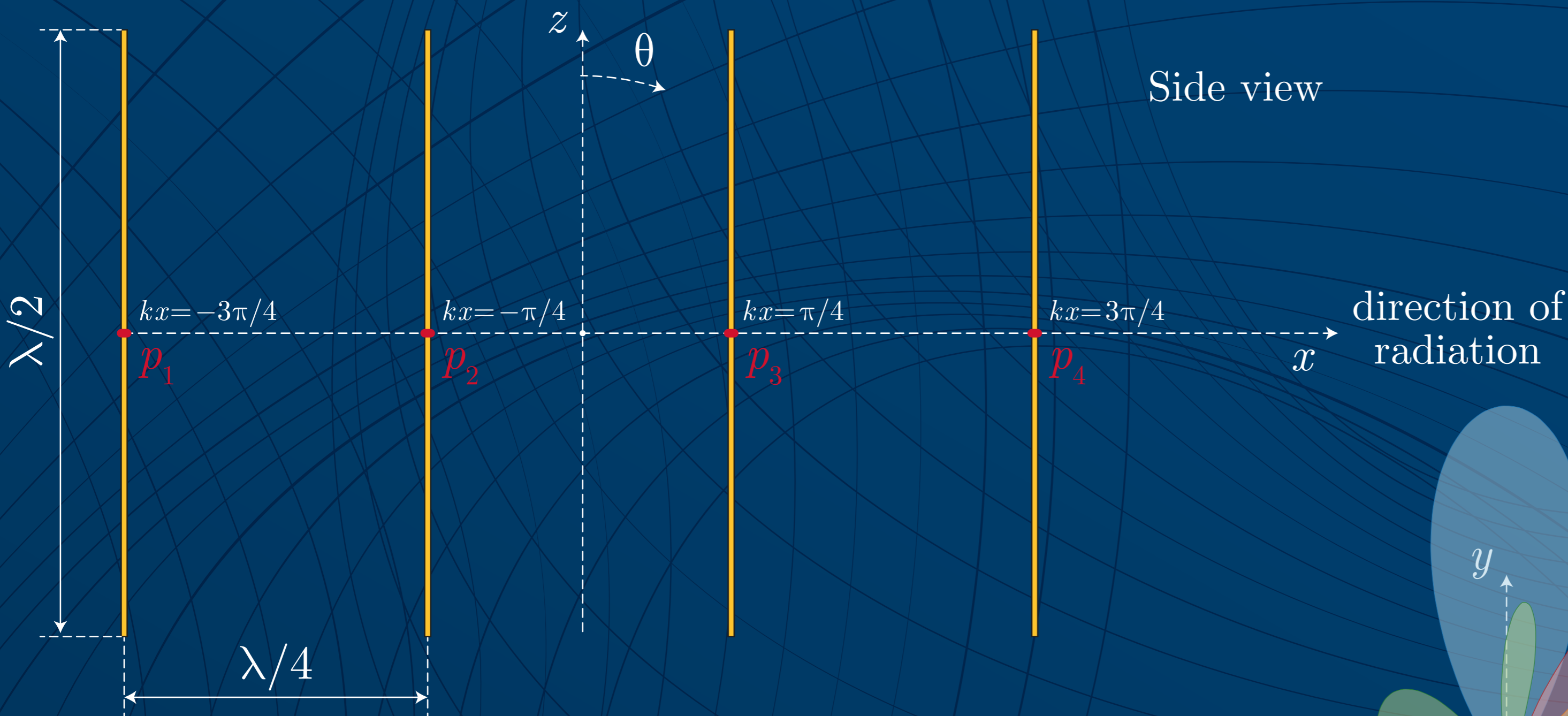


Synthesis Of End-Fire Antenna Array

Motivation

$$v_i \sim \exp(-jkx)$$

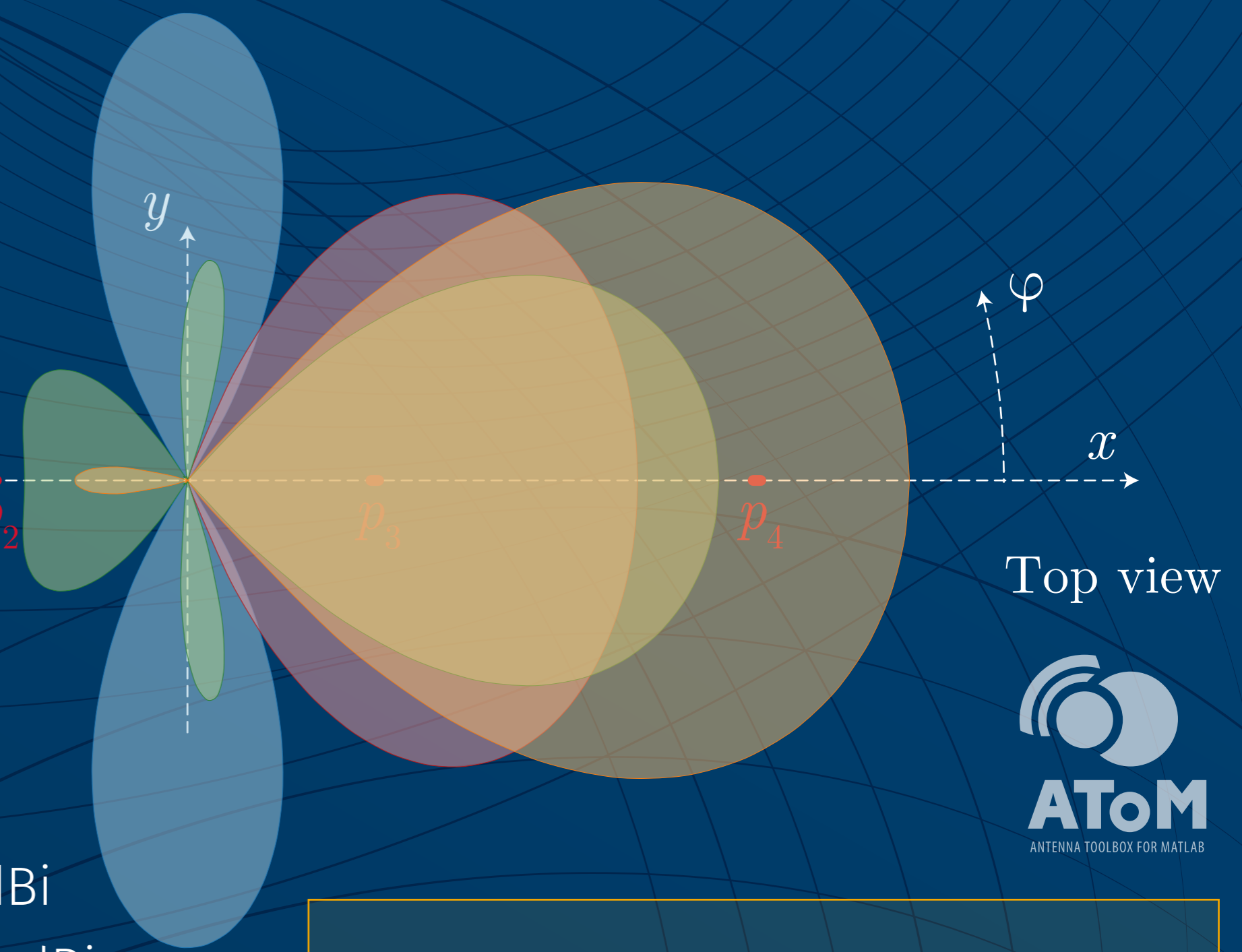
- Synthesis of antenna arrays is an important part of antenna theory.
- End-fire radiation overperforms the broad-side one for small separation distances.
- An idea of traveling wave along the individual radiators might be used to start..



