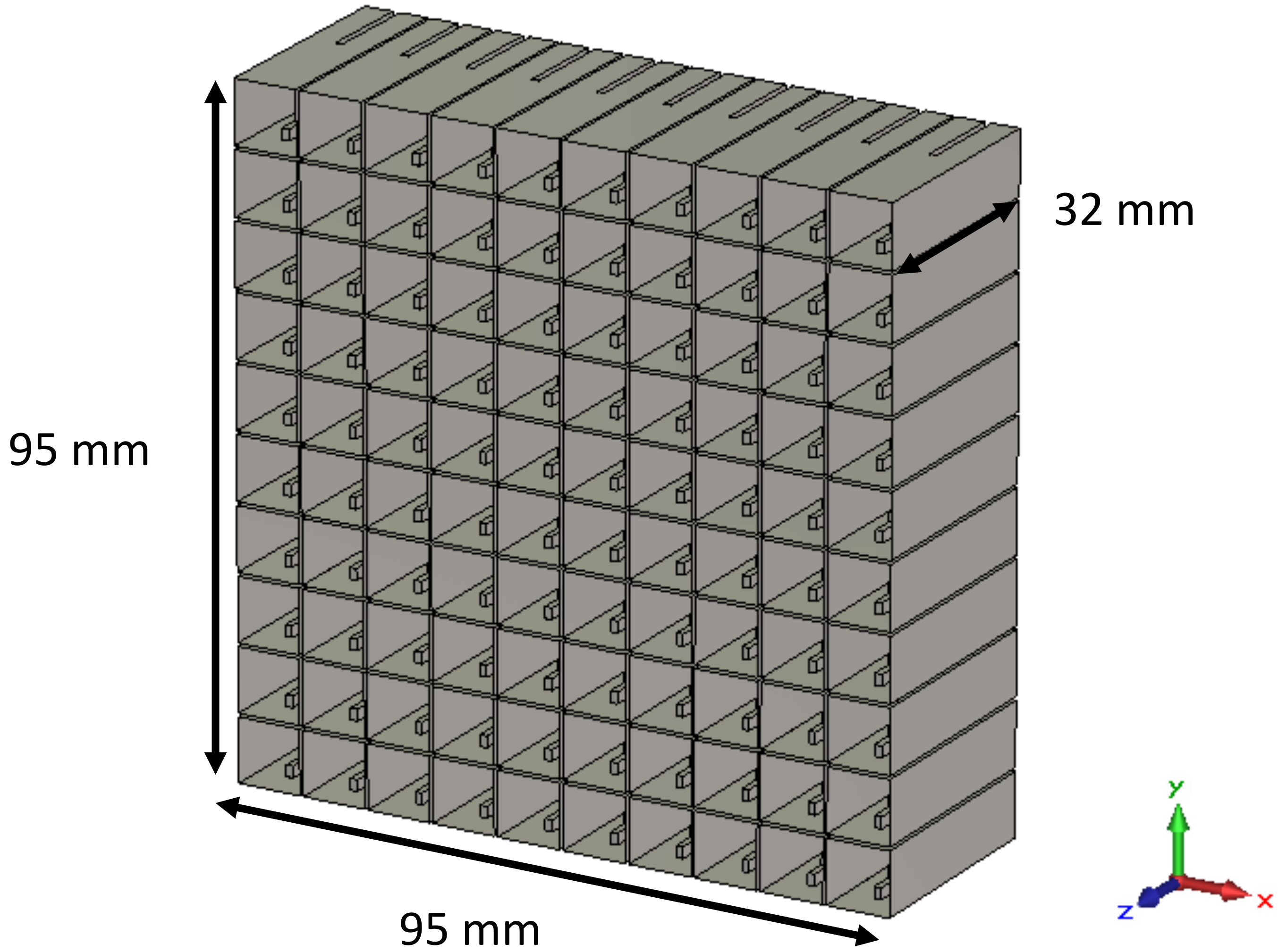
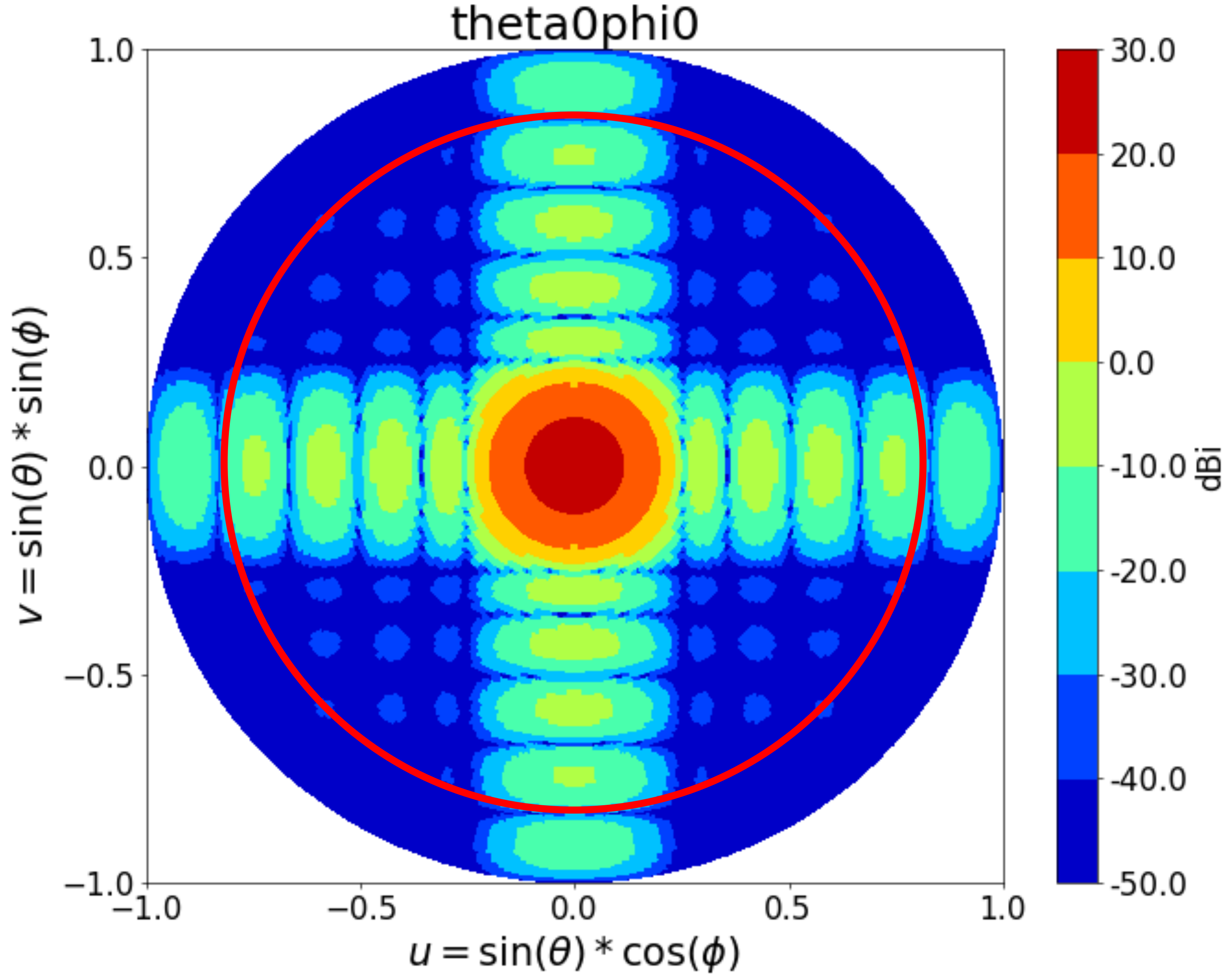
Compact DRA antenna

ARRAY DESCRIPTION



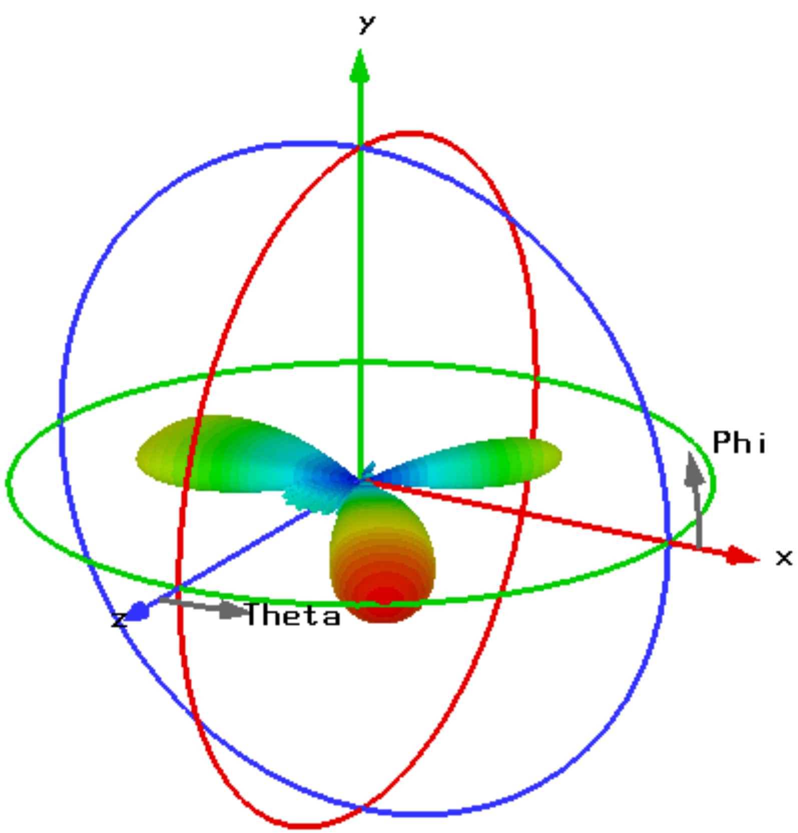
Beam scanning. Situation 1: array pointing at ϕ = 0°, θ = 0°.

