

RAIN Reader Antennas Selection

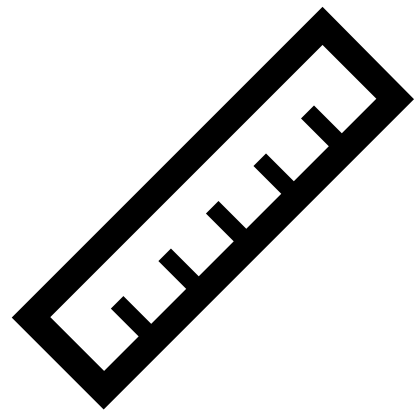


Speaker:

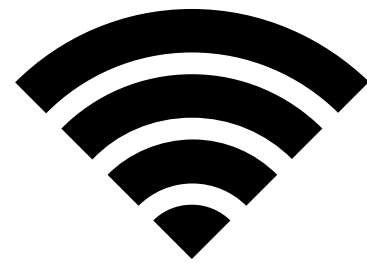
Dr. Prabakar Parthiban,
Head of Engineering and RF Specialist,
Times-7 Research Ltd



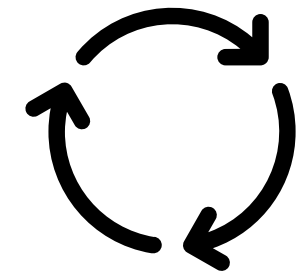
Selection Criteria



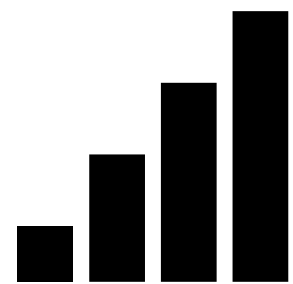
Size



Field



Polarization

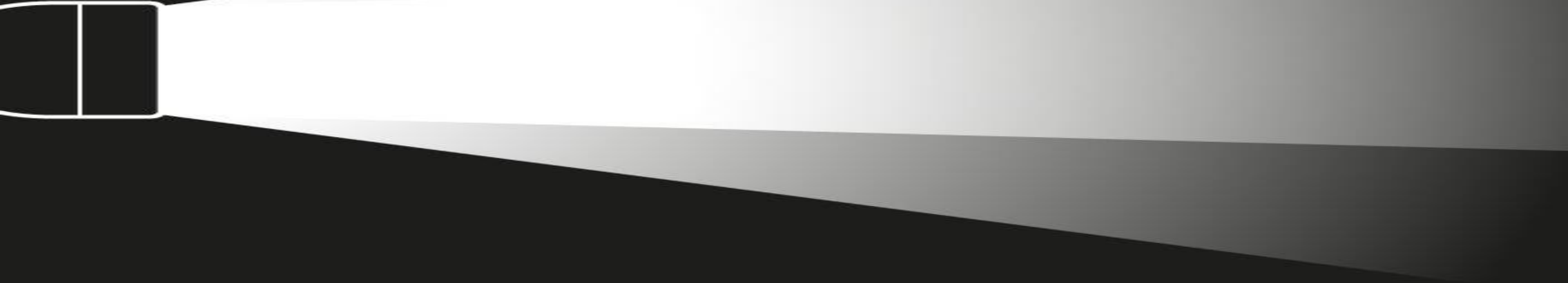


Gain

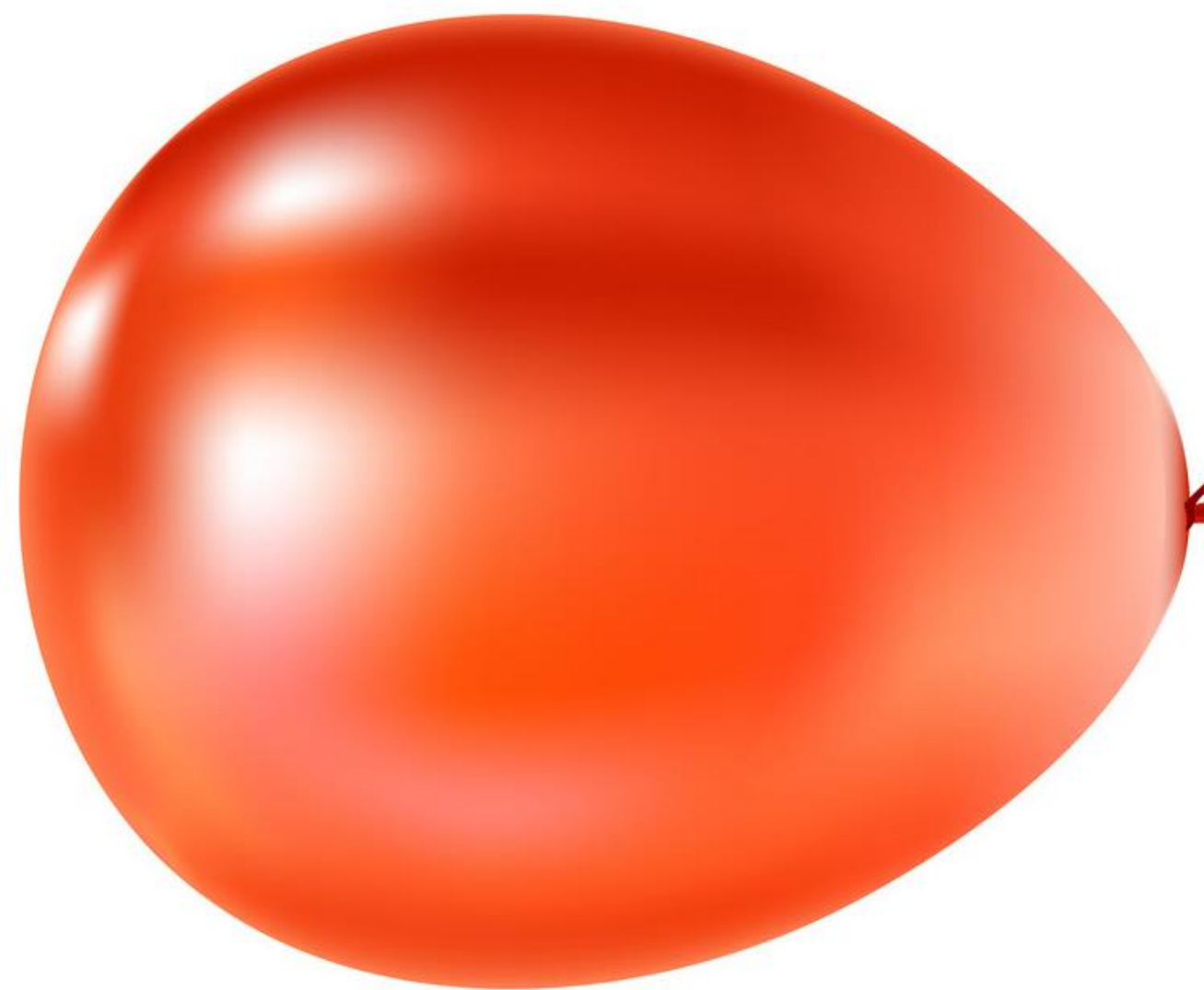


IP Rating

Radiation and RF Beam



How do antennas radiate?