$$D(\theta, \varphi) = \frac{4\pi U(\theta, \varphi)}{P_{\text{rad}}}$$

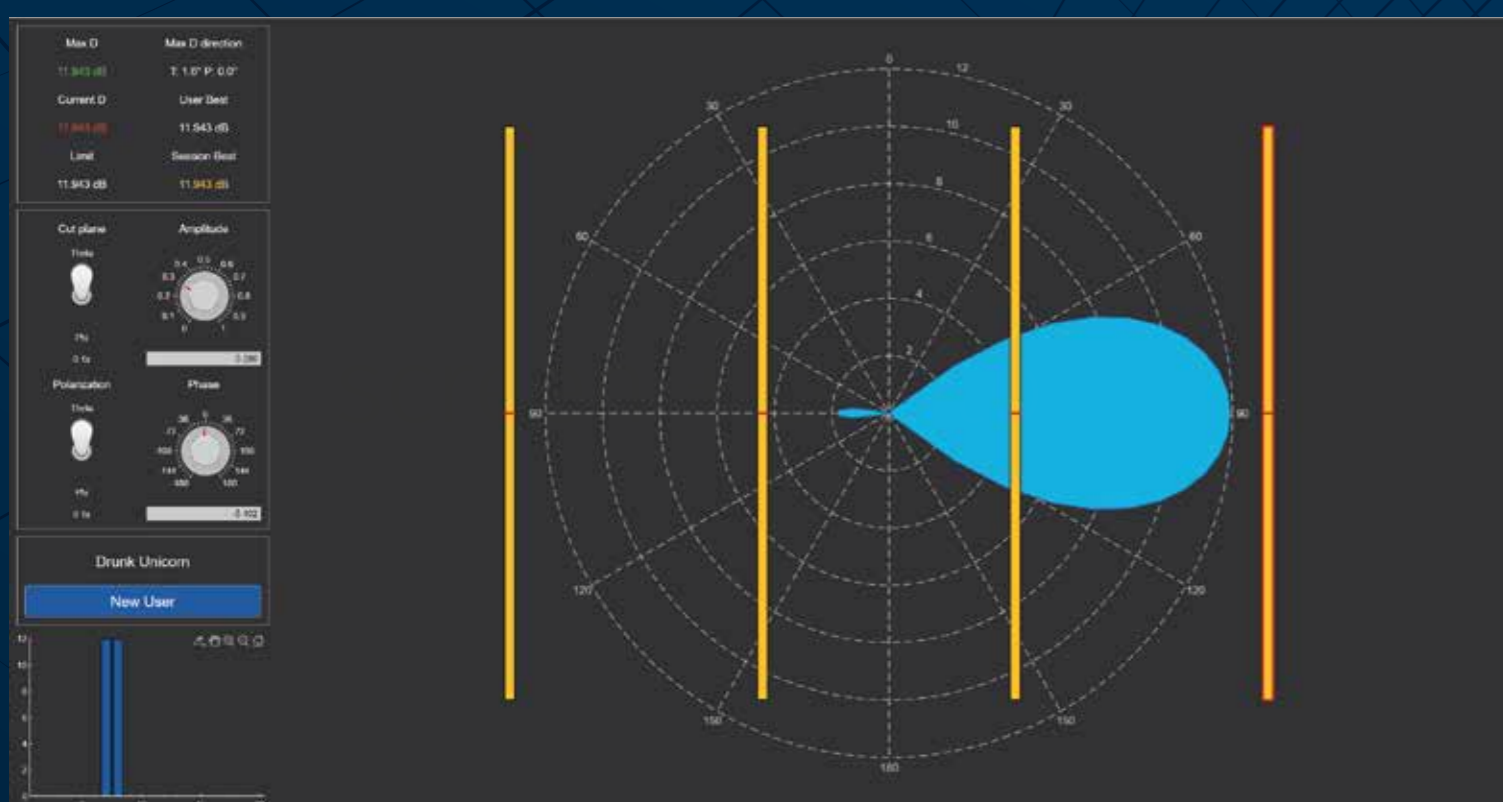
maximize $|\mathbf{fv}|^2$
 subject to $\mathbf{v}^H \mathbf{r}_{\text{rad}} \mathbf{v} = 1$

- Uniform excitation: 0
- Phase delay: 7.45 dBi
- Hansen-Woodyard: 8.79 dBi
- Fundamental bound: 11.94 dBi

