

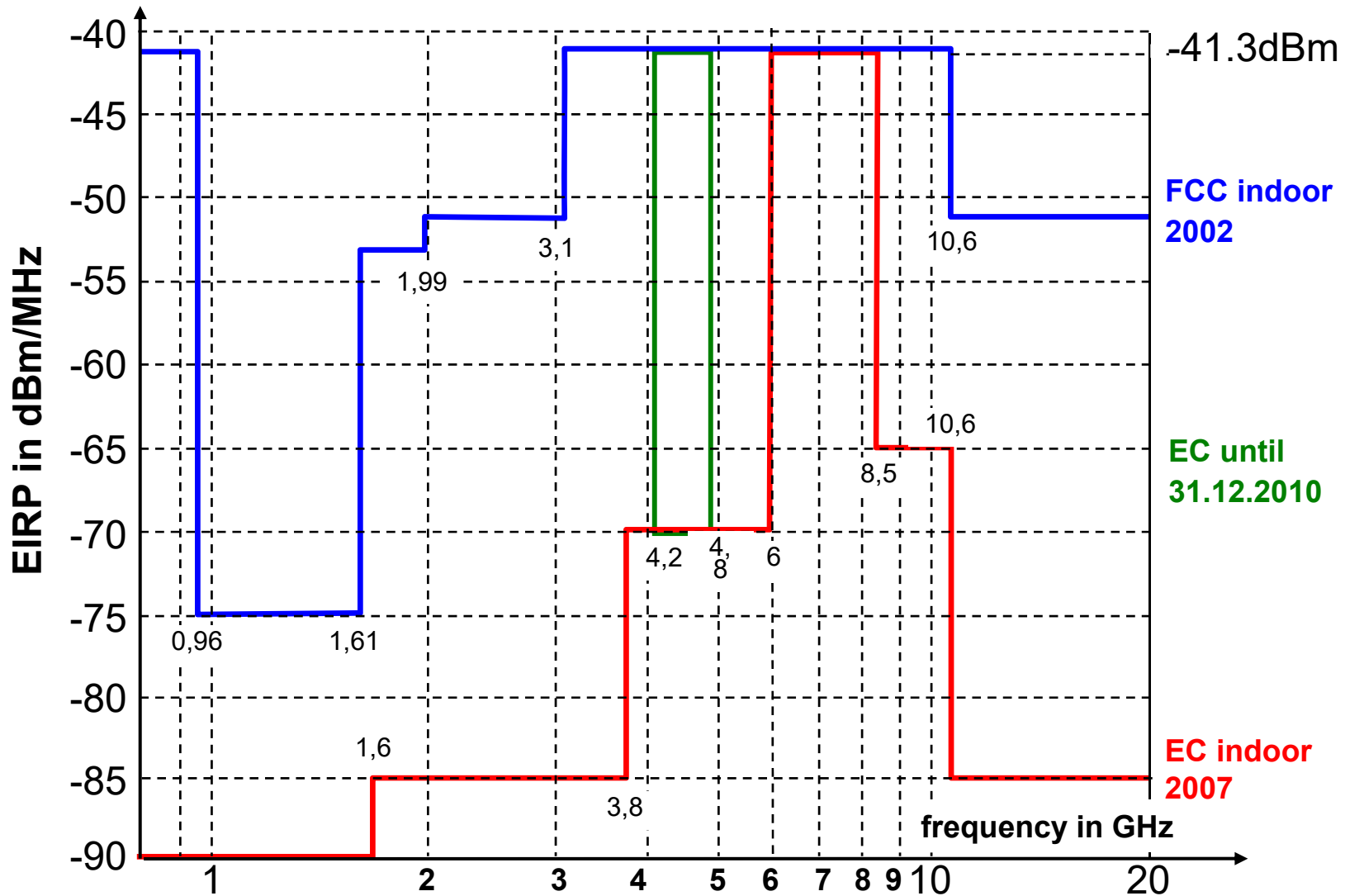
Breitbandantennen

Thomas Zwick

INSTITUT FÜR HOCHFREQUENZTECHNIK UND ELEKTRONIK



UWB Frequency Allocations in US and EU



- Relative band width $> 100\%$
- Absolute band width $> 500 \text{ MHz}$

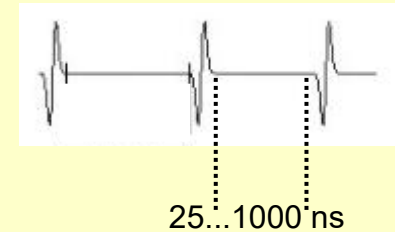
Communication:

- low spectral power density
- high data rates
- license free communication

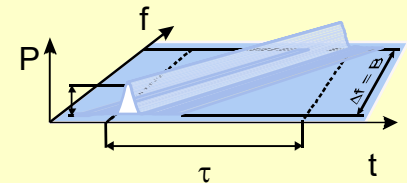
Radar:

- low probability of detection
- high resolution
- license free

Picoseconds pulses



UWB chirp signals



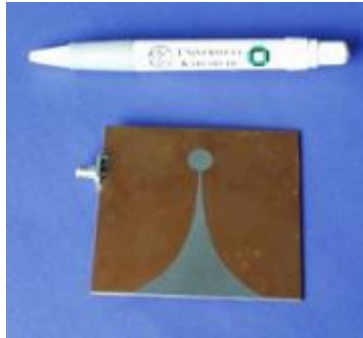
UWB in Karlsruhe by Heinrich Hertz in 1887



Übersicht Breitbandantennen



Hornantenne
dual polarisiert



Vivaldi
Antenne

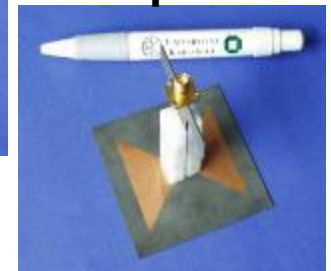


Spiral
Antenne

Log.-Per.-
Antenne



Breitband-
dipol



Breitband-Dipolantennen

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Bi-Conical Dipole Antenna

- Impedance depends on angle

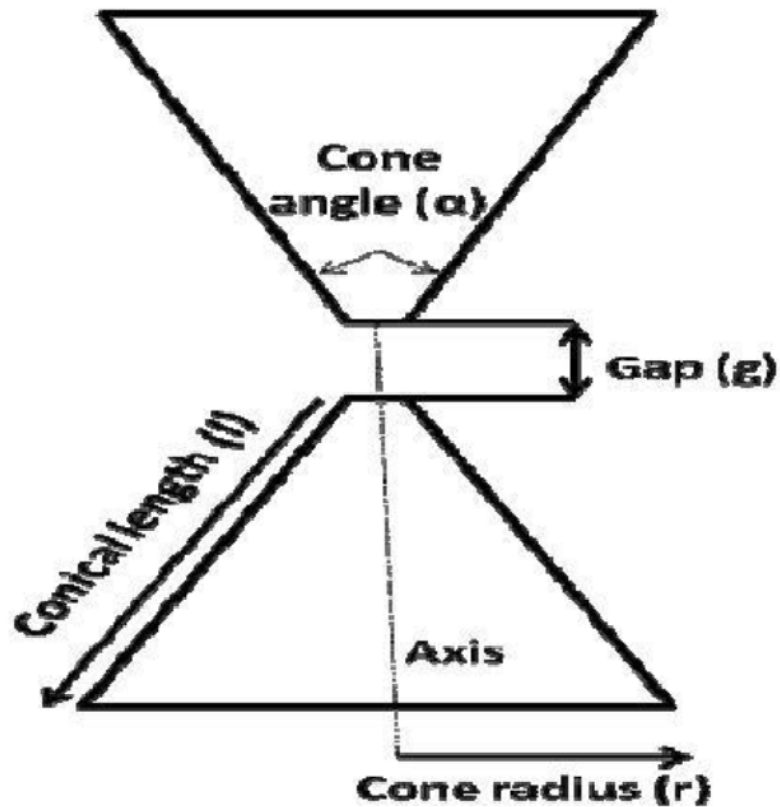
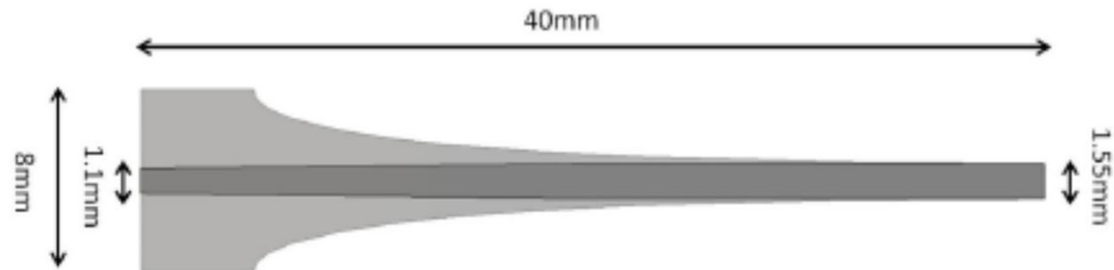