Like a balloon!



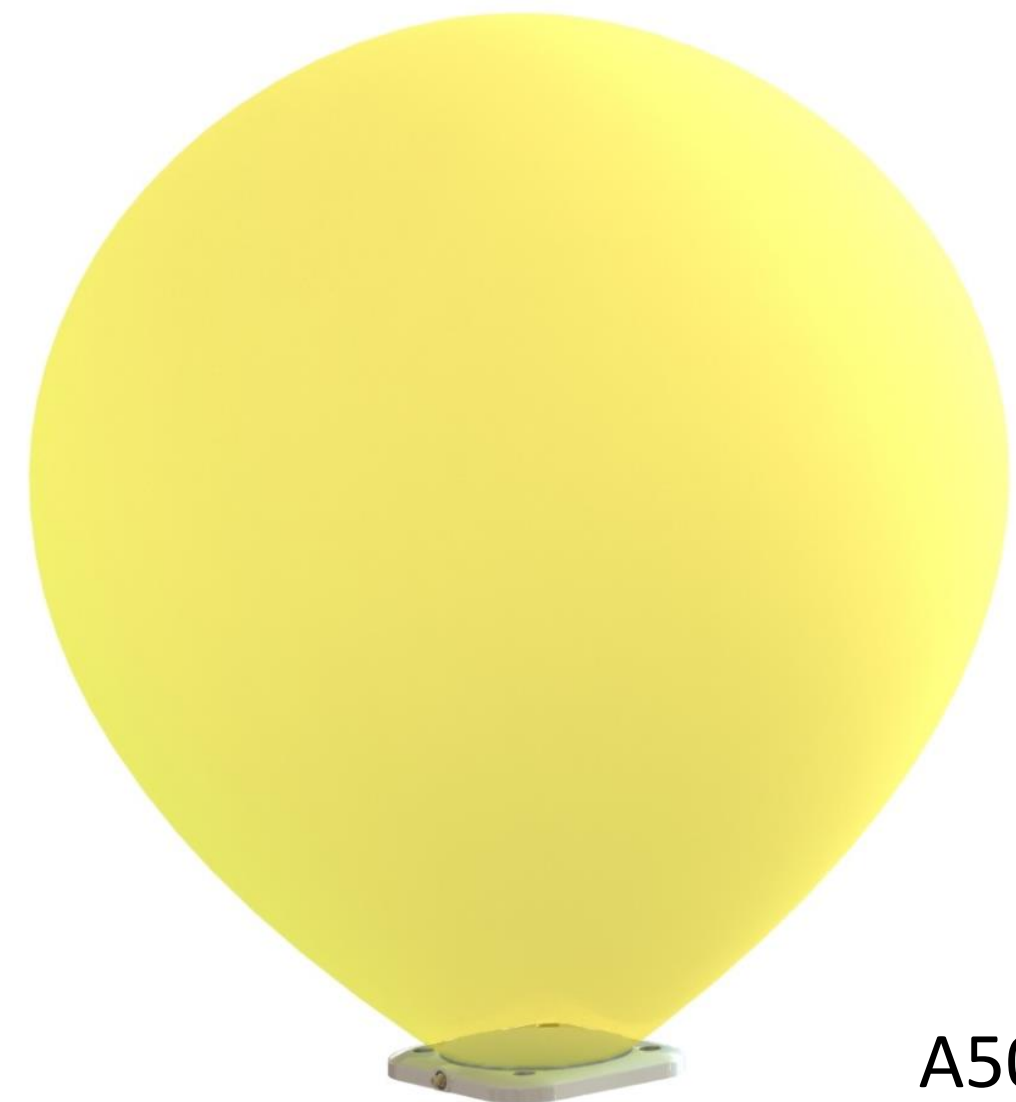
Radiation and power

**Radiation expands
when the power
increases**



Different forms of radiation

**Symmetric wide
radiation**



A5020

