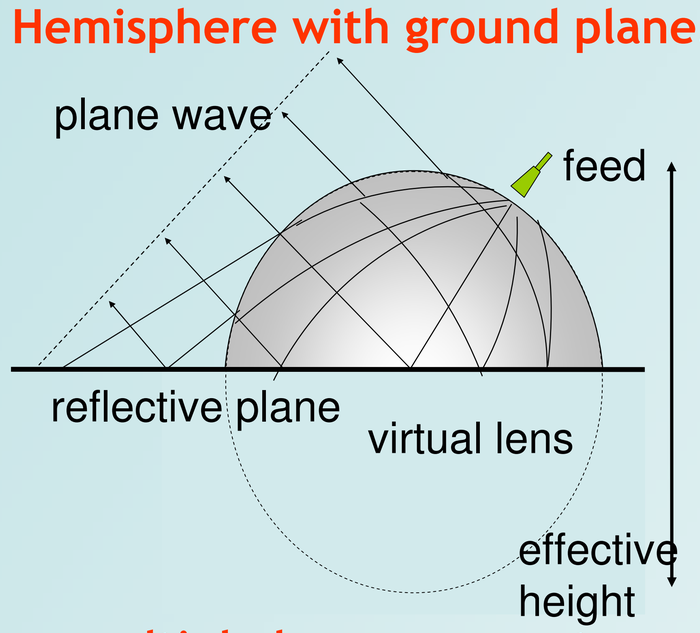
John Thornton University of York

Rationale:

- High frequency (20-30 GHz) strongly influences choice of technologies.
- Lens antenna offers multiple beams without scan loss.

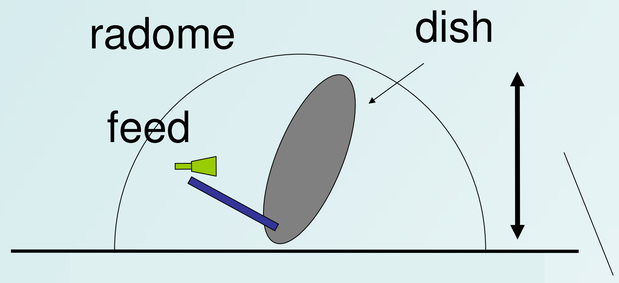
Space considerations

Hemisphere with ground plane.



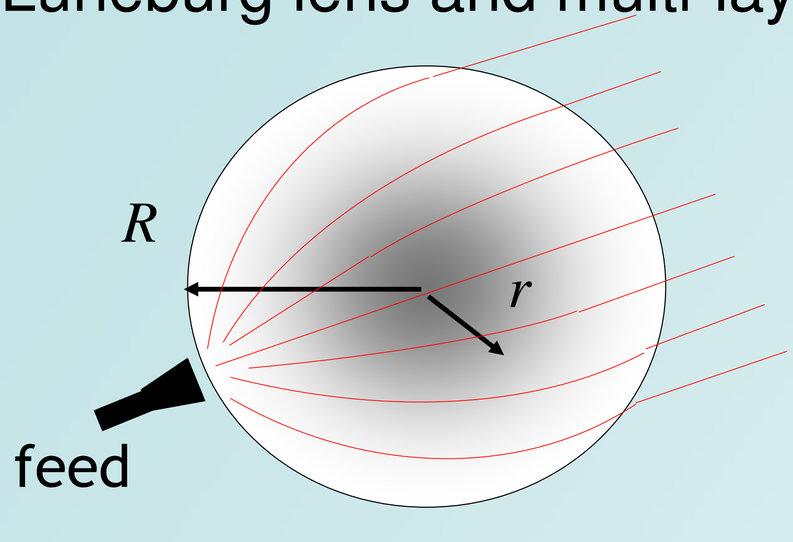
multiple beams per antenna

reflector antenna.

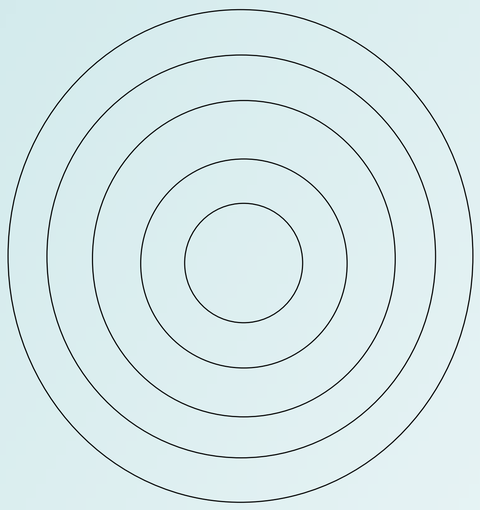


1 beam per antenna

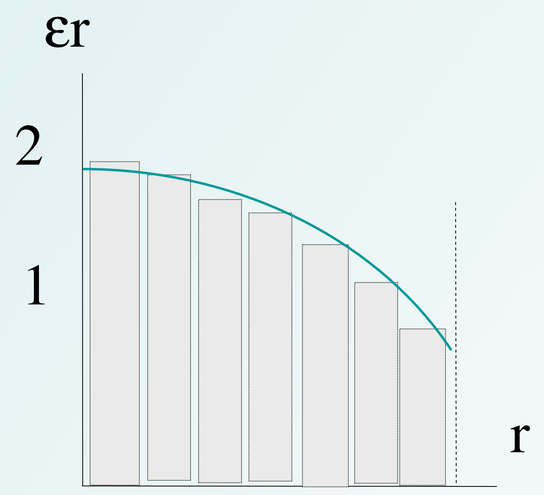
Luneburg lens and multi-layer approximation



