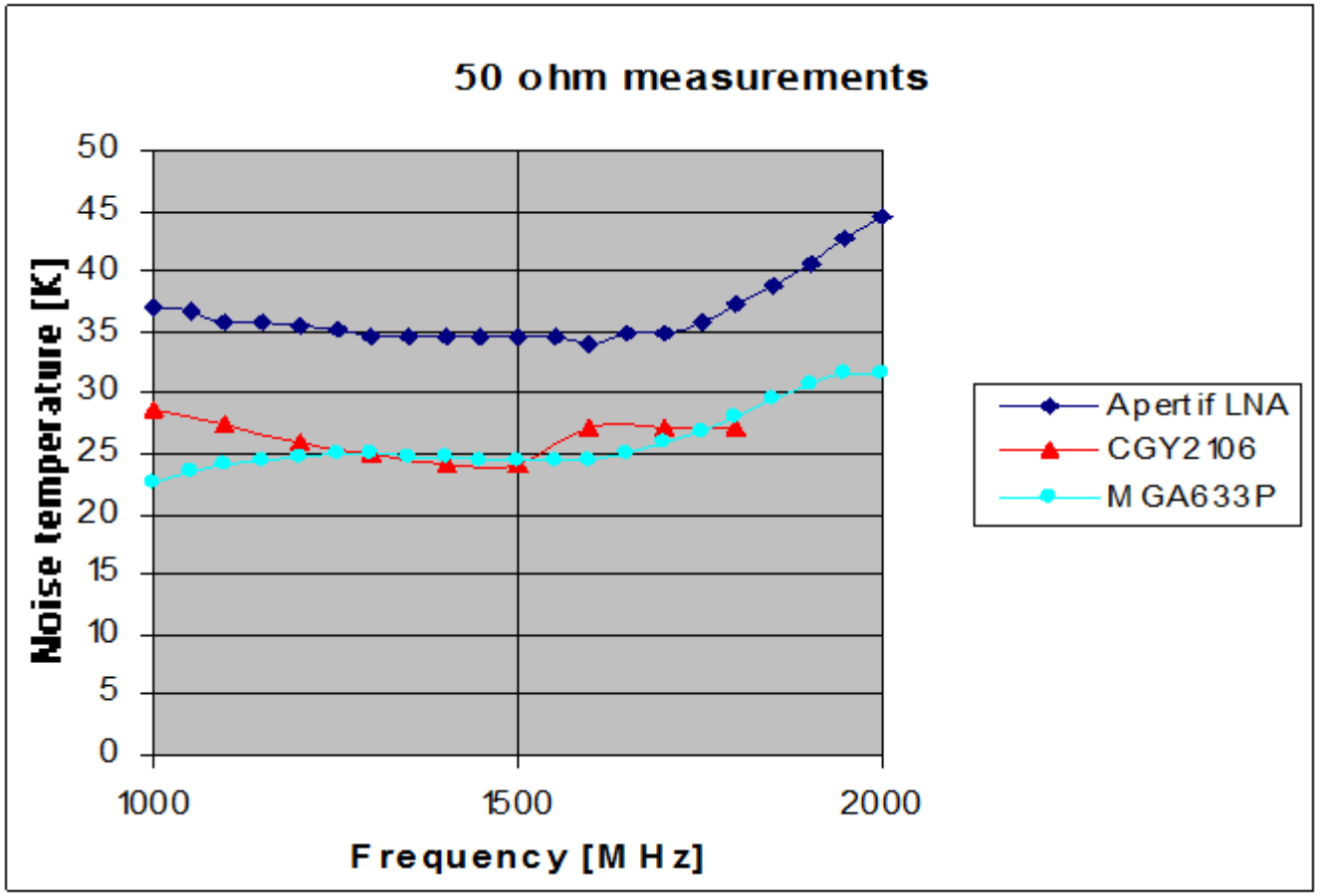
UV-plot of Tsys at 1400 MHz for a 49-element array