Different forms of radiation

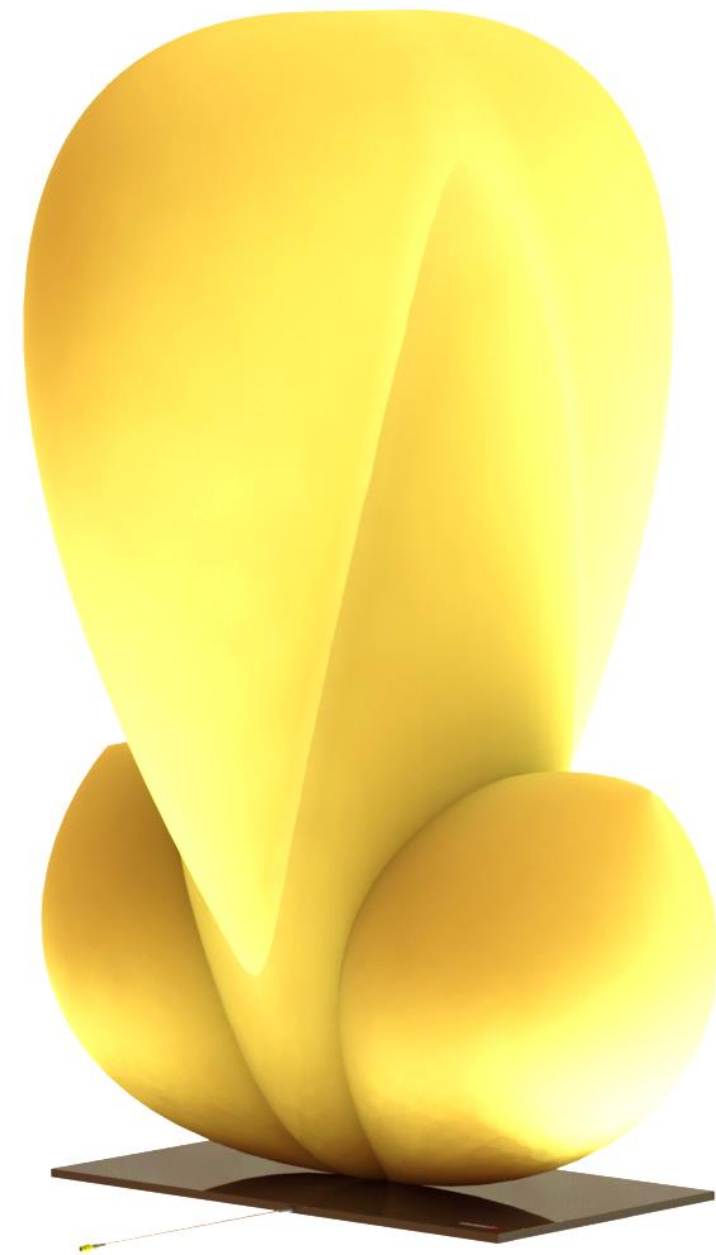
**Symmetric Narrow
radiation**



A5010

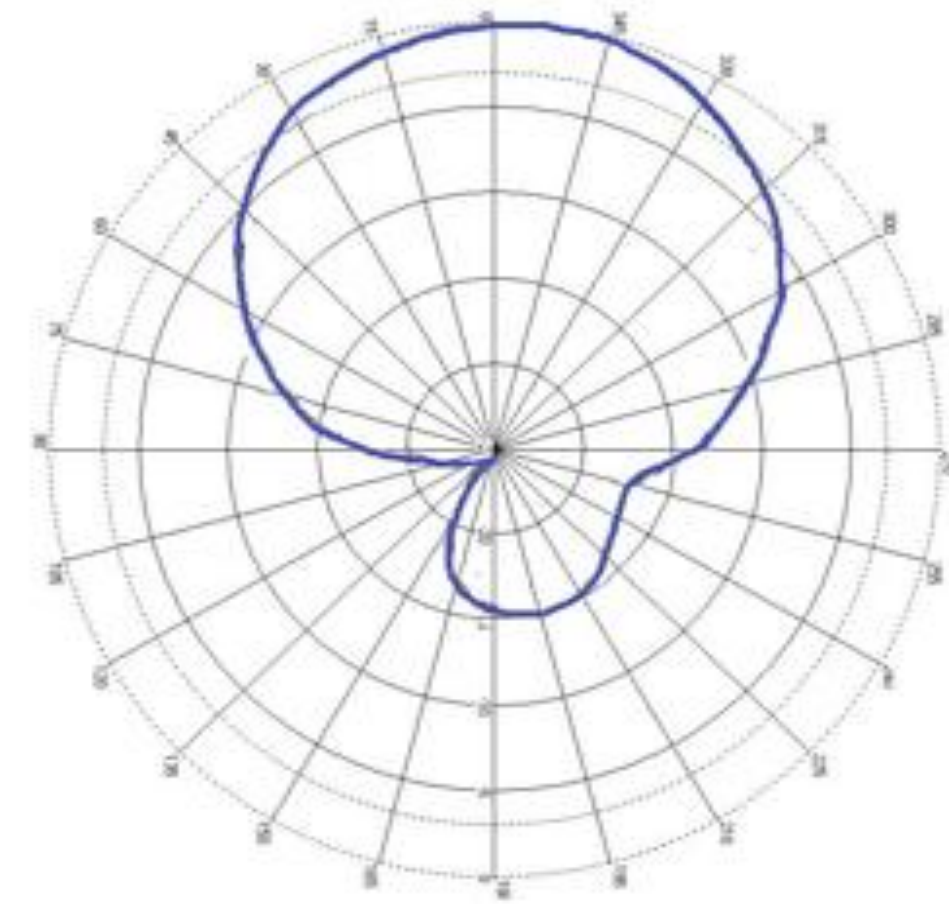
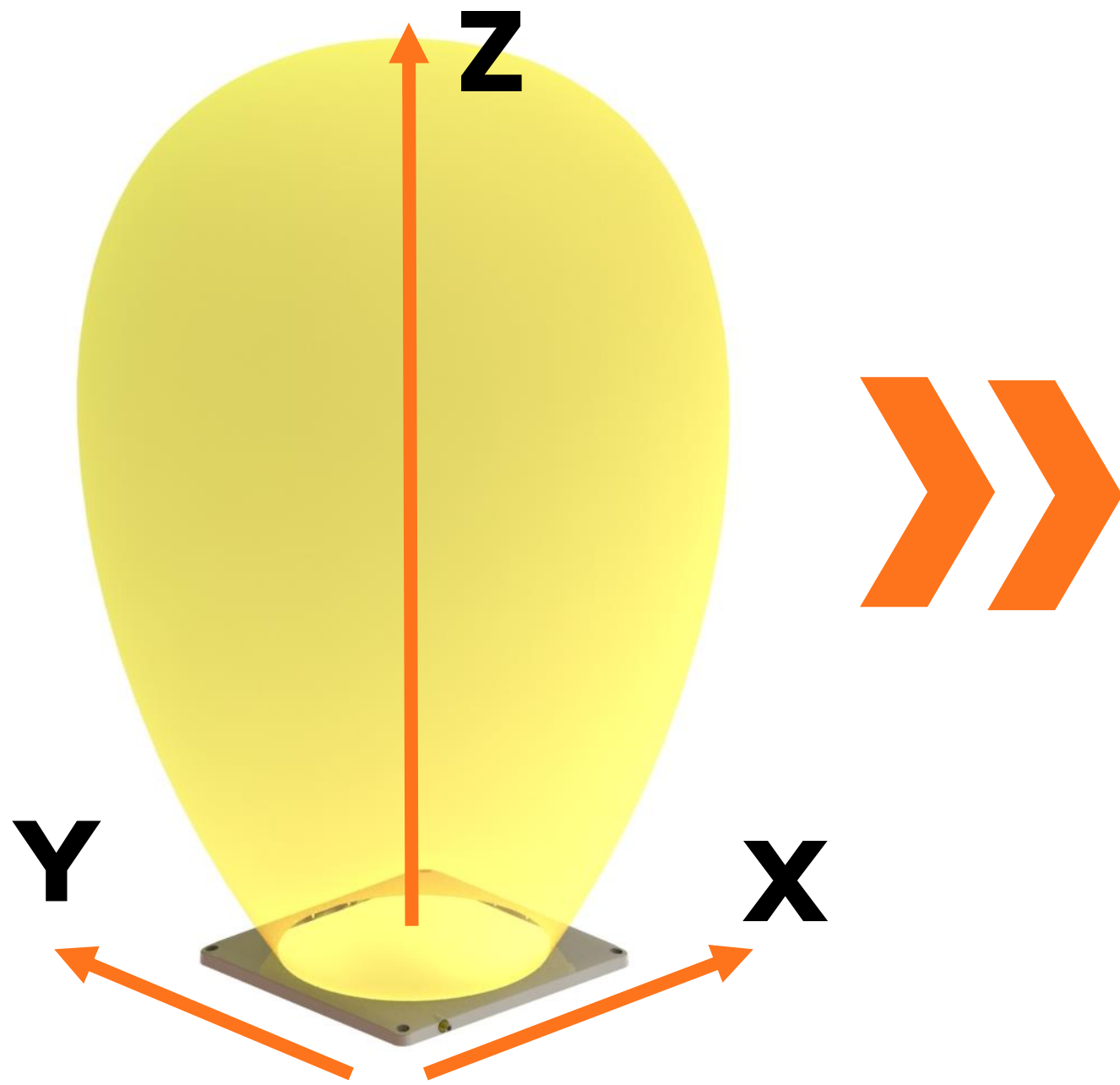
Different forms of radiation

