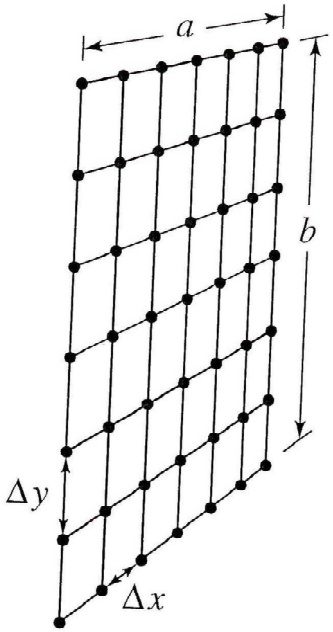
Misure a microonde

Antenne

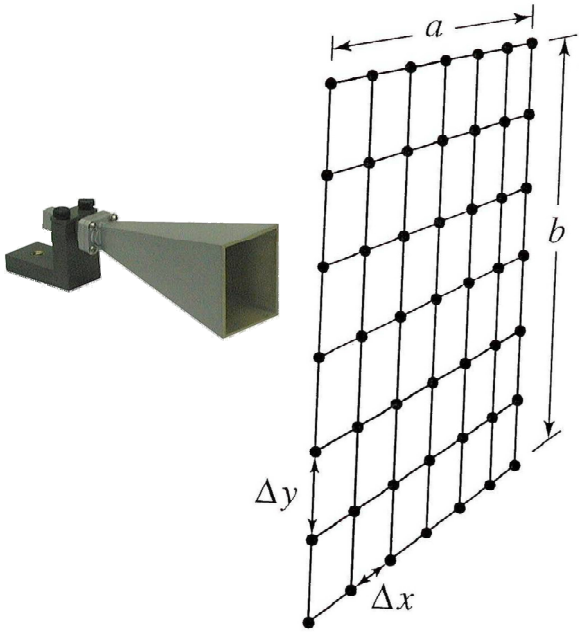
MISURE IN CAMPO VICINO

Misure in campo vicino

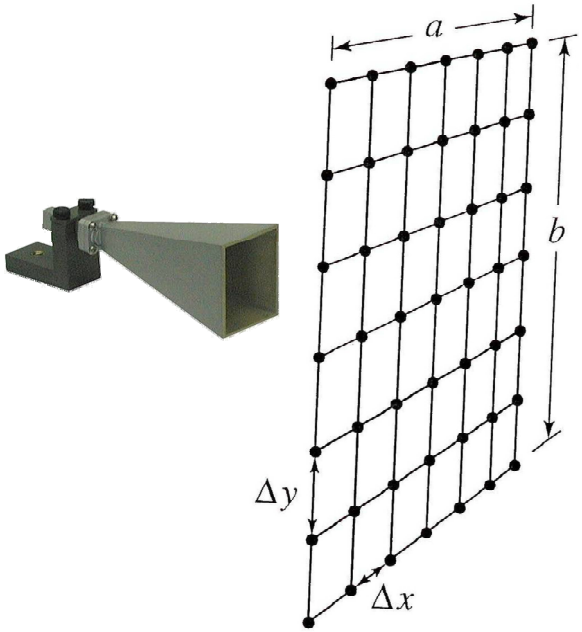