Image sources: www.aaronia.com, www.tmc-direkt.de, M.A.Khadar Baba, „Design and Testing of Biconical Antenna“, International Journal of Recent Trends in Engineering & Research , 2017

Breitband-Dipolantennen planar

■ Bowtie-Antenne

■ Balun für Speisung

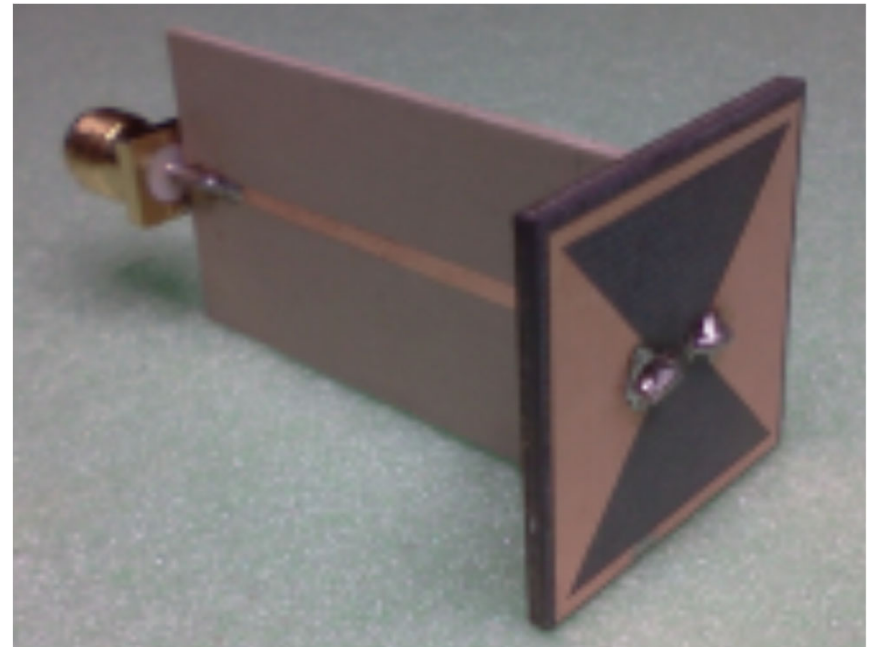


■ Breitband-Dipol

■ Medizinische Anwendung

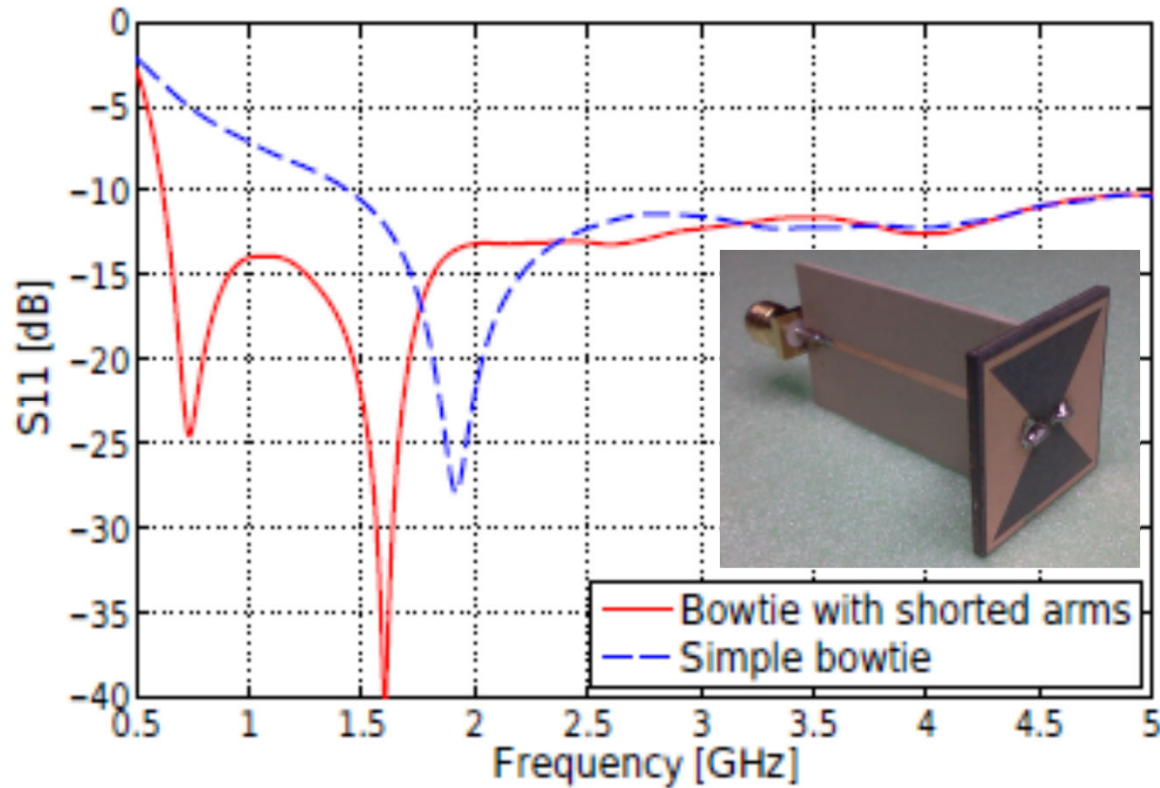
■ Antenne in Wasser-Ethanol-Lösung ($\epsilon_r = 42$ @1 GHz)