**Asymmetric
radiation**



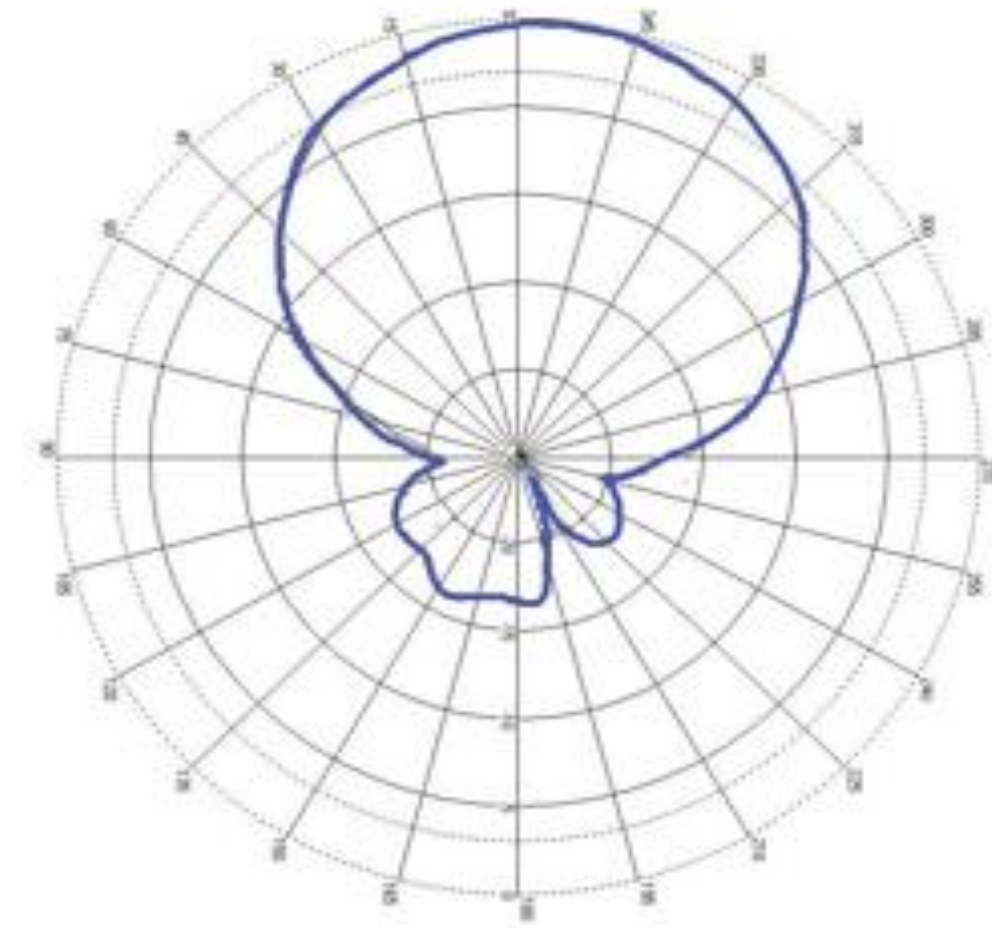
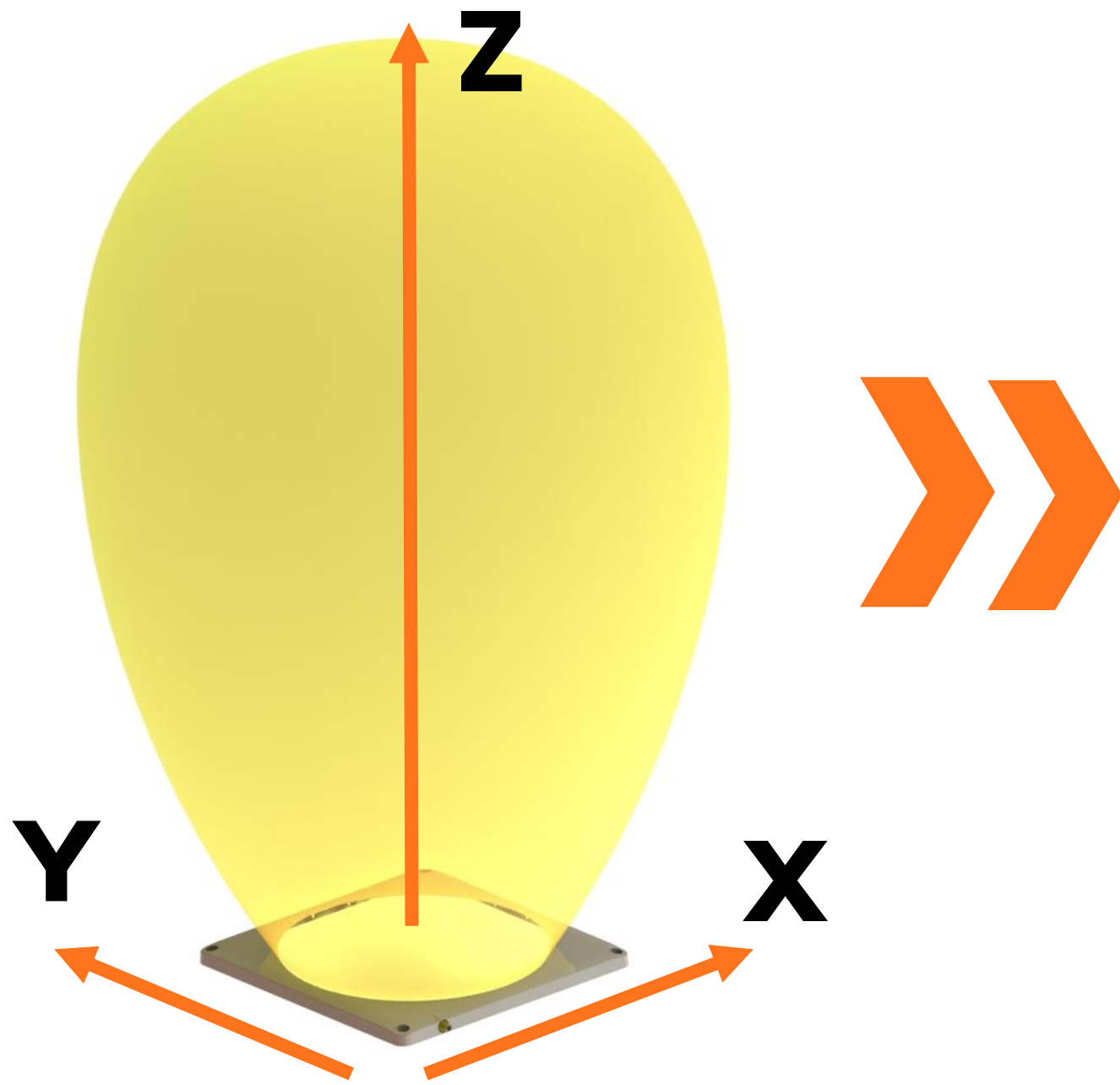
A5060