Università di Pavia

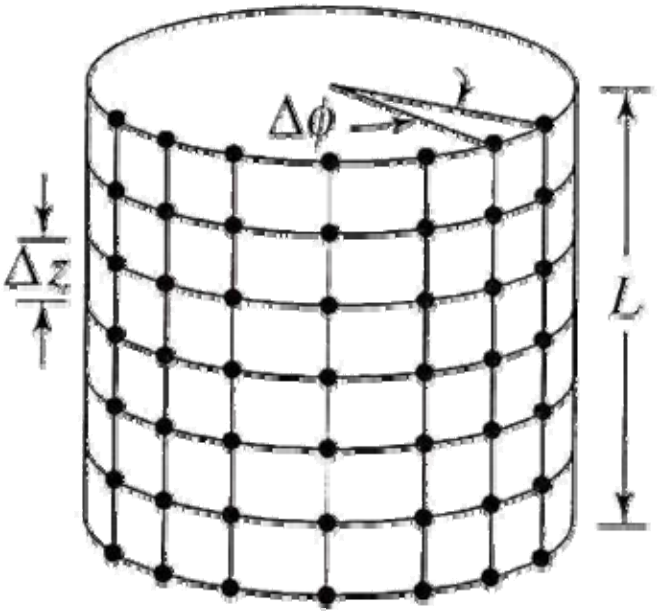


Misure in campo vicino

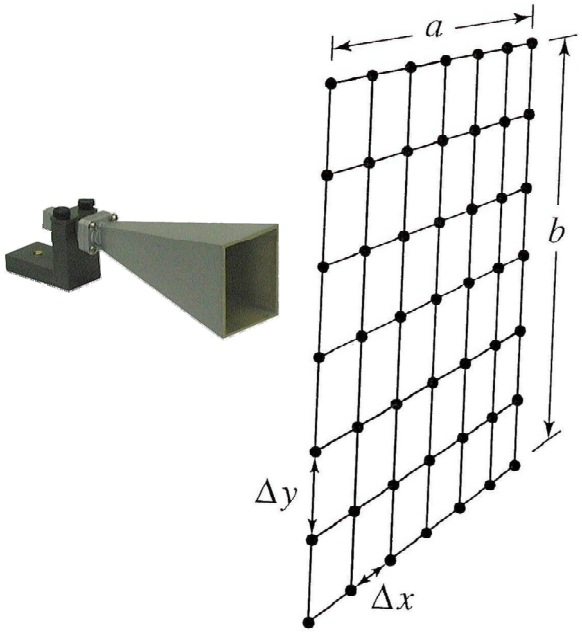


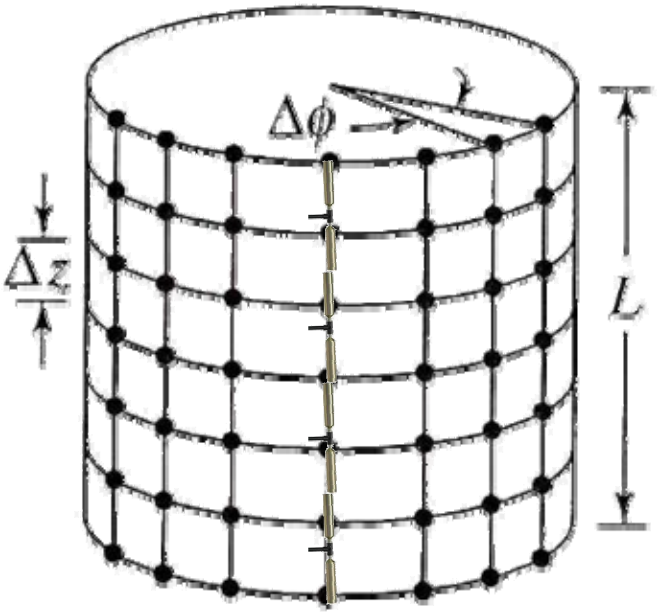