■ Kurzschluss der Arme verbessert Bandbreite



M. Jalilvand: Application-Specific Broadband Antennas for Microwave Medical Imaging, Dissertation, Karlsruhe 2016.

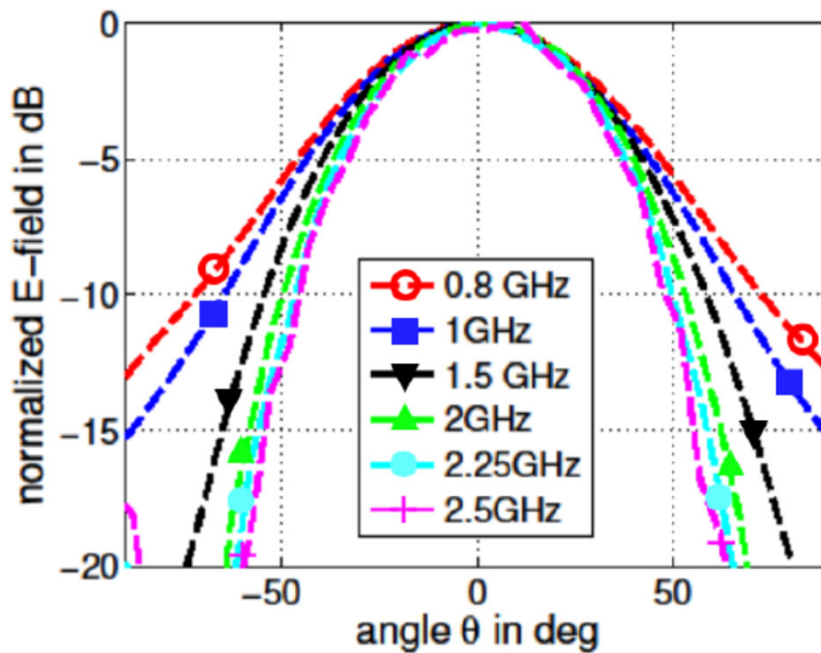
■ Kurzschluss vergrößert Bandbreite



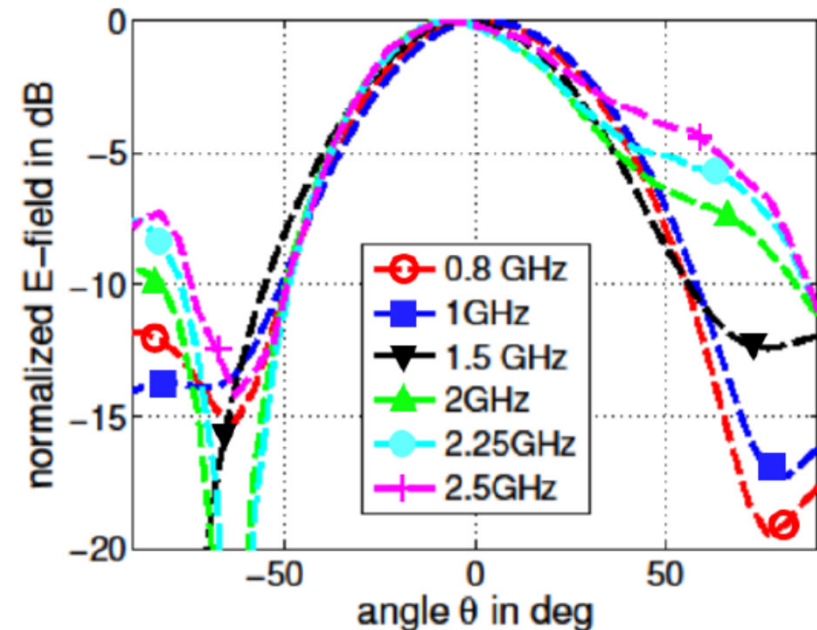
M. Jalilvand: Application-Specific Broadband Antennas for Microwave Medical Imaging, Dissertation, Karlsruhe 2016.

Patternmessung der Bowtie-Antenne