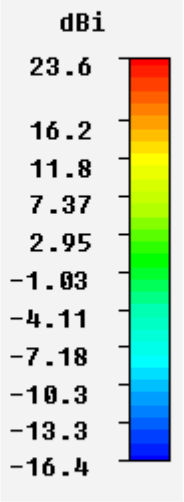
Frequency: 18.95 GHz

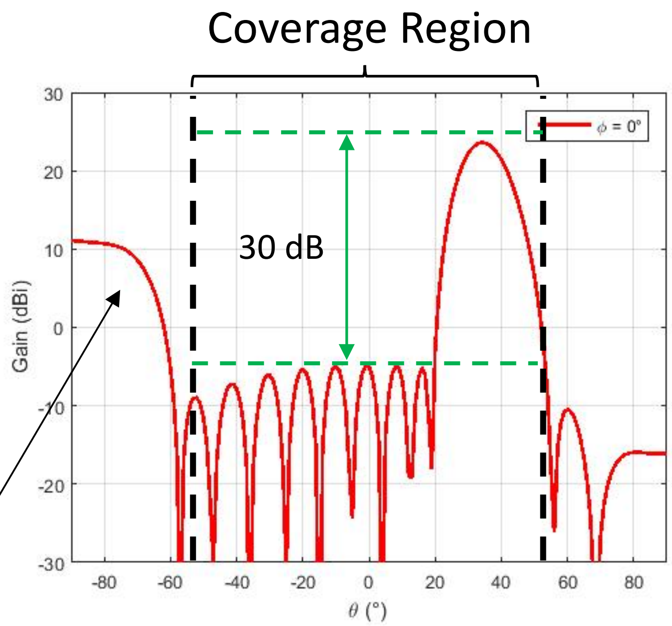


Beam scanning. Situation 5: array pointing at ϕ = 35°, θ = 0°.

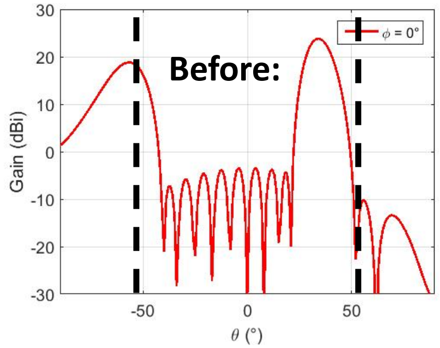
Frequency: 18.95 GHz

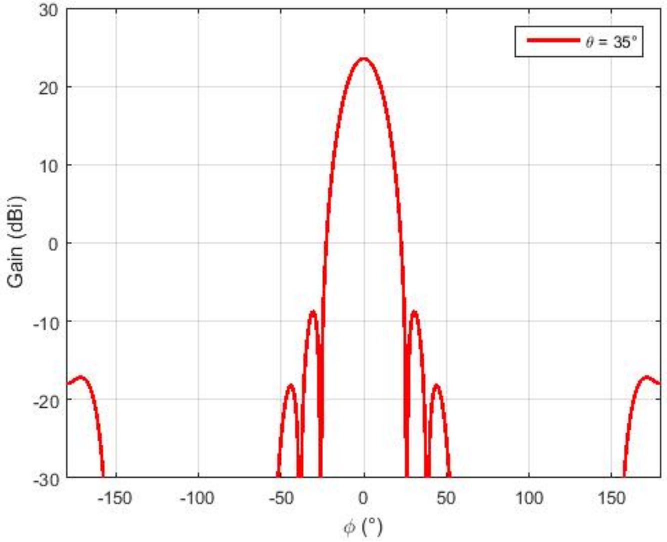






Now the grating lobe is completely outside coverage region

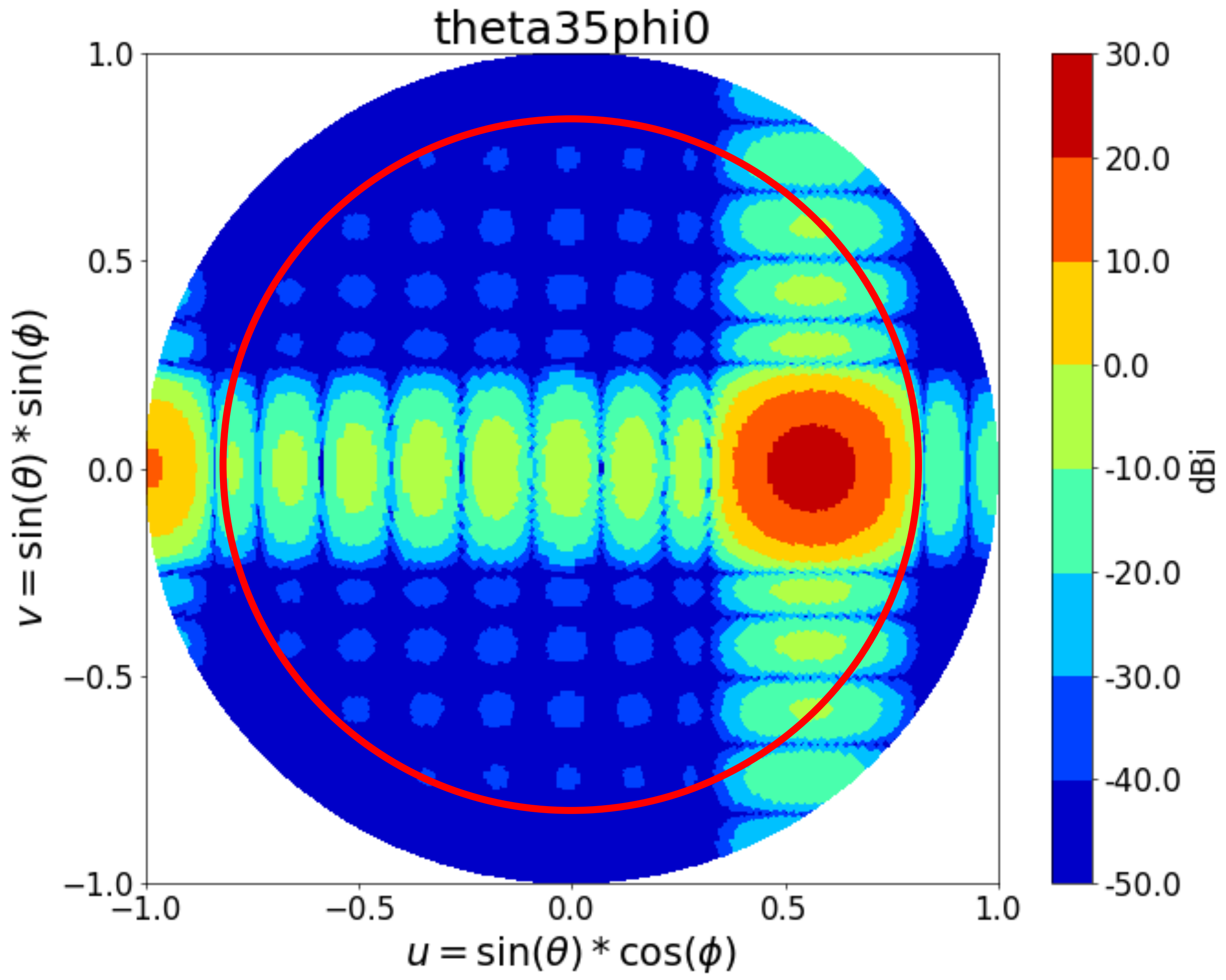




At 20.2 GHz (less favorable scenario), the grating lobe is still outside of coverage region (just about to enter).

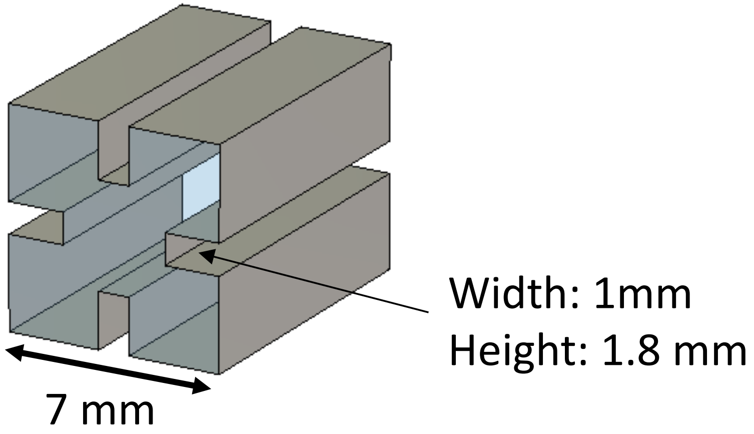
Beam scanning. Situation 5: array pointing at ϕ = 35°, θ = 0°.