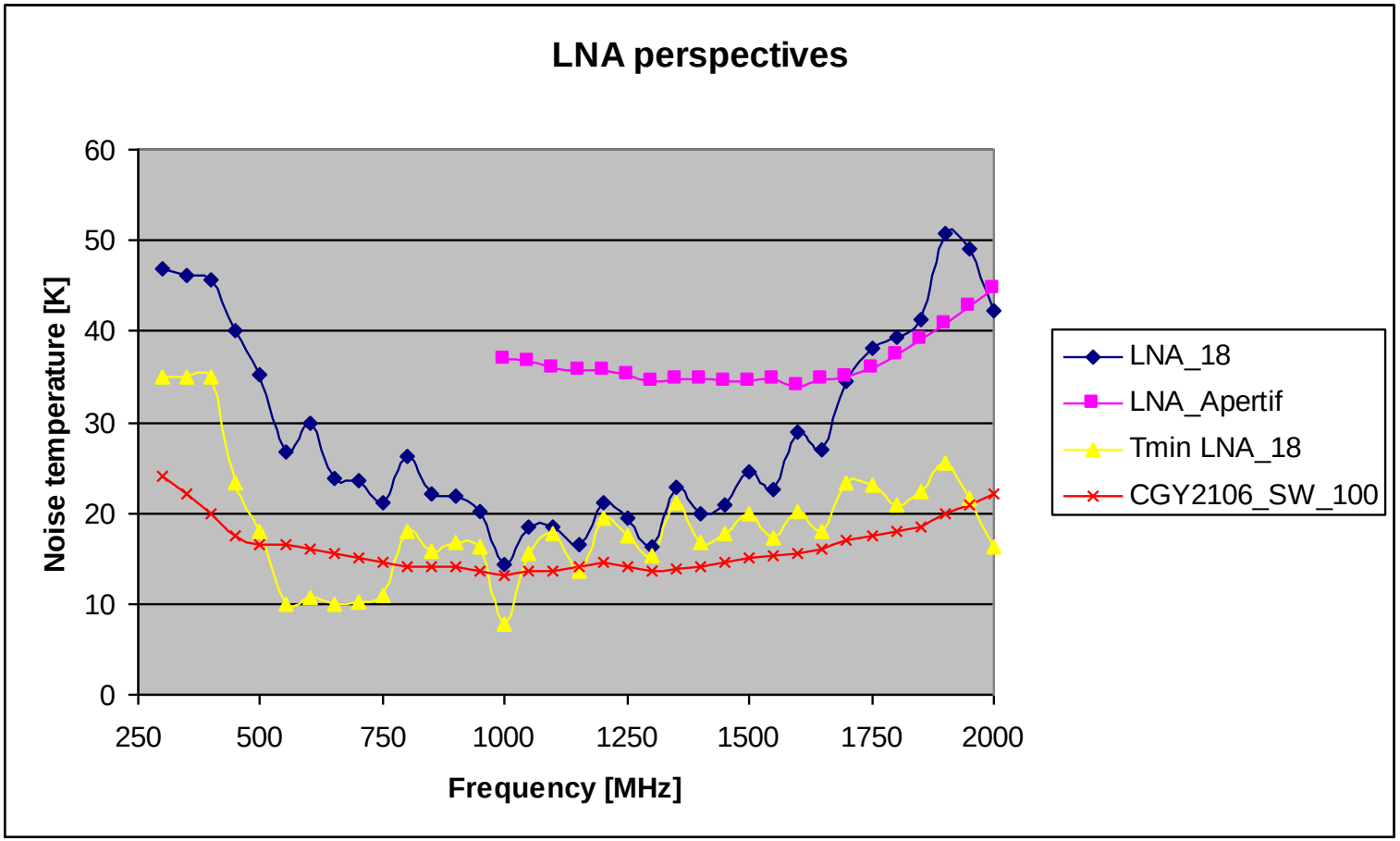
Future Tsys improvement,
given LNA perspectives (1)