2-Dimensional Slice



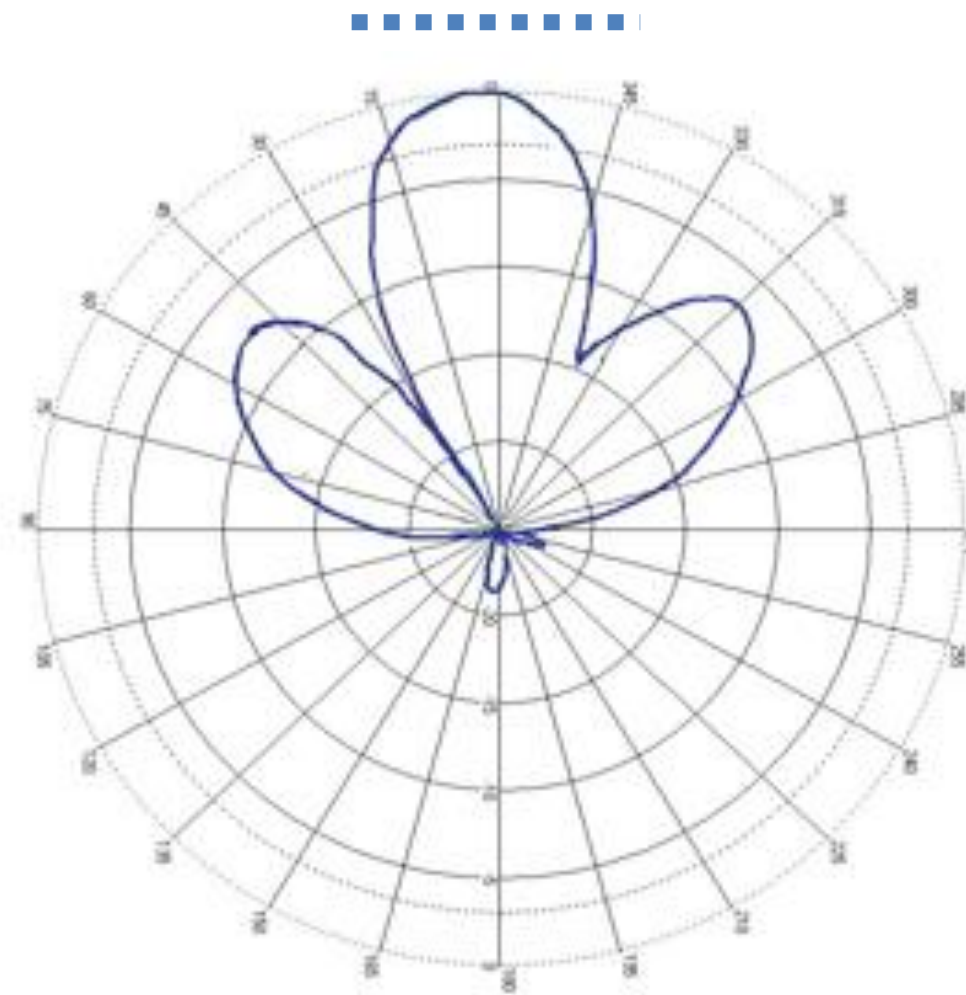
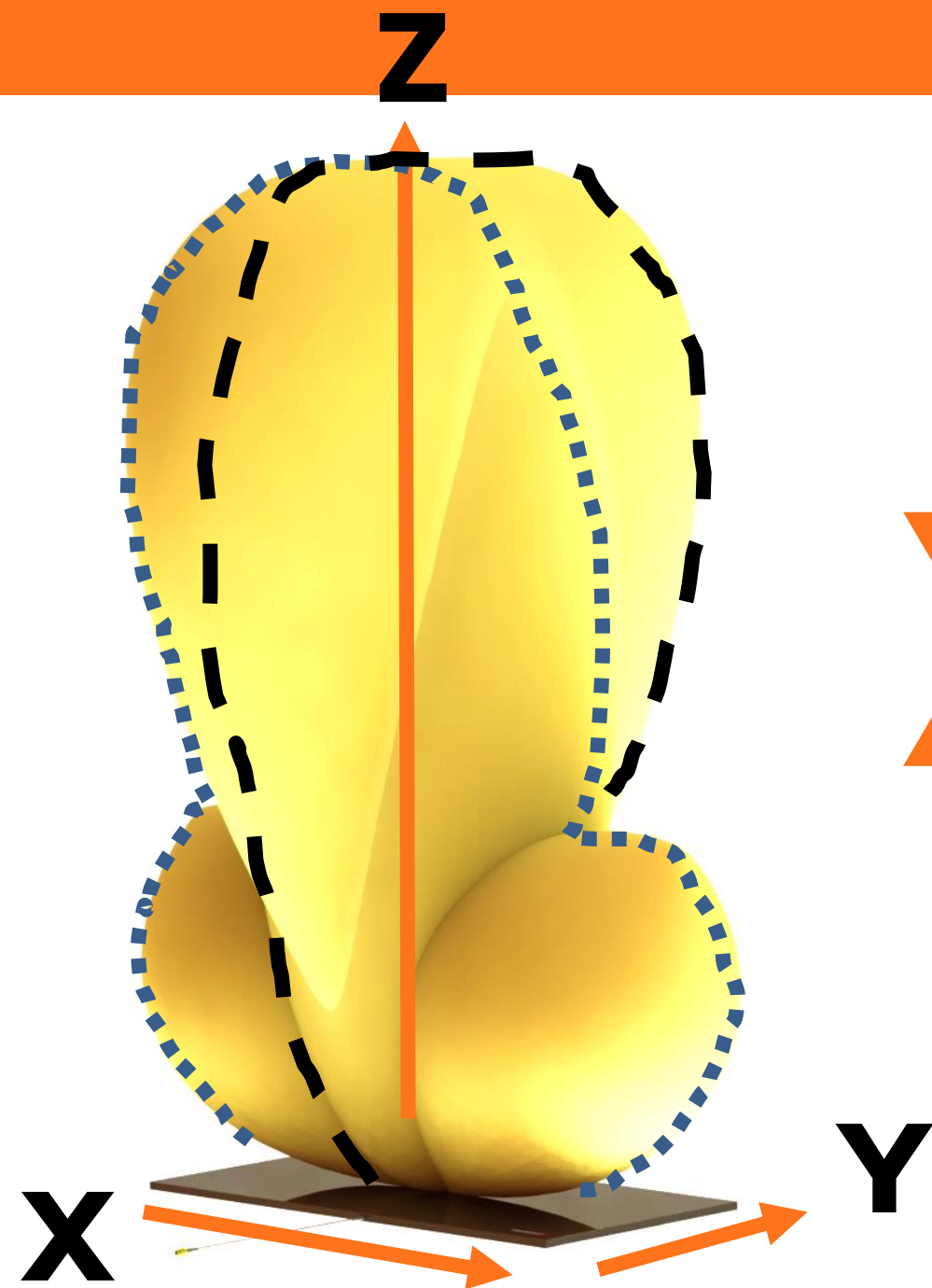
A5010 XZ (Azimuth) plane