Misure in campo vicino



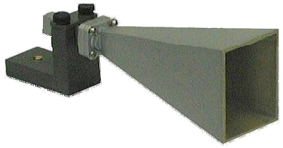


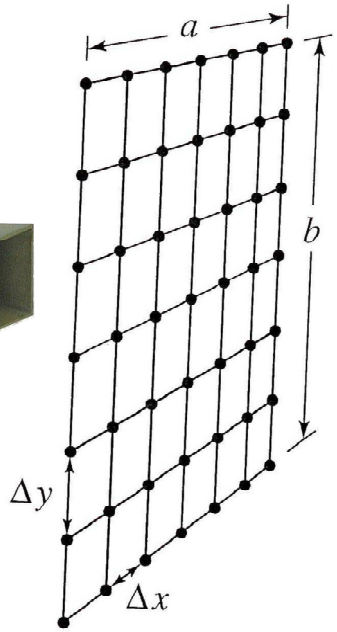
Misure in campo vicino

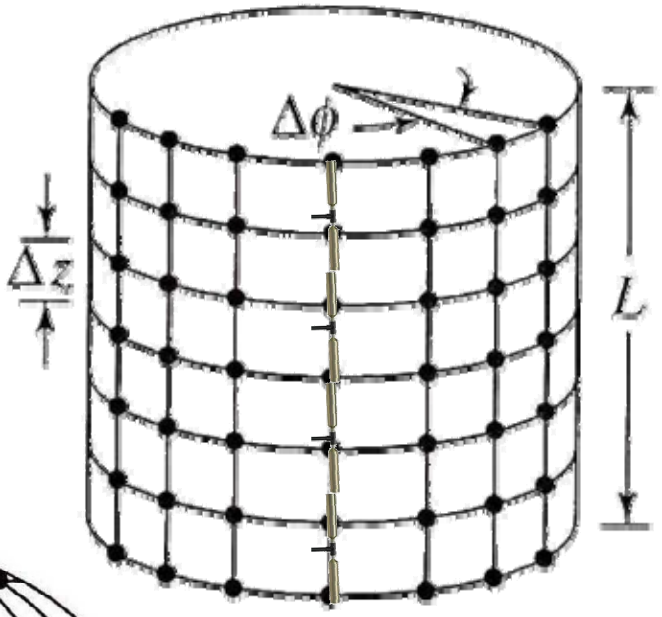