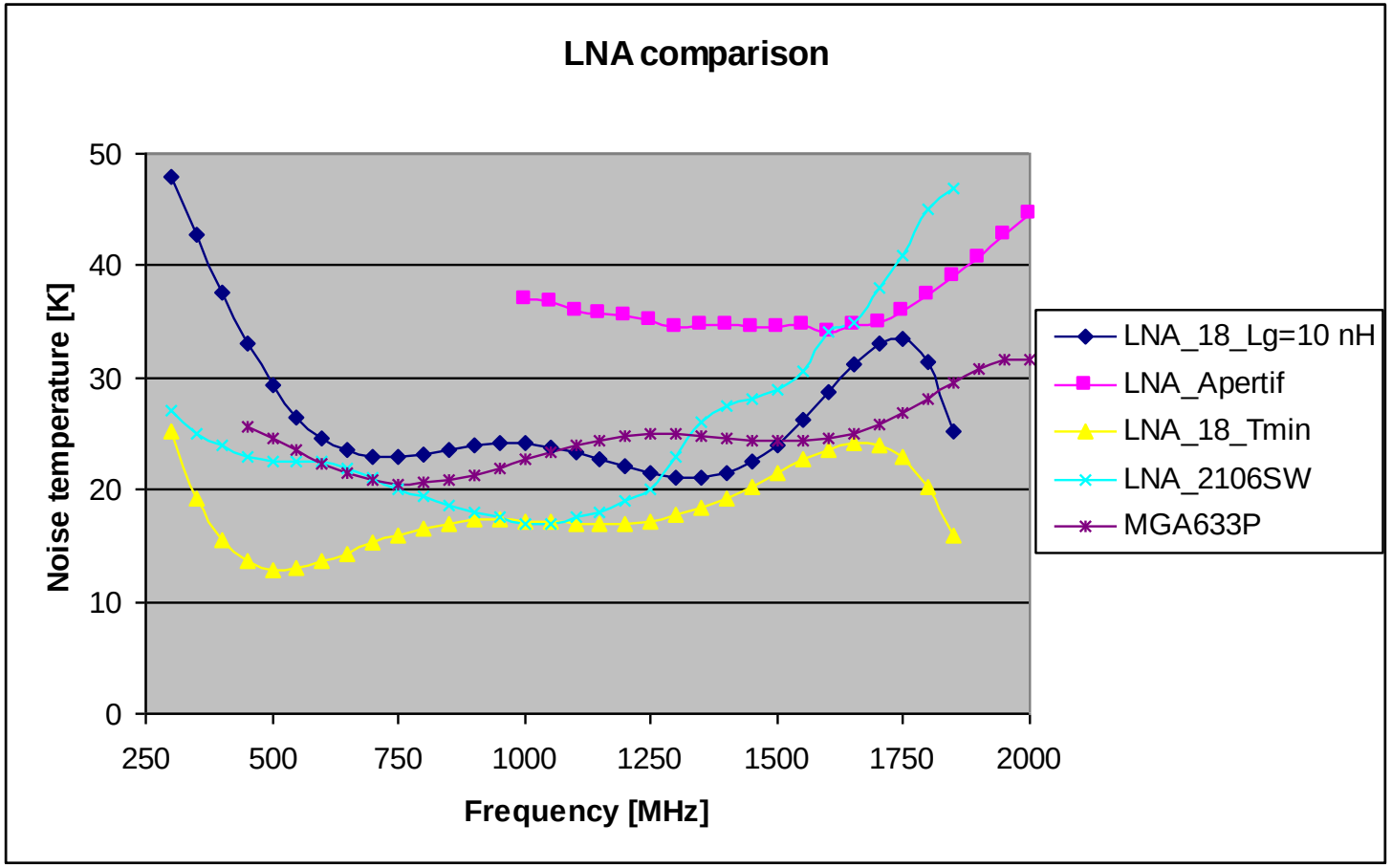
LNA perspectives (2)



LNA perspectives (3)



Recently measured results



Future perspectives

Results of improvement of LNA performance

- Present status Apertif LNA: 35 K for Tsys <= 50 K
- Recent LNA results: Avago MGA633P (<25 K), CGY2106 (ASTRON, Weinreb < 25 K), LNA18 (<25 K)
- > 10 K improvement in Tlna possible
- Expected Tsys <= 40 K