■ Bowtie-Antenne



horizontal



vertikal

M. Jalilvand: Application-Specific Broadband Antennas for Microwave Medical Imaging, Dissertation, Karlsruhe 2016.

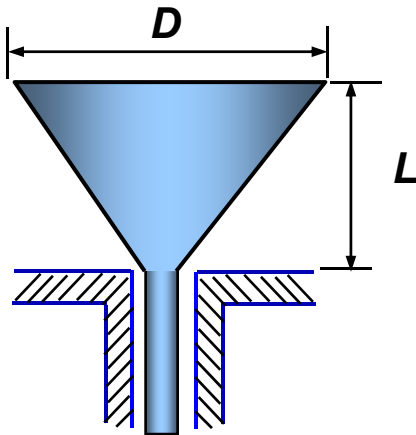
Breitband-Monopolantennen

by Thomas Zwick

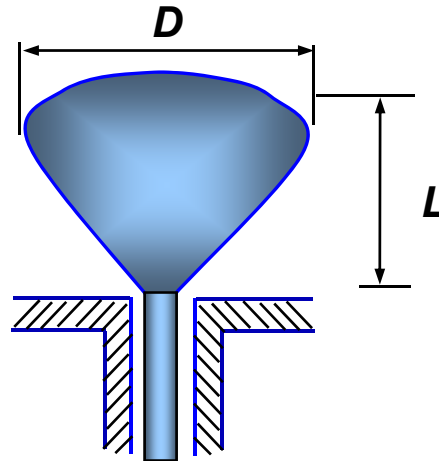
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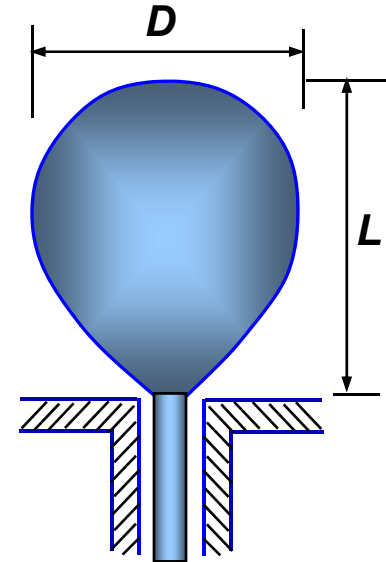
Breitband-Monopol-Antennen