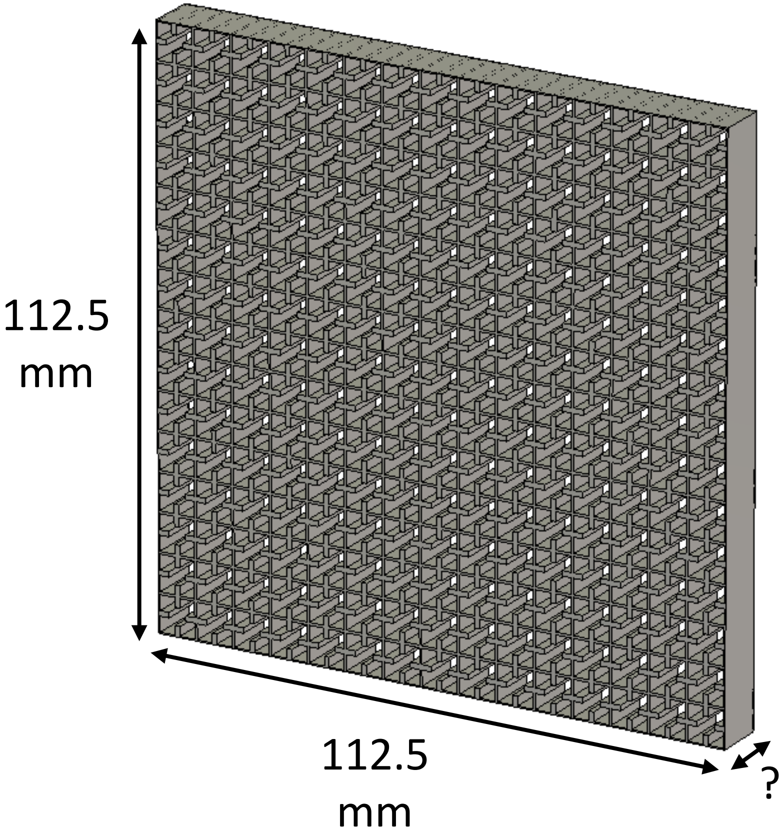
Frequency: 18.95 GHz



Solution: Quad-Ridged fanout array

DESCRIPTION OF ELEMENTS



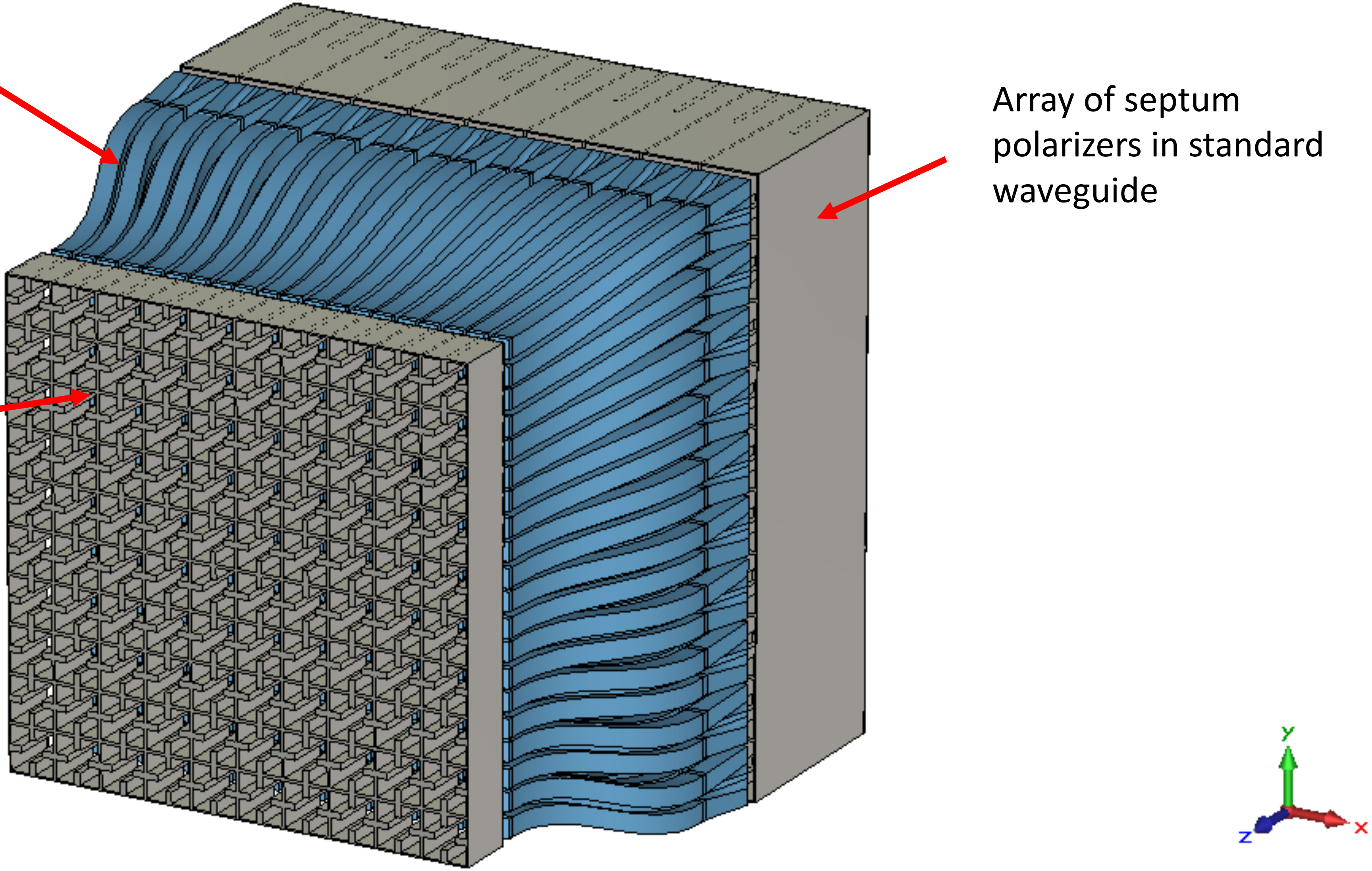


HOW TO FEED THE ARRAY

Array of custom quad-ridge waveguides (transforming also from square to quad-ridge)

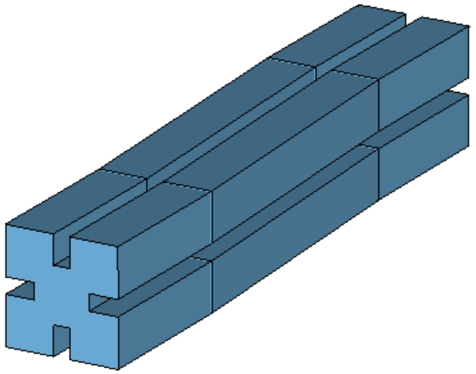
Array of septum polarizers in standard waveguide