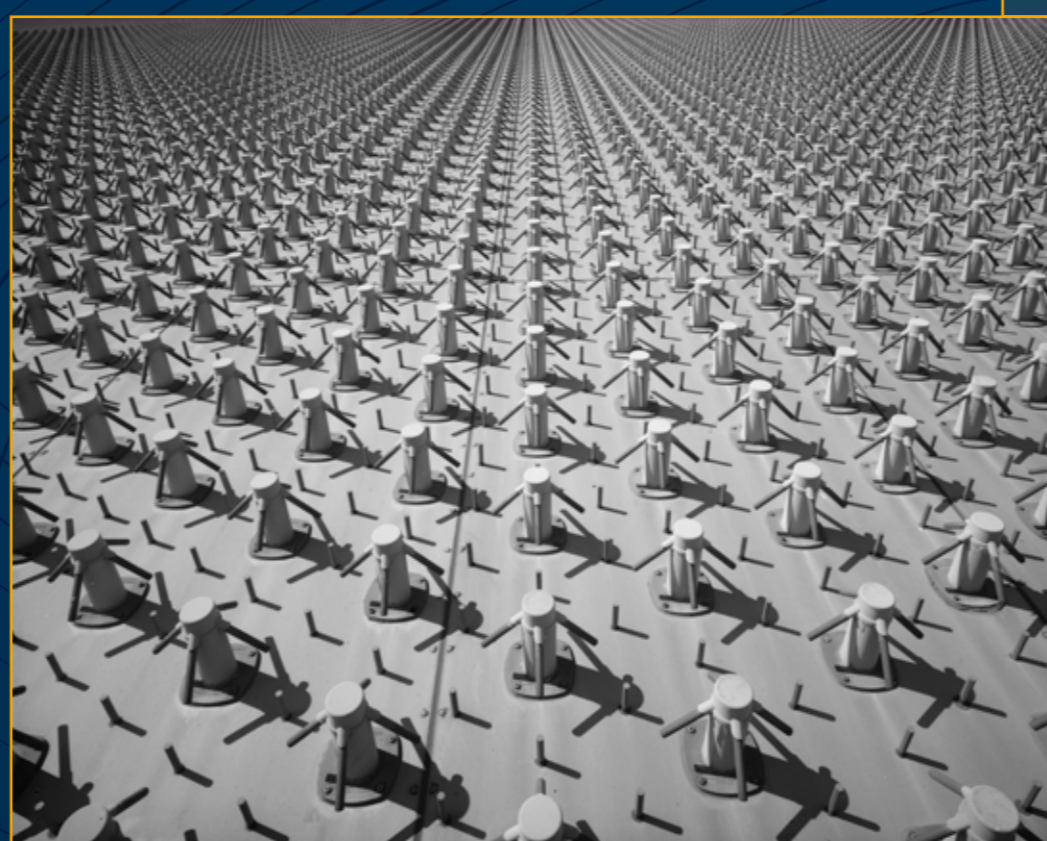


Challenge

- Try to maximize the antenna directivity!
- Dipoles are fed in the middle.
- Direction is $\theta = \pi/2, \varphi = 0$.



Interactive MATLAB antenna designer powered by AToM.



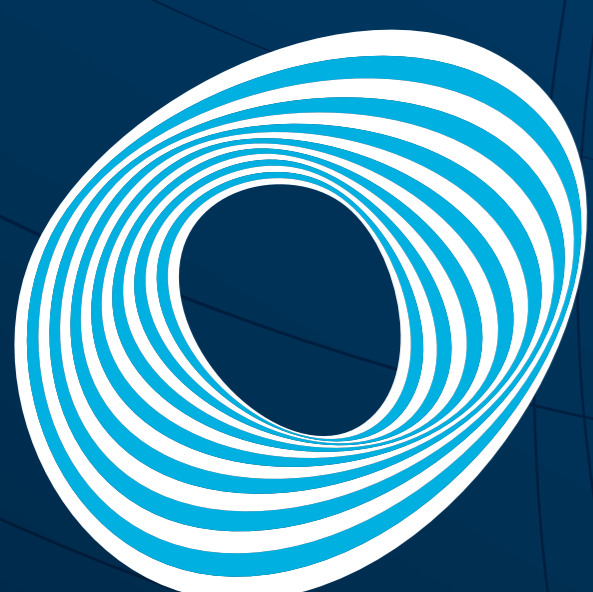
Did you know?

...arrays are often used as radar antennas. Some of them are pretty impressive. The US PAVE PAWS radar from the cold war contained 2677 crossed dipoles and reached gain of 38.6 dB with only 2.2° beam width.

More...

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| Other topics: EM theory, fundamental bounds, synthesis



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