2-Dimensional Slice

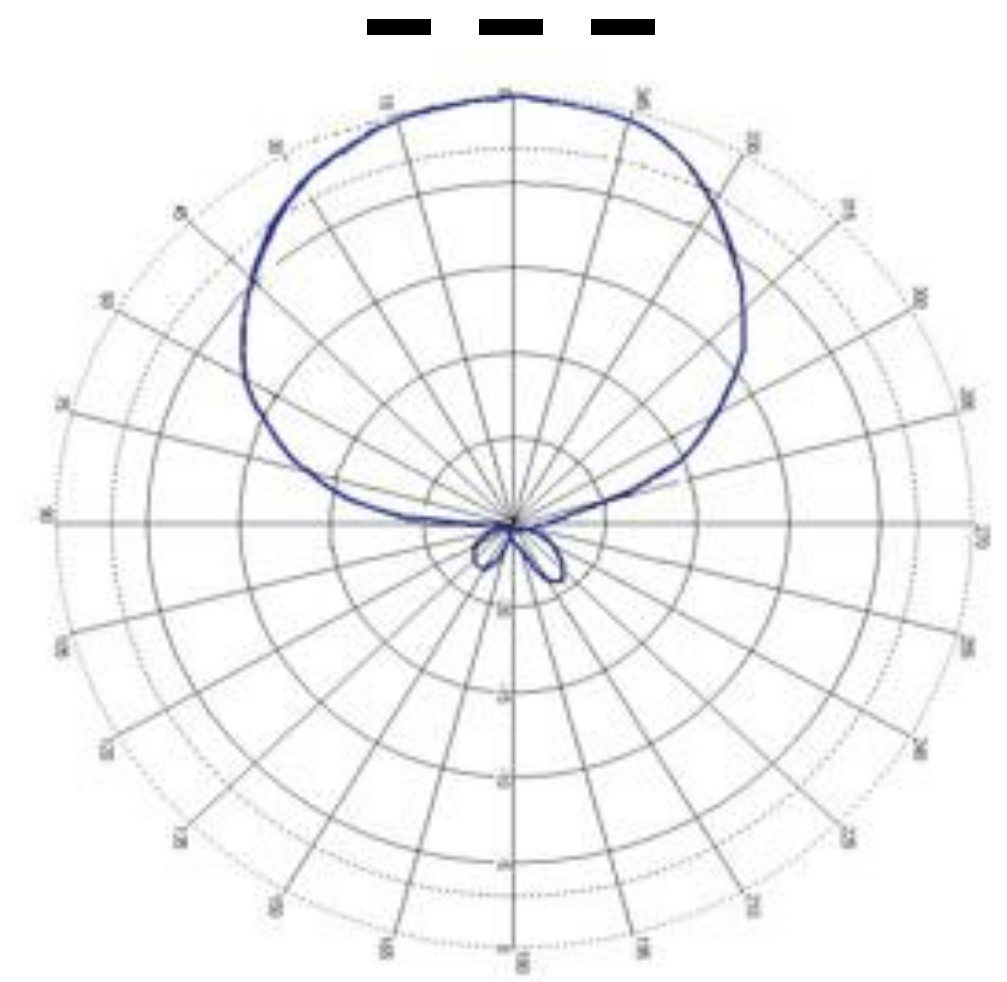


A5010 YZ (Elevation) plane

Complex 2-D Slices

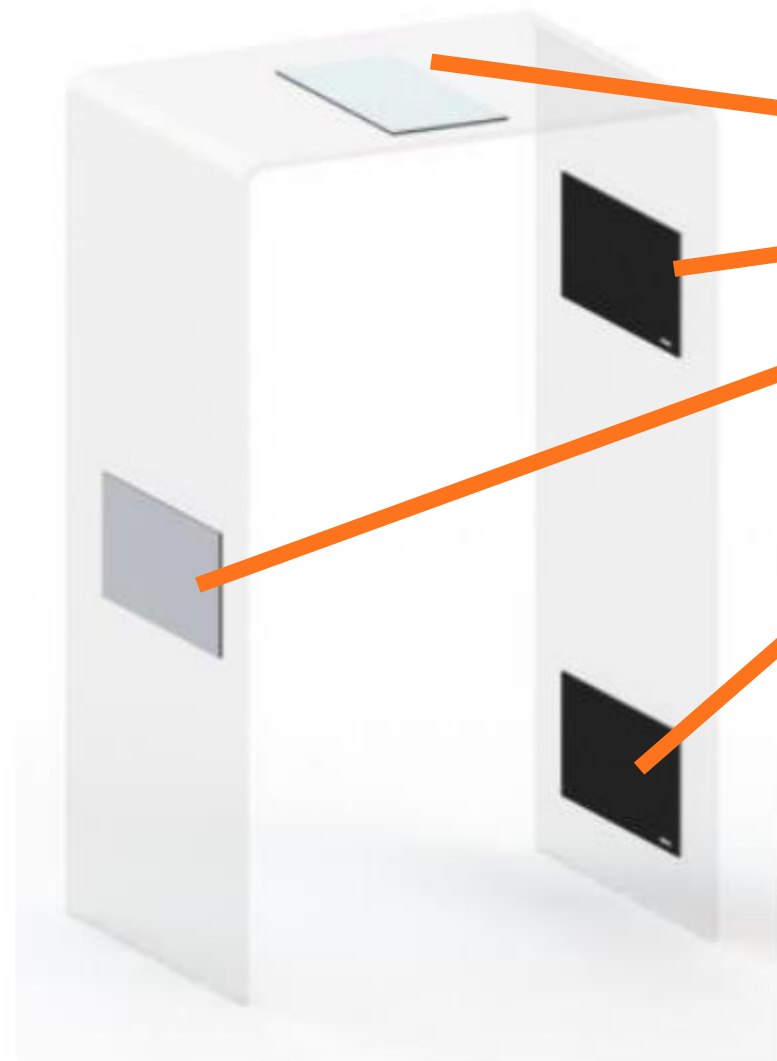


A5060 XZ (Azimuth) plane



A5060 YZ (Elevation) plane

Example



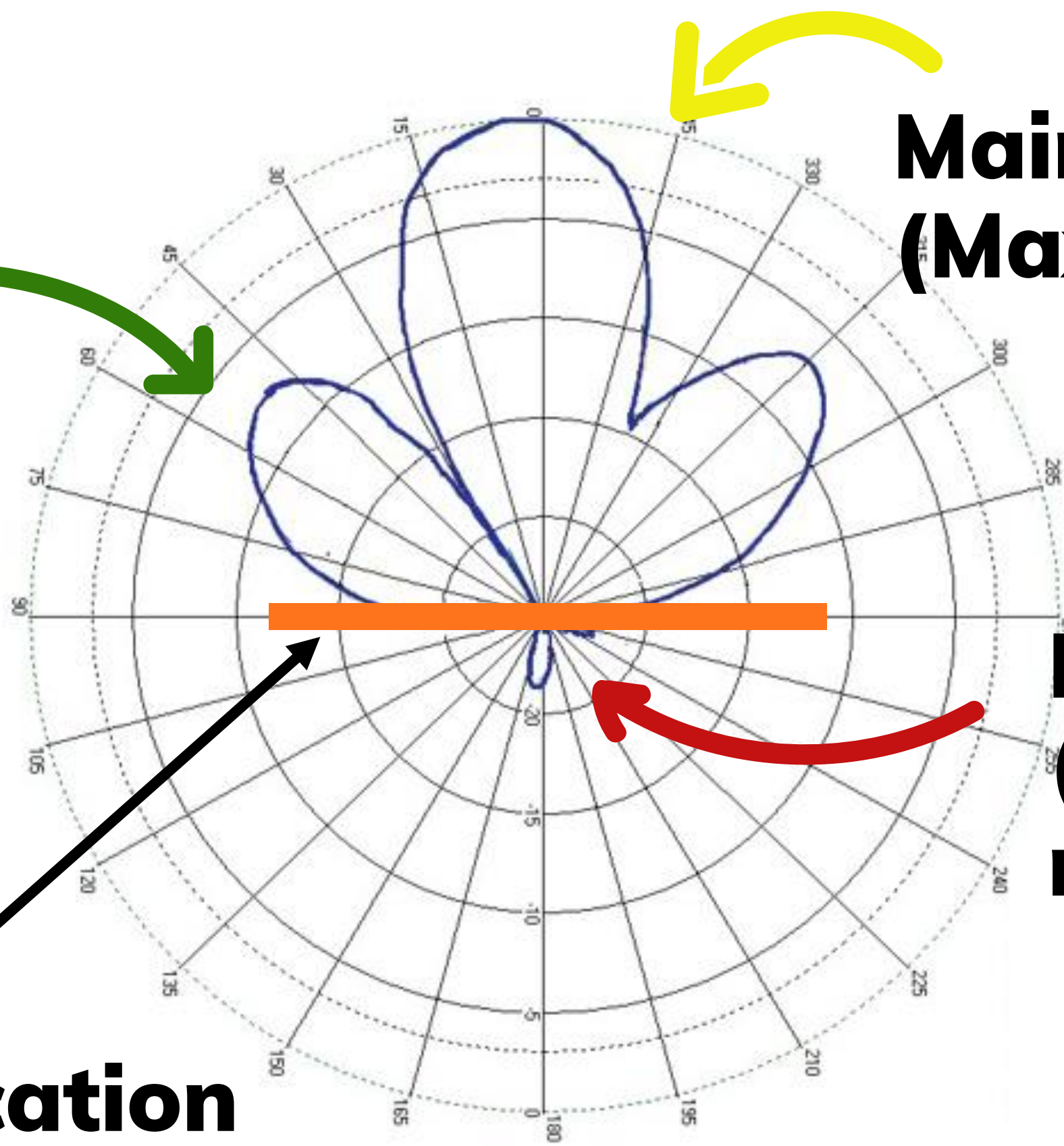
**A5060 Antenna
Mounted Horizontally**

Side lobes

**Main lobe
(Max. directive gain)**

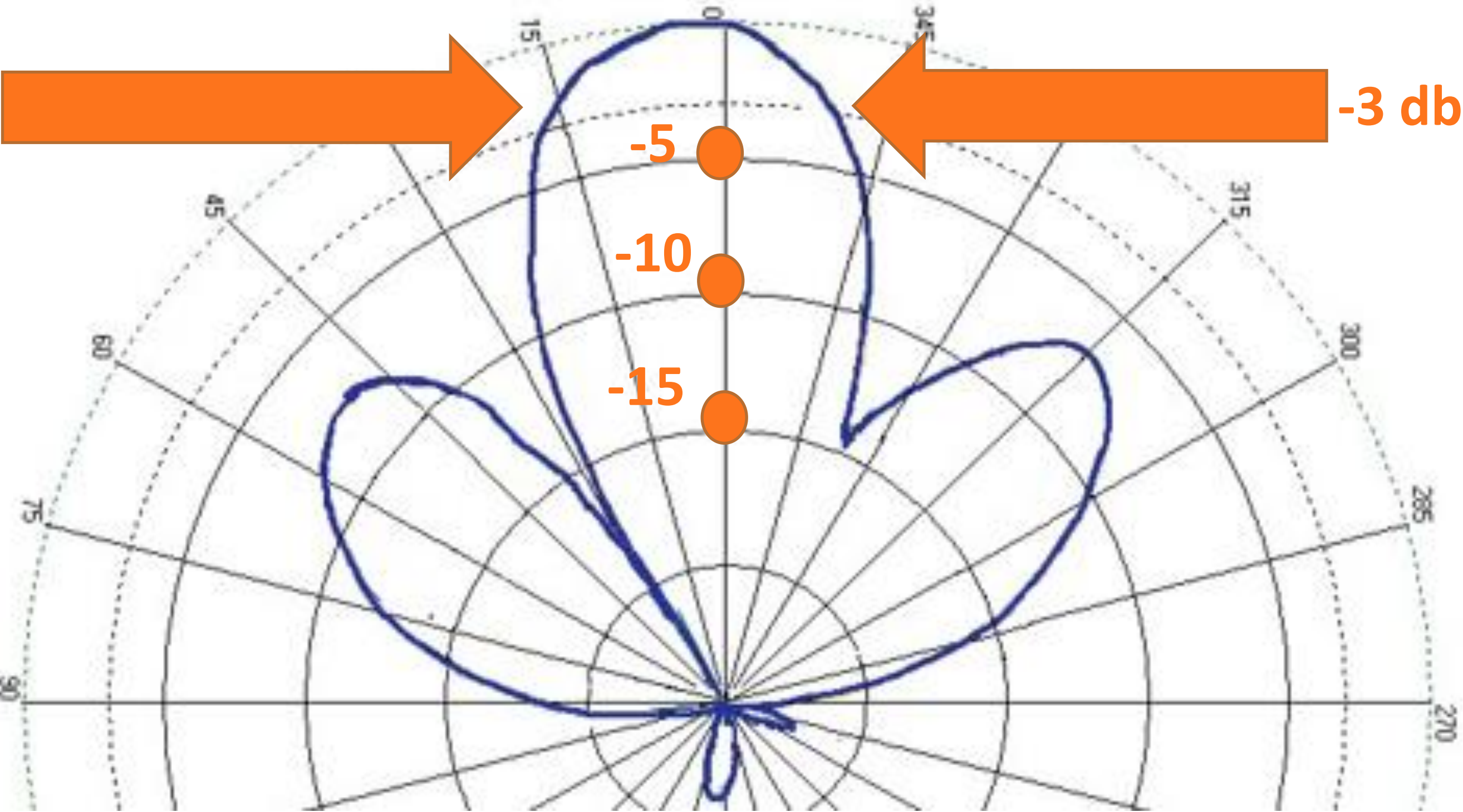
**Back lobes
(Front to back ratio)**

Antenna location



3 db Beamwidth - HPBW (Half-power beamwidth)

-3 db