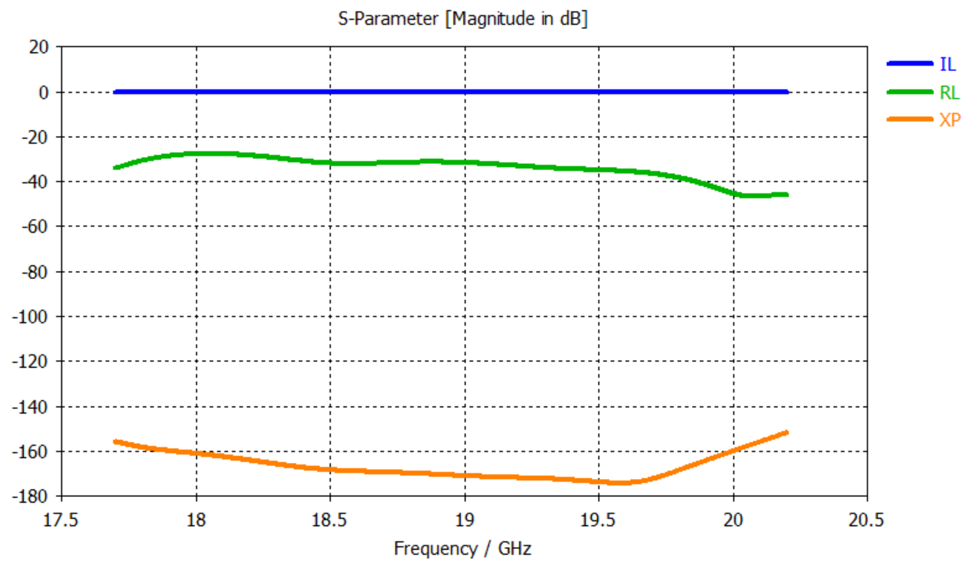
Array of quad-ridge apertures



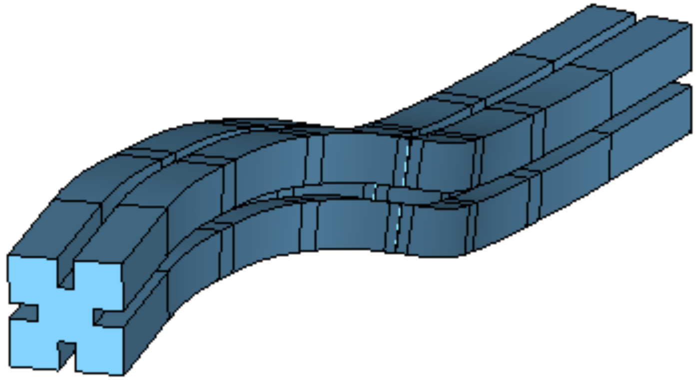
Customized Quad-Ridge Waveguides

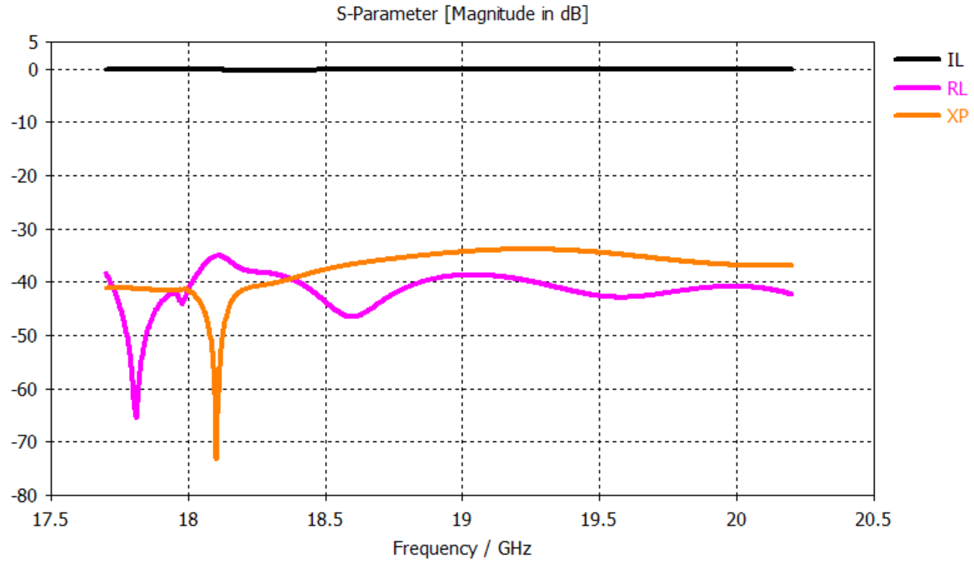
Simple “lofts” work well



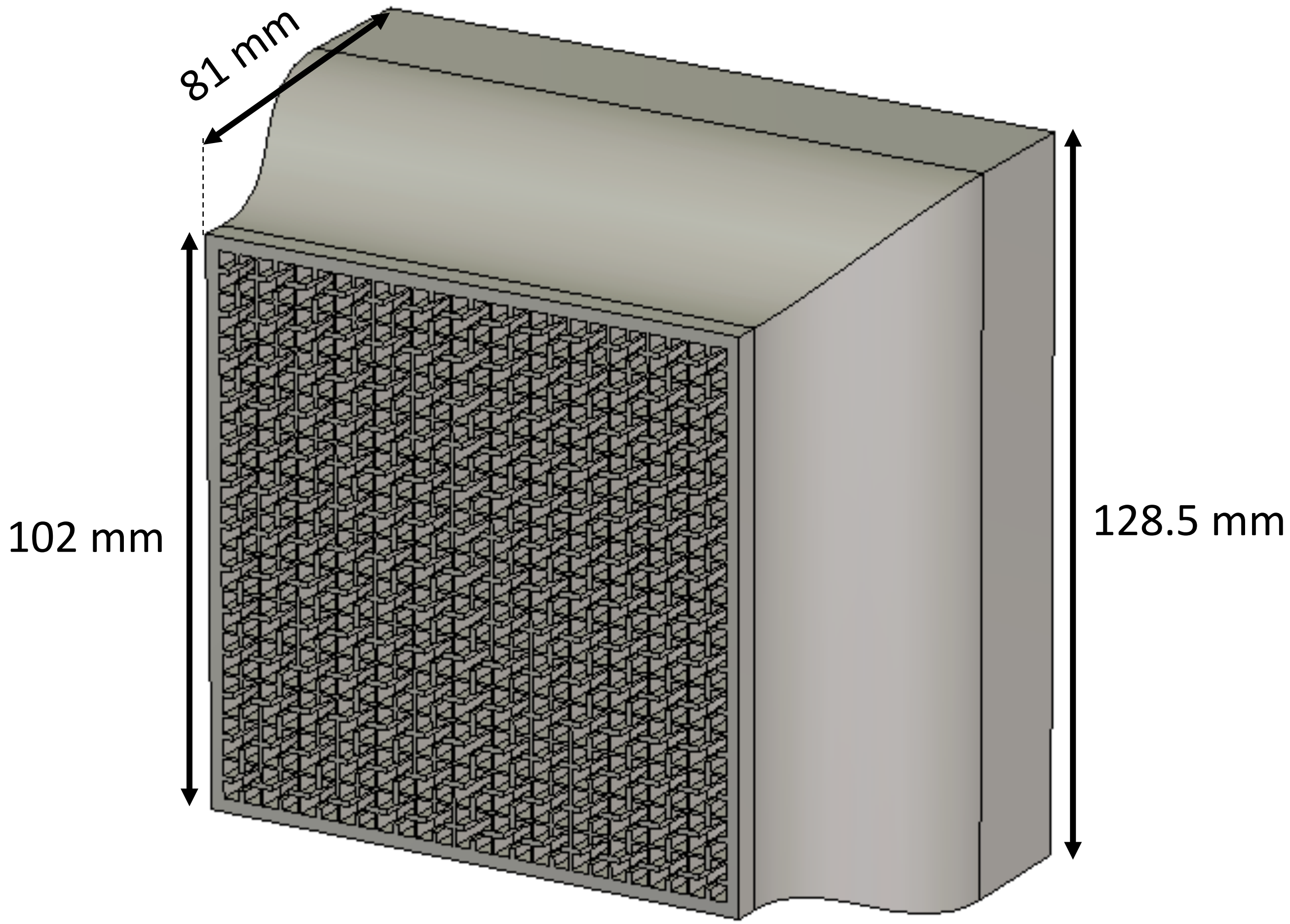


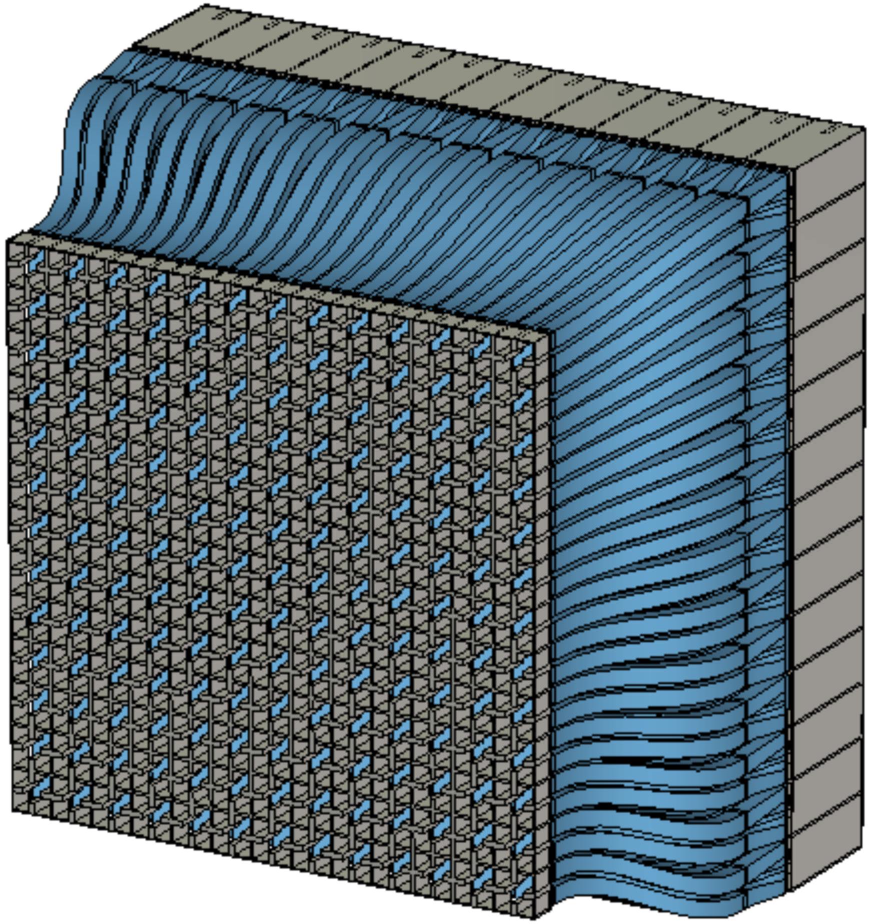
More complex waveguides can be built by connecting small waveguides that work well





Overview of the proposed antenna structure

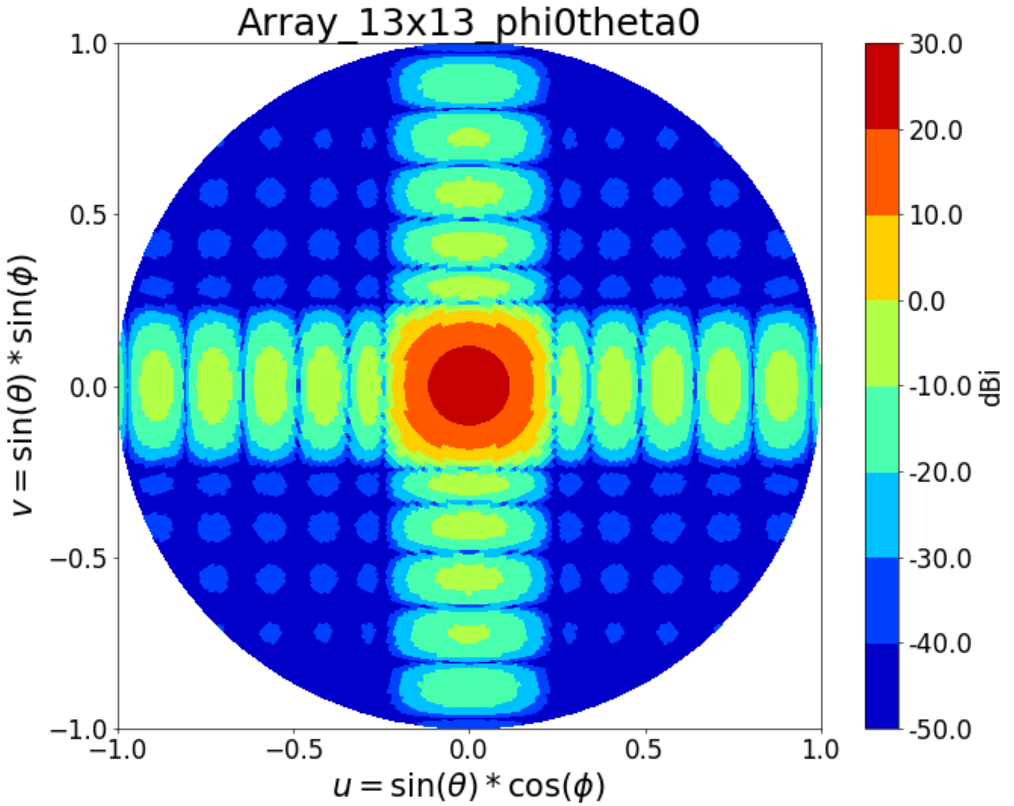


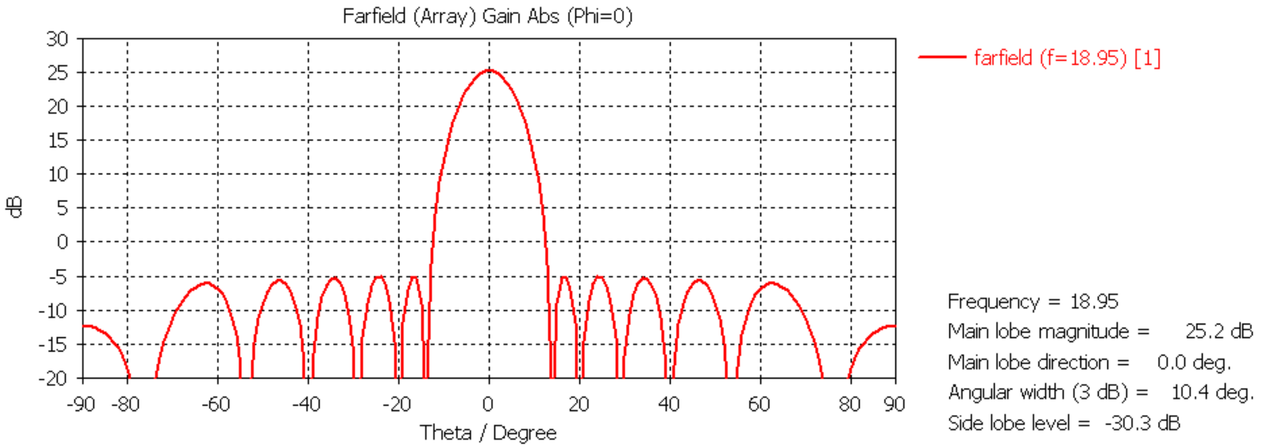


- Mass: Max. 700g (Aluminum base material). Further weight reduction is feasible and will be explored in the design phase
- Dimensions are based on first preliminary design and may be optimized (especially the height of 81mm may be reduced)