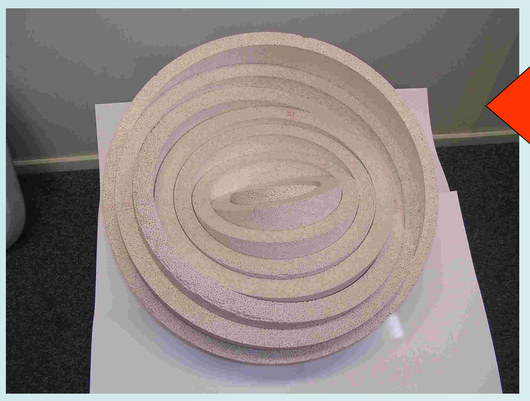
$$\varepsilon_r = 2 - \left(\frac{r}{R}\right)^2$$



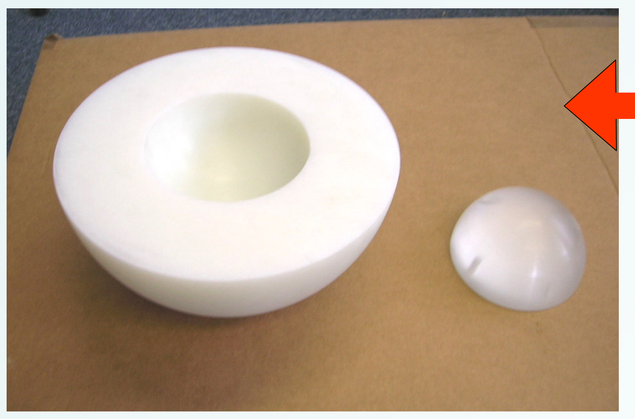
concentric shells as approximation



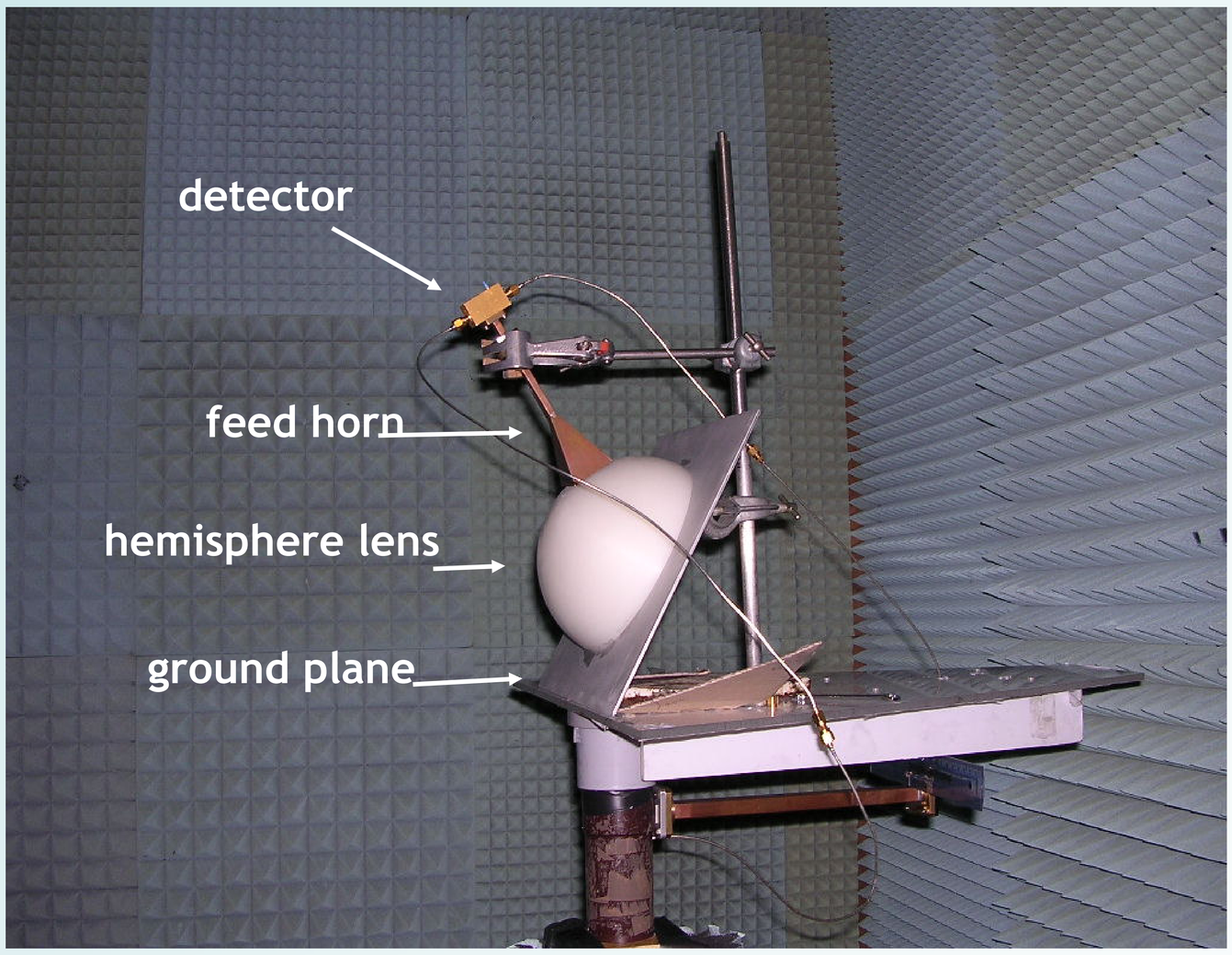
conventional wisdom is to use lots of layers ....*difficult to make* !



traditional quasi-Luneburg lens. (8 pieces)



two-layer lens developed at York



Key results:

- 35 dBi at 28 GHz
- 68% aperture efficiency
- reflector performance but with multi-beam capability
- 360º azimuth scan
- +/- 75º elevation scan