-3 db

Significance



Coverage

Beamwidth and Height

$$\text{RF read zone} = 2 \times \left(H \times \tan \left(\frac{\phi}{2} \right) \right)$$

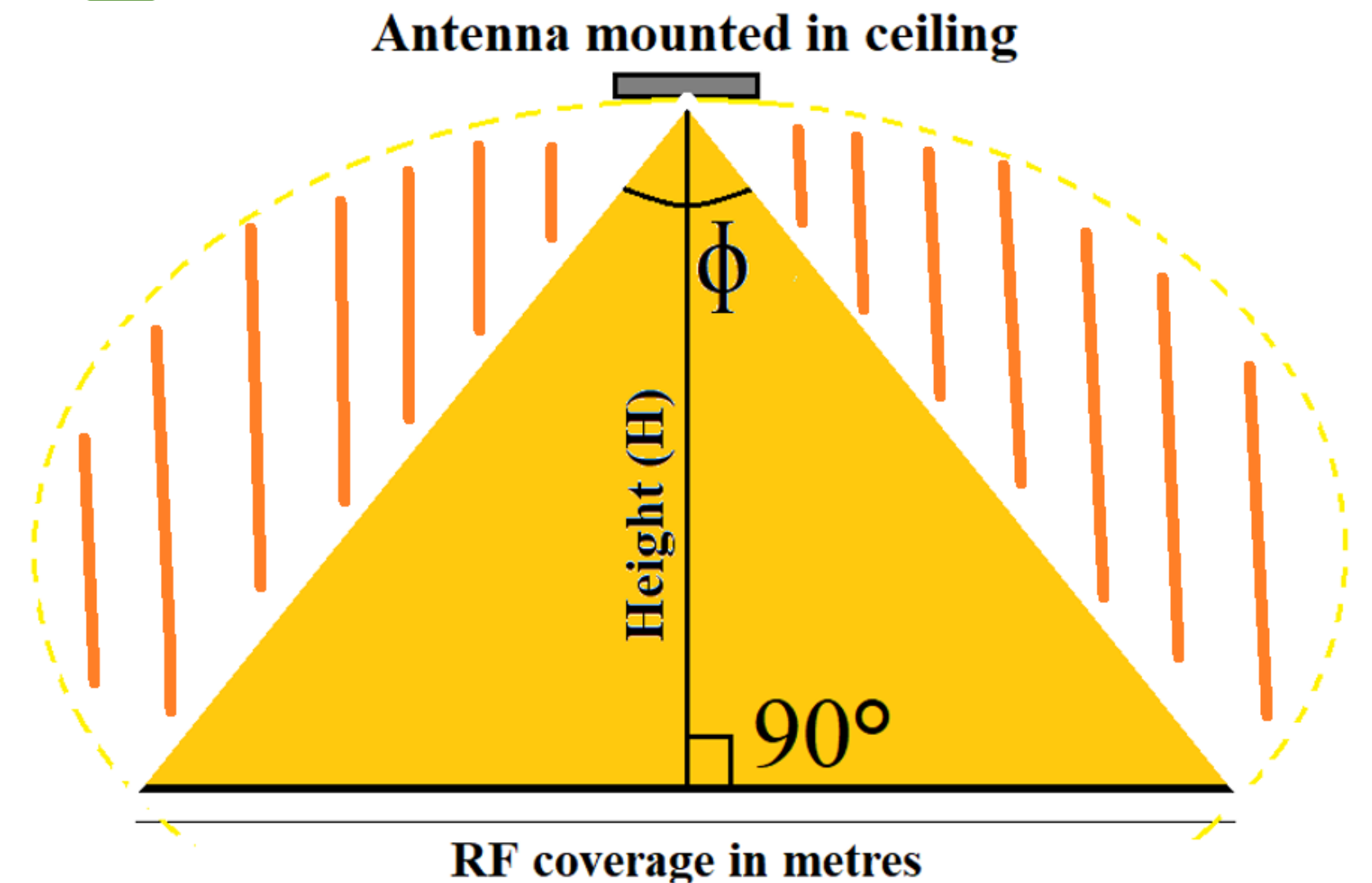
Where, ϕ = HPBW and H = Height



calculator



<https://www.ahsystems.com/EMC-formulas-equations/Antenna-beamwidth-coverage-calculation.php>



What impacts read coverage in a real environment?



**Reader Power
Settings**



**Power Loss in
Cables**



**RFID Tag
Type**



**Environmental
reflections**

In 3 steps to the read coverage

1

Select the best suitable antenna by looking at the beam shape.

Tip: In case of a stray tag-read concern, opt for narrow beam antennas!

2

Use the theoretical calculation to determine the rough number of antennas needed to cover the wanted read zone.

3

Test the antenna with the tag you intend to use for your application.

Tip: Use tagged assets vs tags in free space!

We are here to help!

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sales@times-7.com