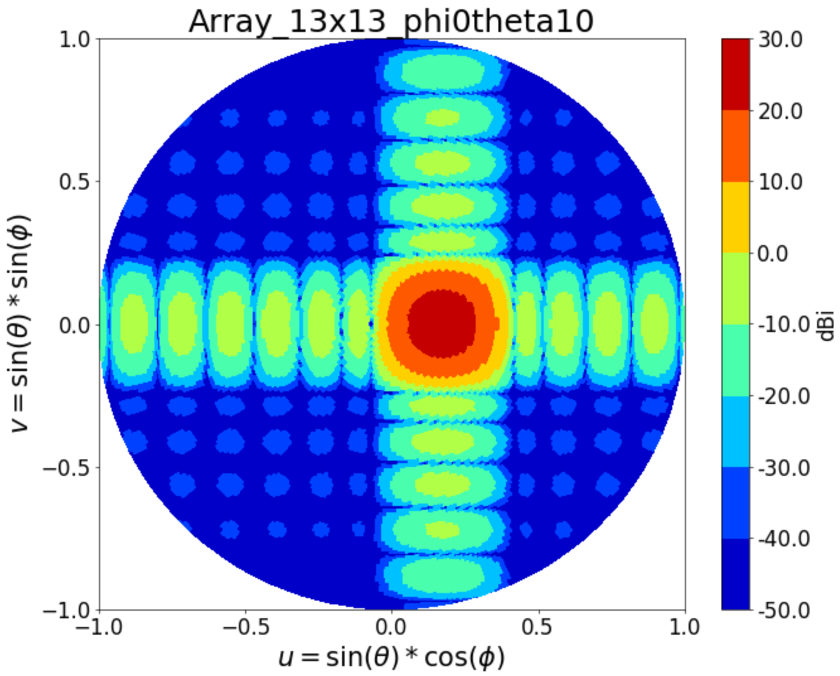
Negative view of quad-ridge waveguides

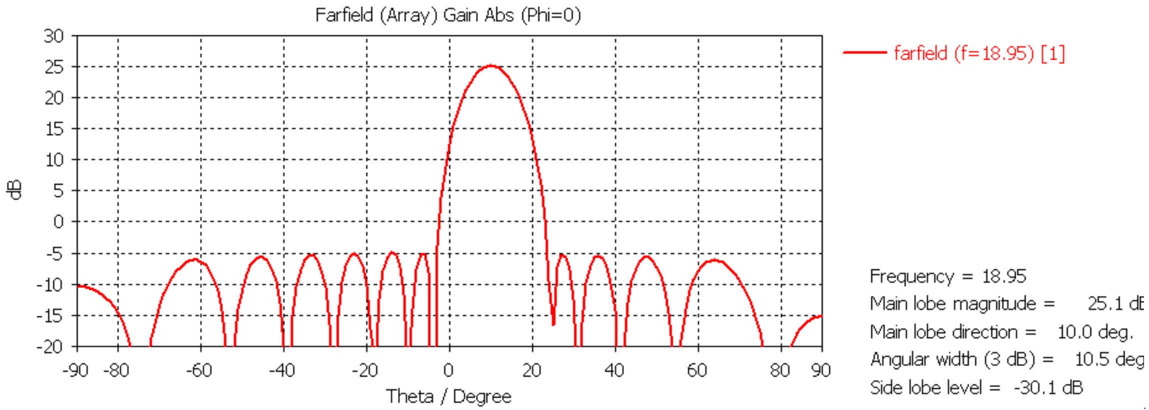
Beam Scanning: $\phi = 0°, \theta = 0°$



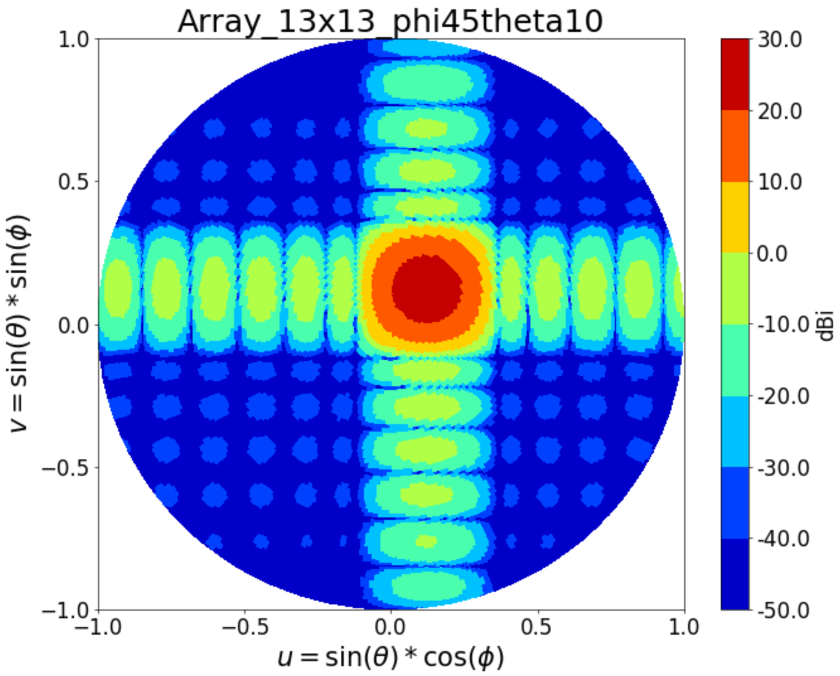


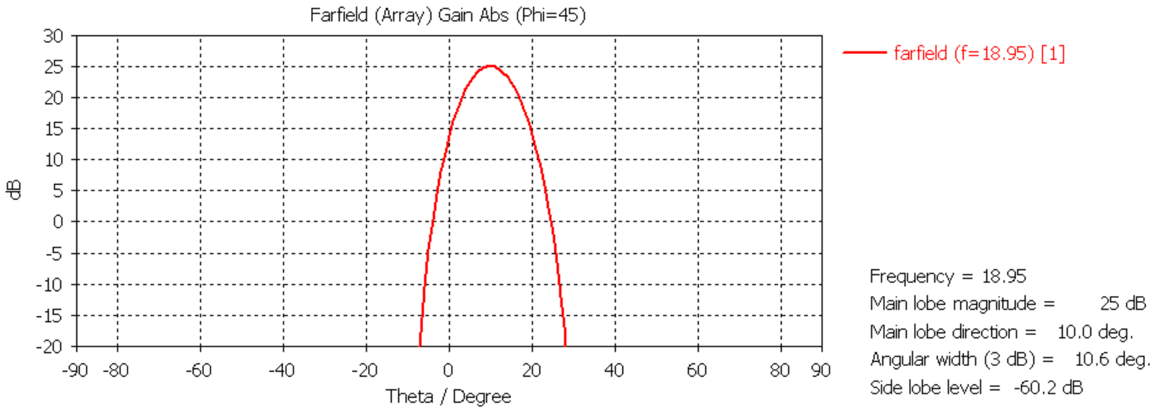
Scanning: ϕ = 0°, θ = 10°



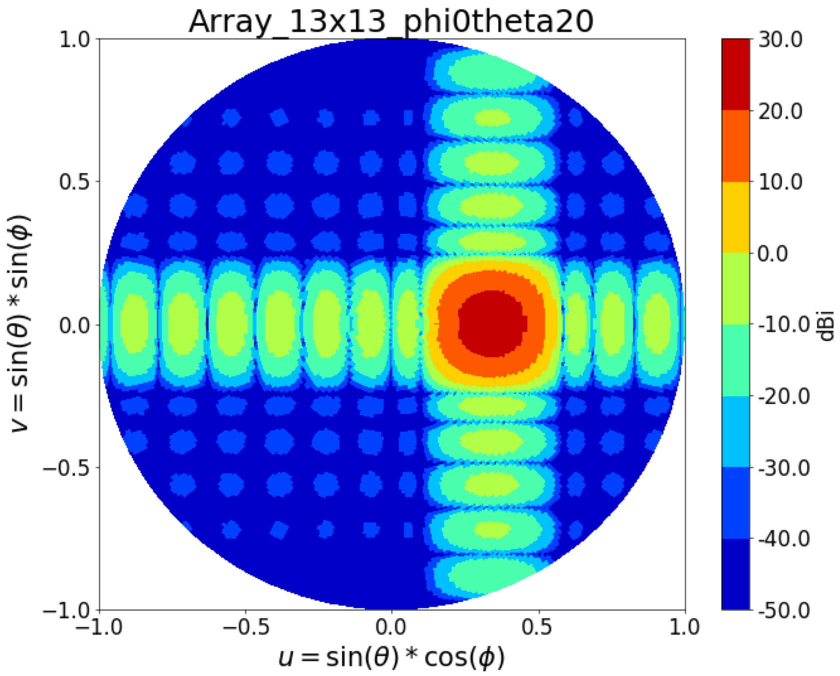


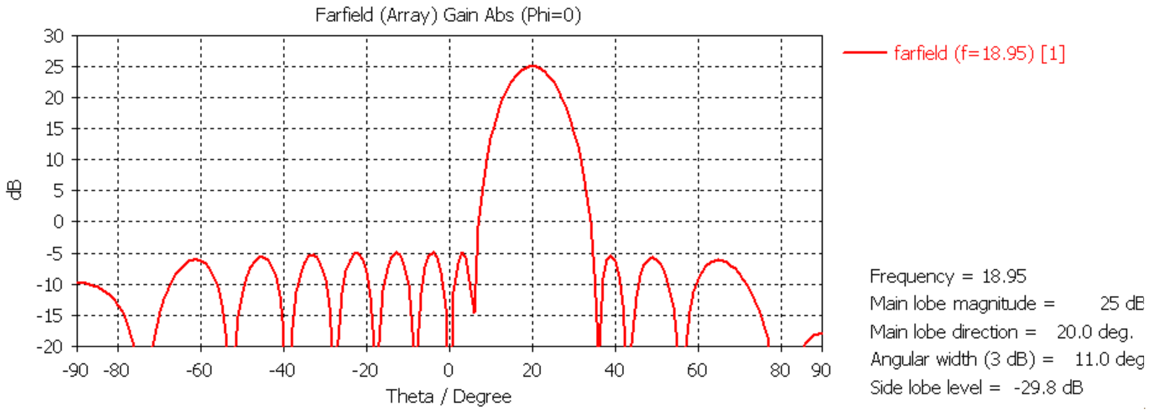
Scanning: ϕ = 45°, θ = 10°