Kegel

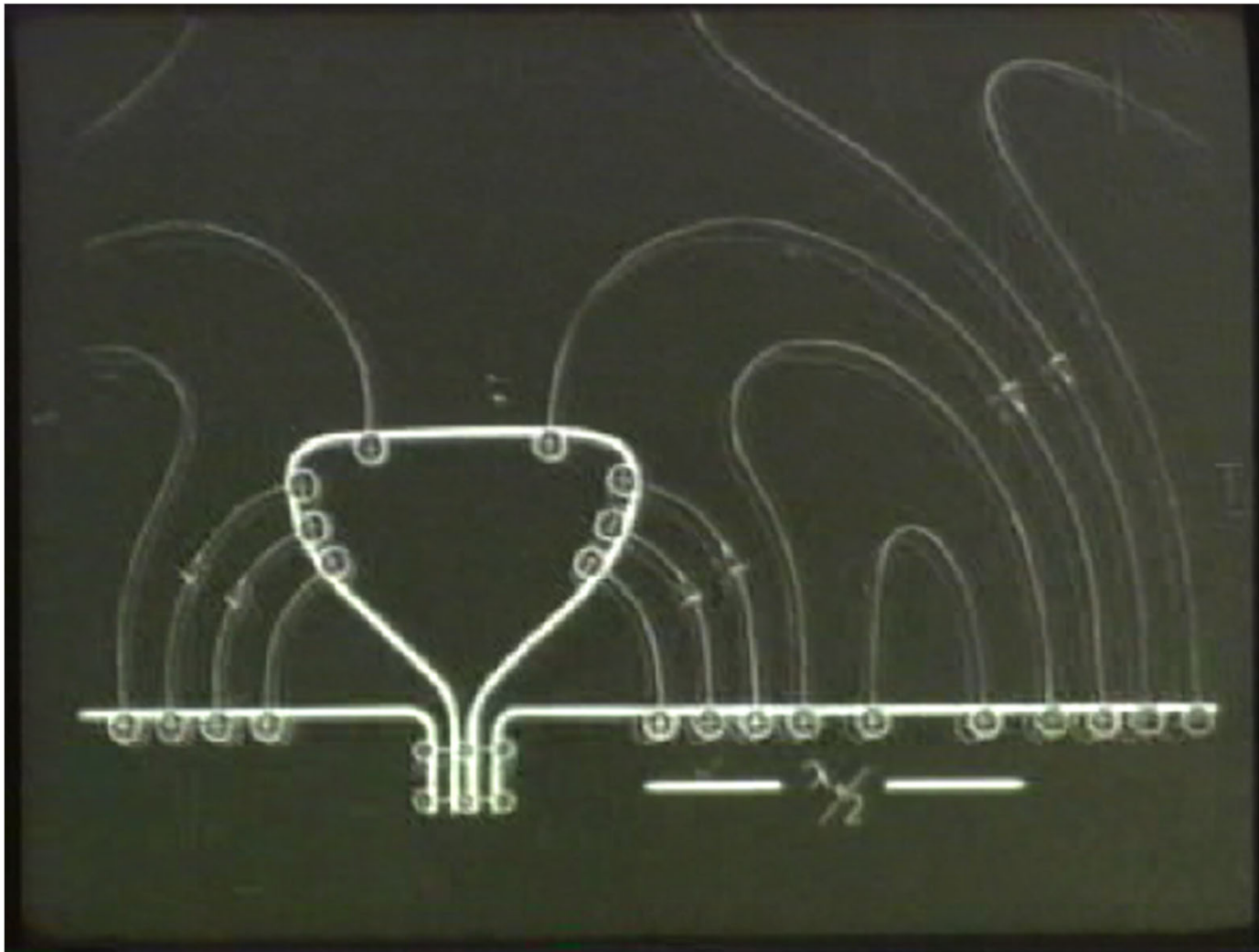


Kegel mit Ellipsoid



Kegel mit Kugel

Breitband- Monopol-Antenne, Wellenablösung



Selbst Komplementäre Antennen

by Thomas Zwick

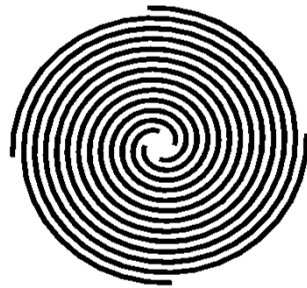
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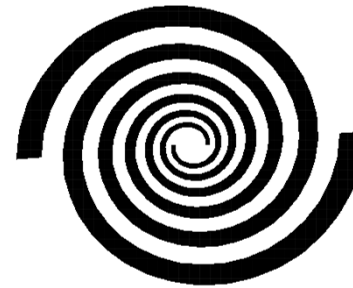
Selbst-Komplementäre Antennen



2-Arm
Archimedische Spiralantennen



4-Arm



2-Arm
Logarithmische Spiralantennen



4-Arm



Aus Dualitätsprinzip:

$$R_S^S \cdot R_S^D = \frac{Z_{F0}^2}{4}$$



$$R_{in} \approx 188\Omega$$