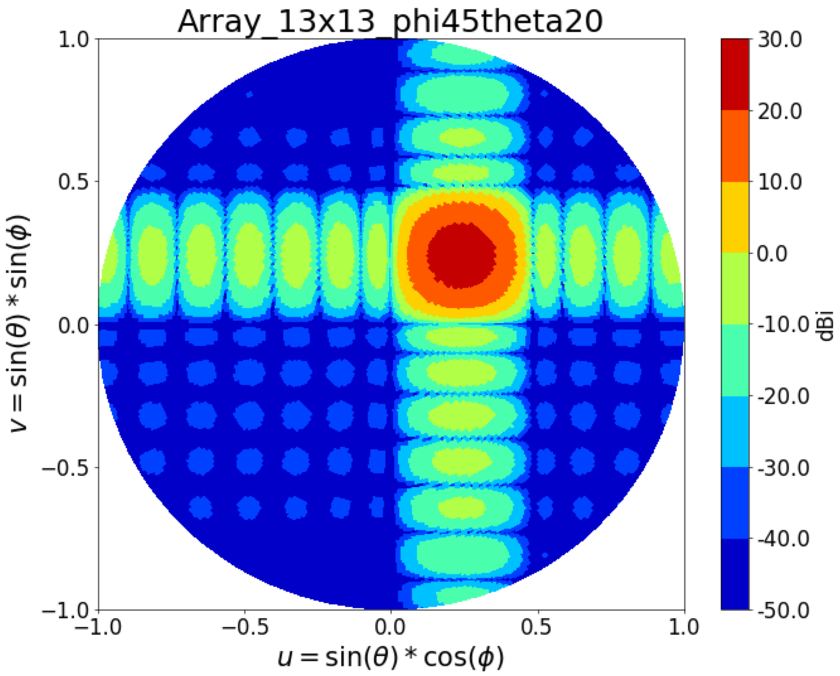


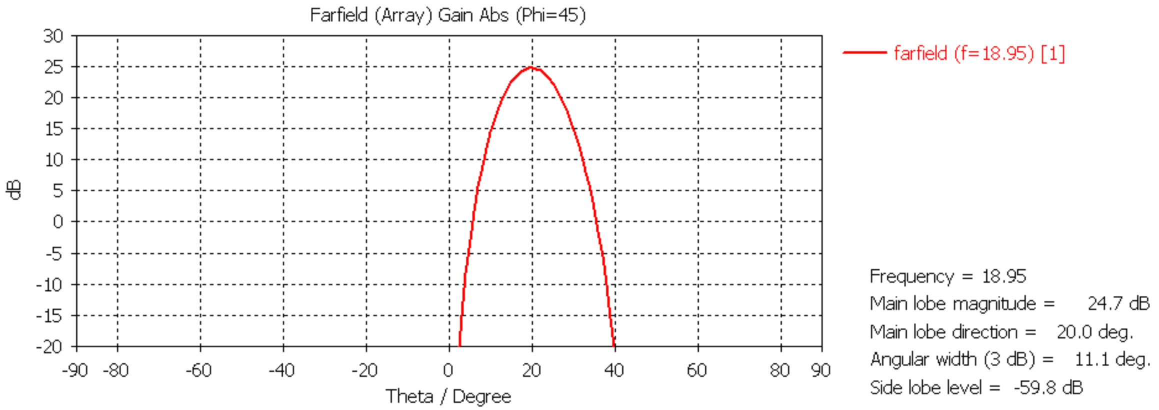
Scanning: $\phi = 0°$, $\theta = 20°$



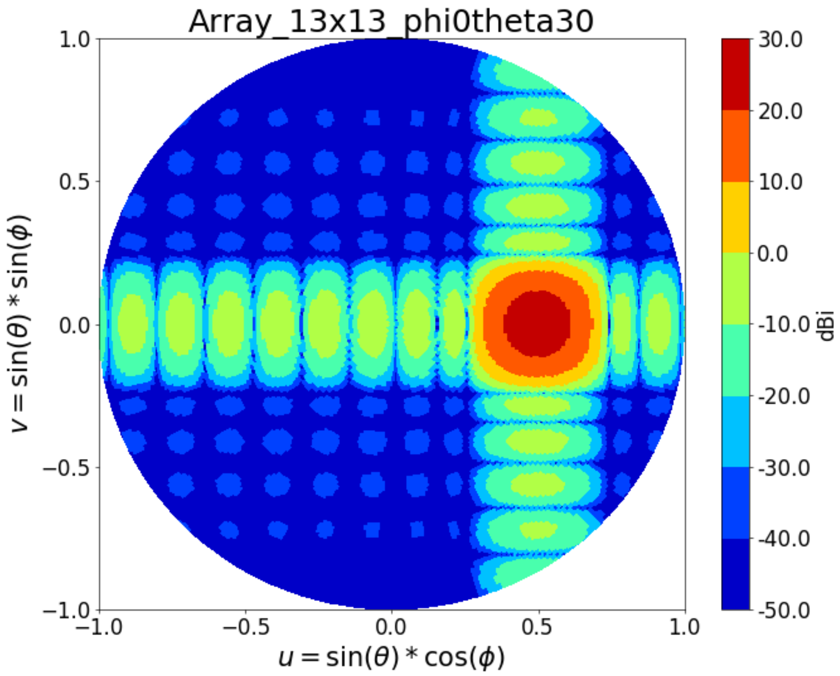


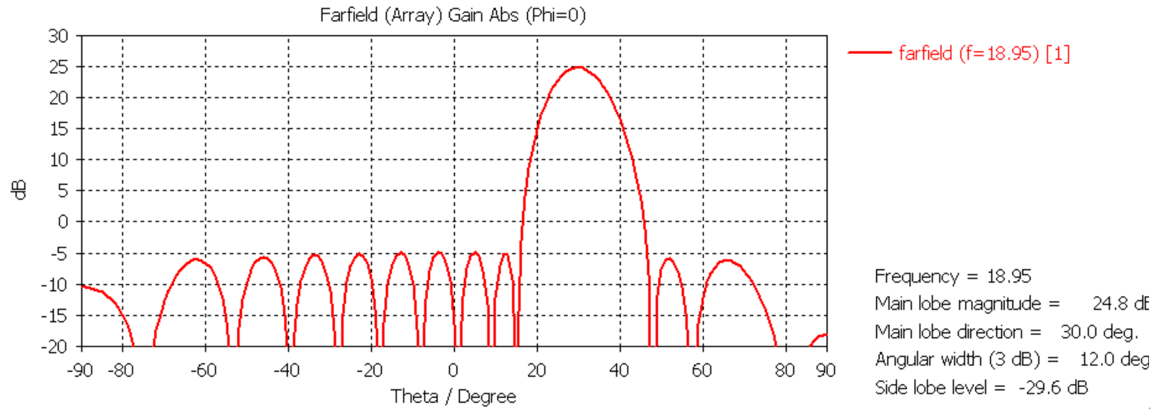
Scanning: $\phi = 45°$, $\theta = 20°$



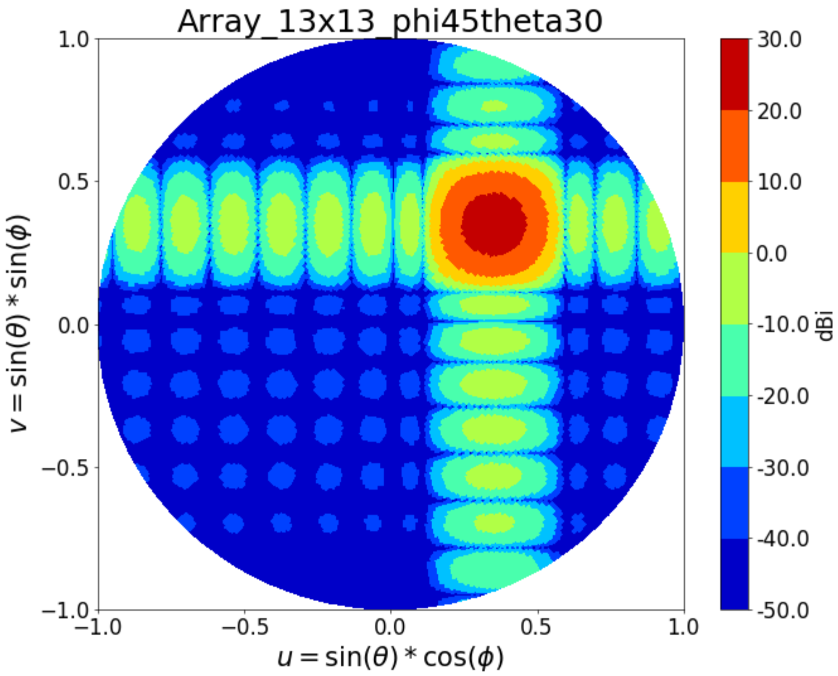


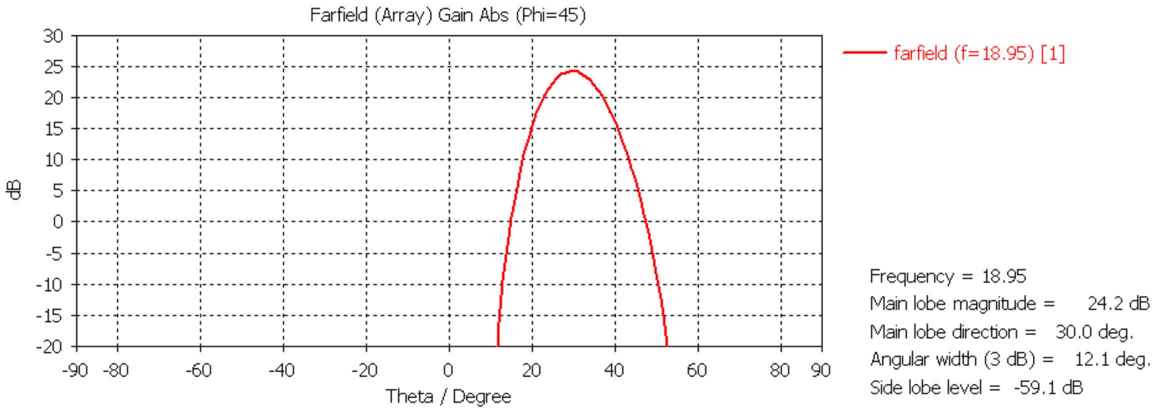
Scanning: ϕ = 0°, θ = 30°



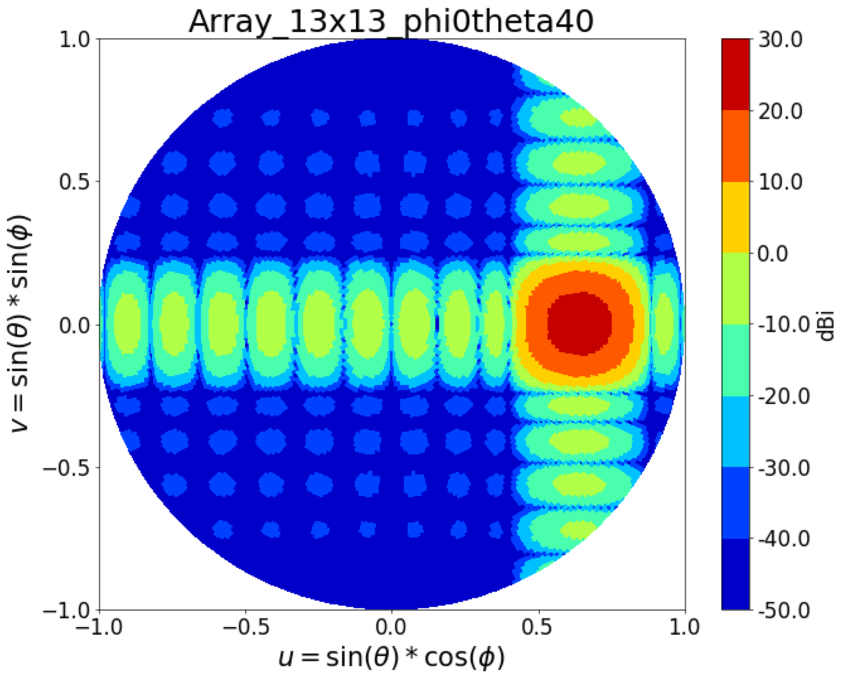


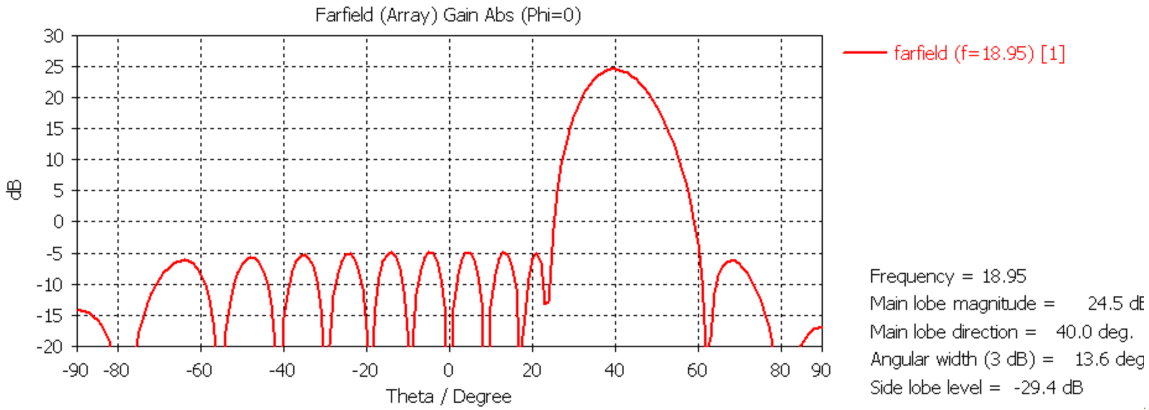
Scanning: ϕ = 45°, θ = 30°



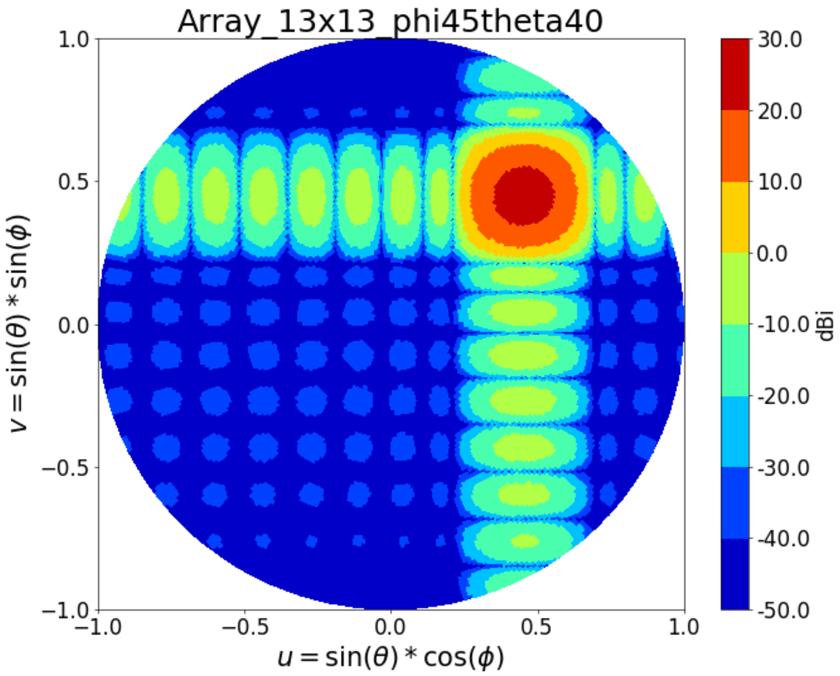


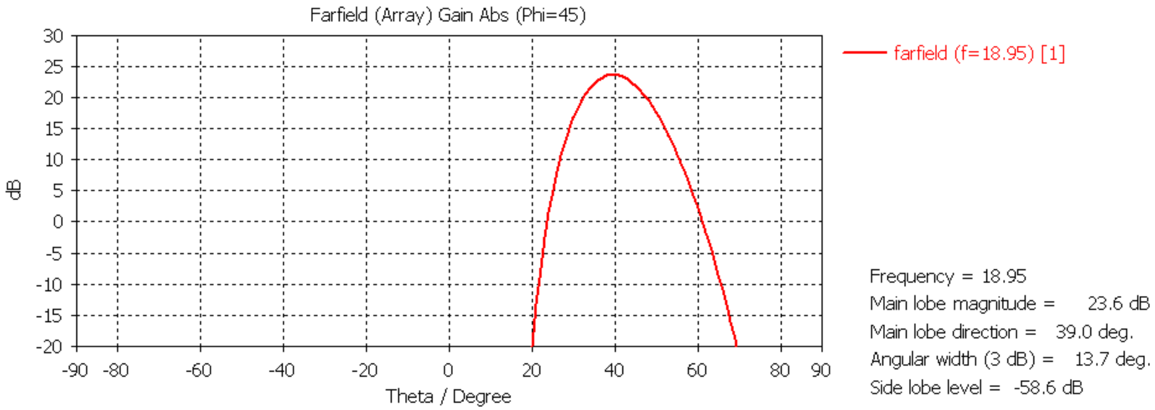
Scanning: ϕ = 0°, θ = 40°



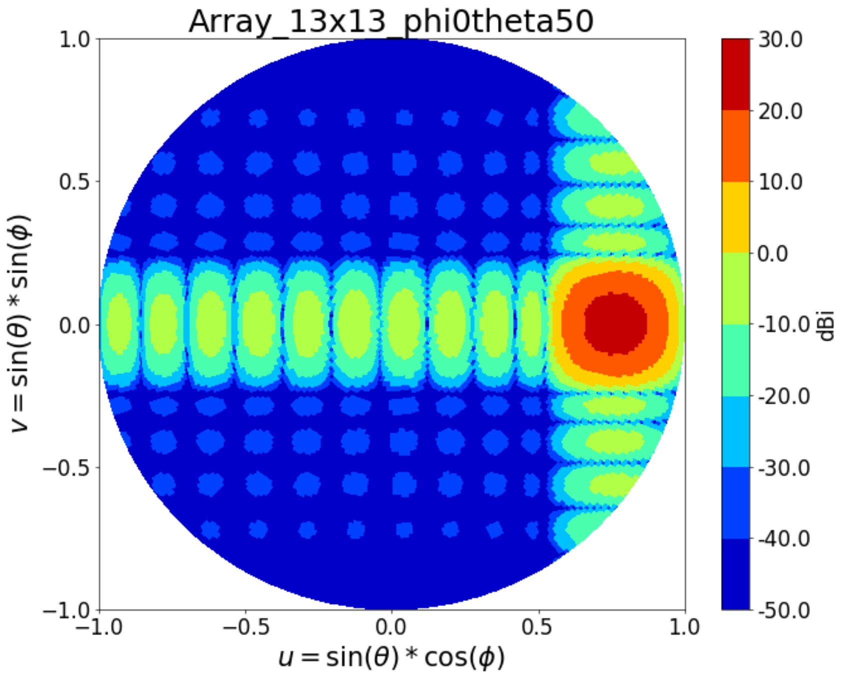


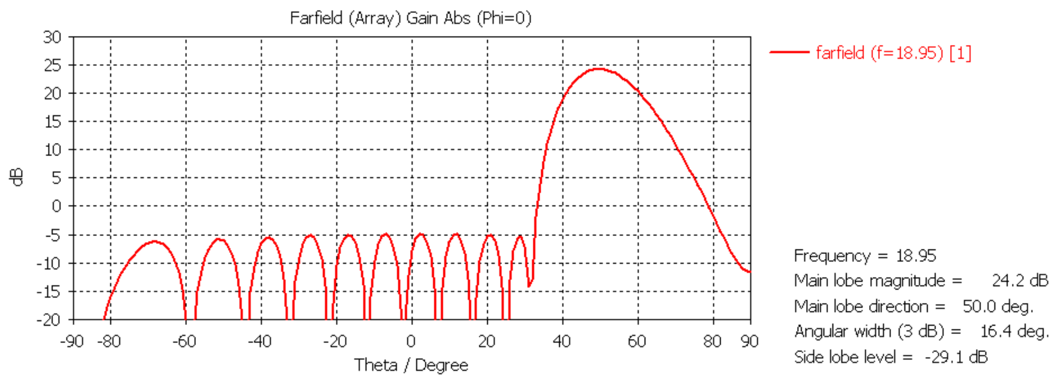
Scanning: ϕ = 45°, θ = 40°



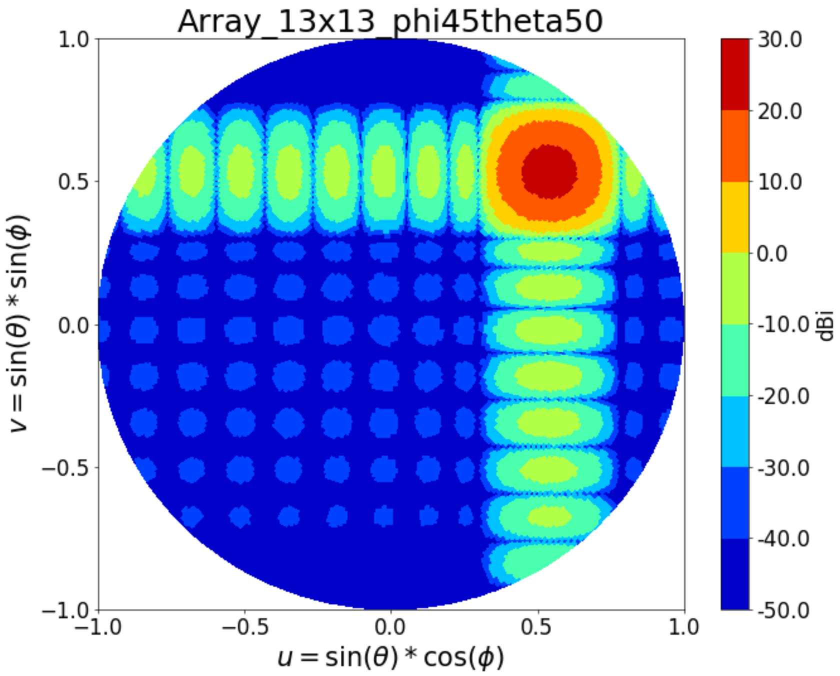


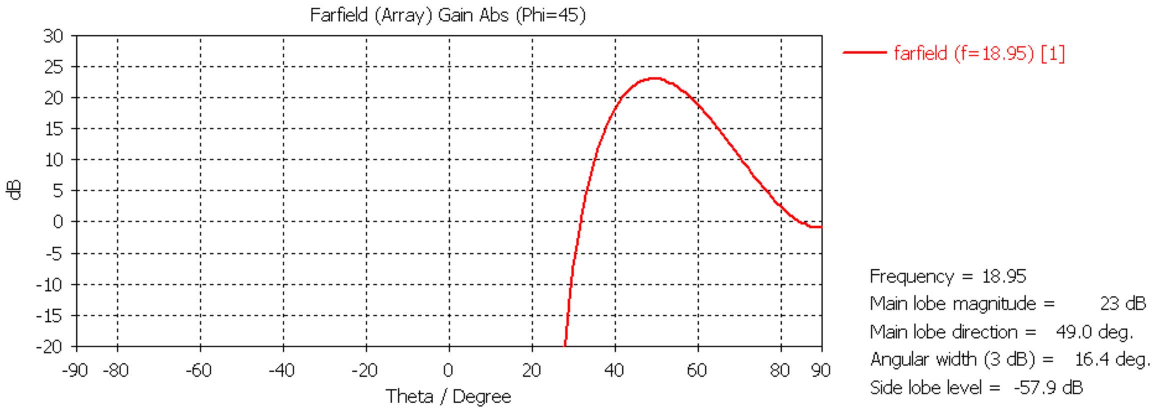
Scanning: ϕ = 0°, θ = 50°



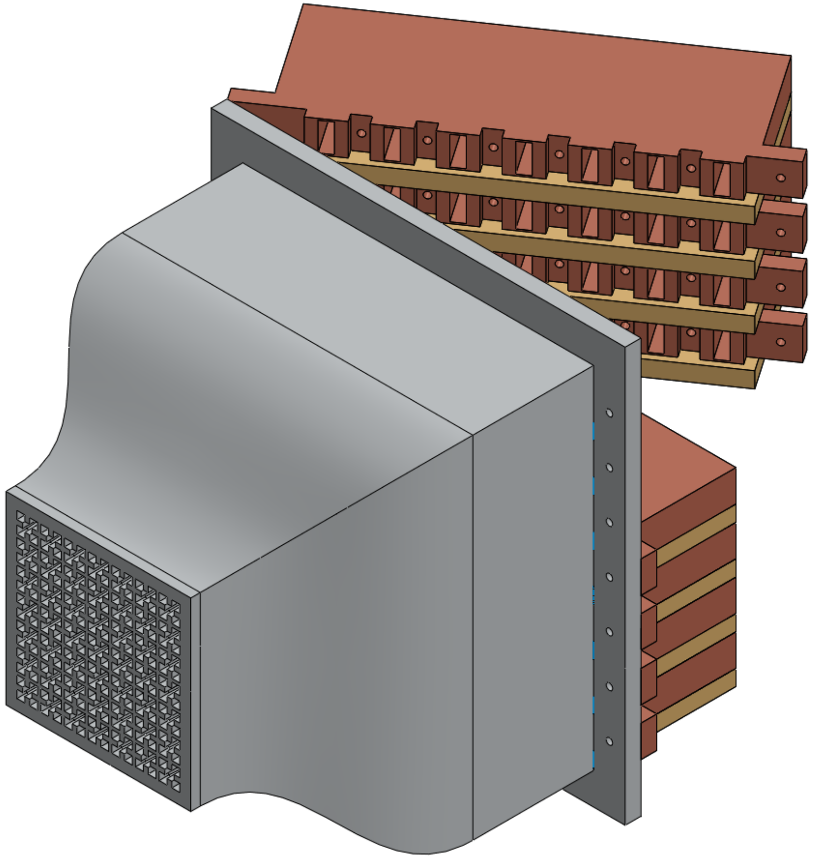


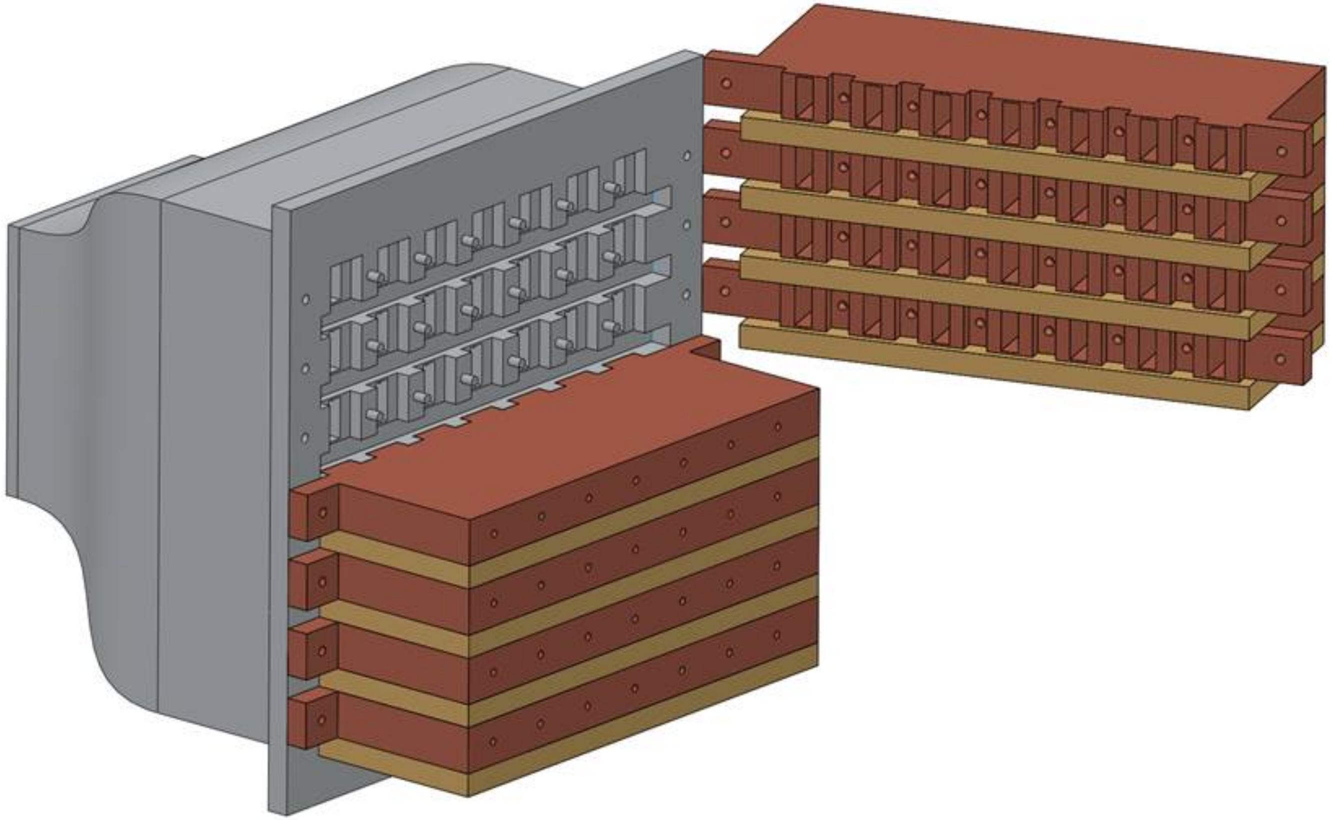
Scanning: ϕ = 45°, θ = 50°

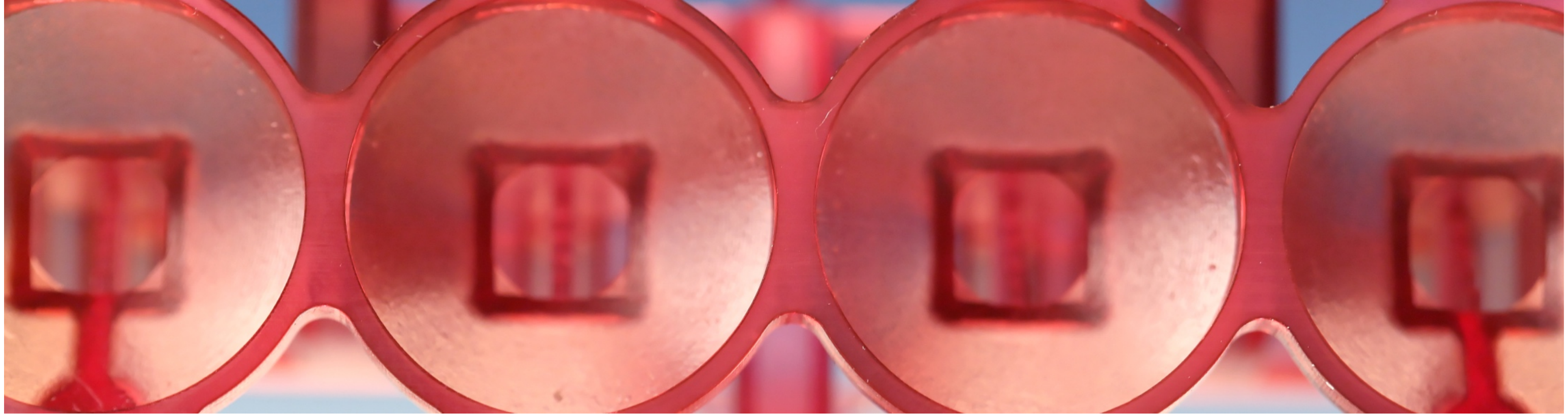




Interface with the SSPAs







SWISSto12 SA
EPFL Innovation Park, Building L
Chemin de la Dent d'Oche 1B
CH-1024 Lausanne
www.swissto12.ch
+41 21 353 02 40