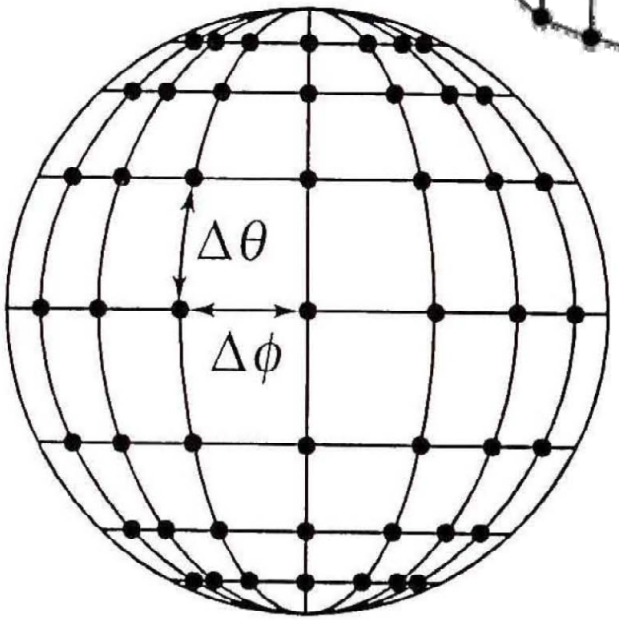


Misure in campo vicino

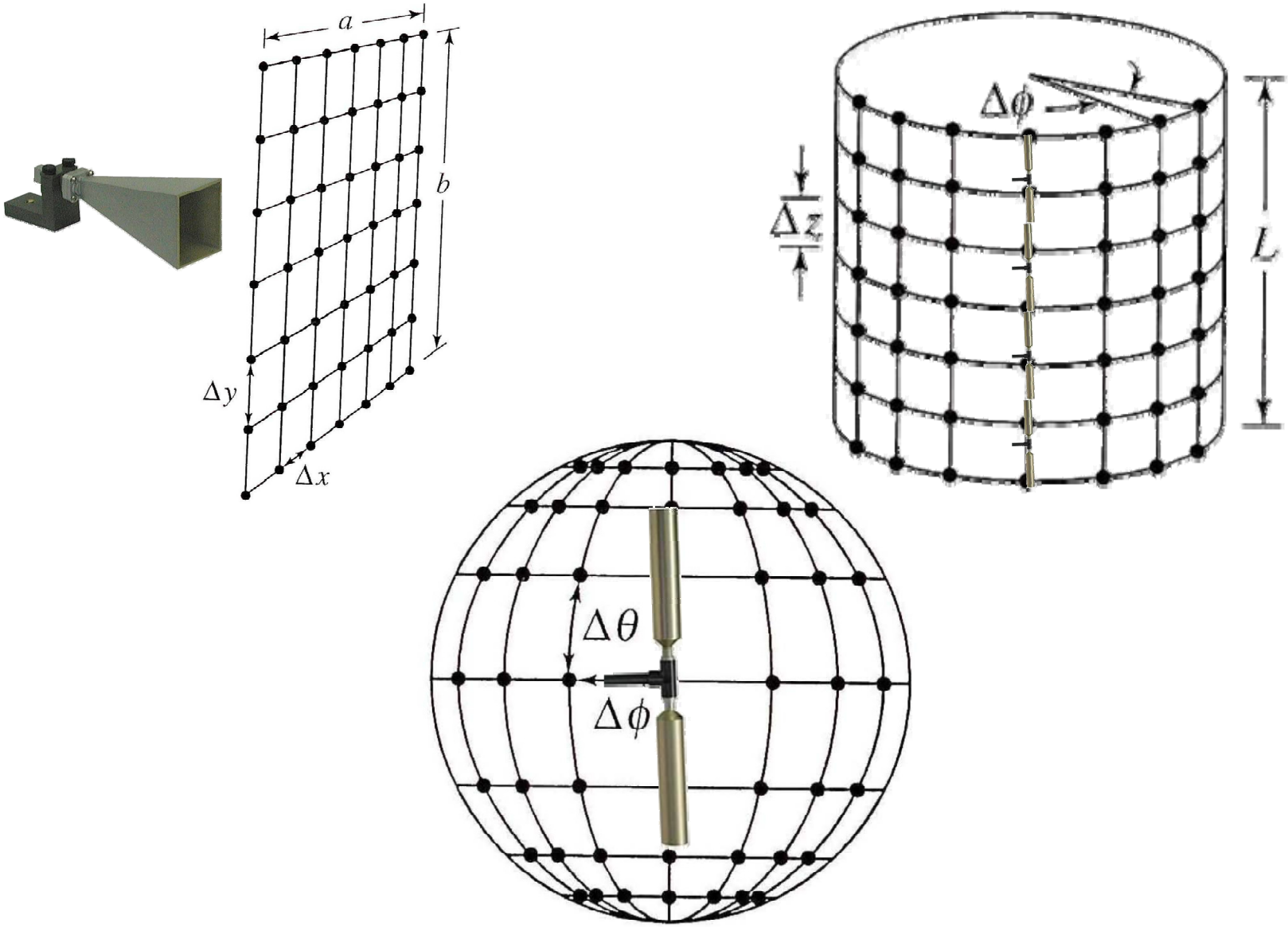




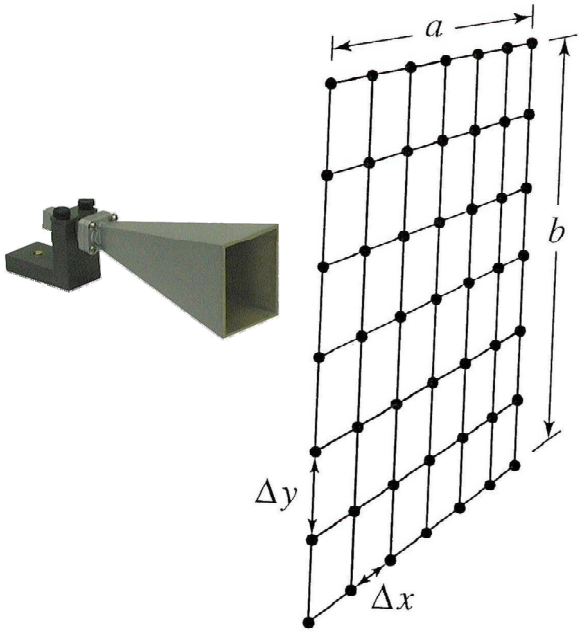




Misure in campo vicino



Misure in campo vicino



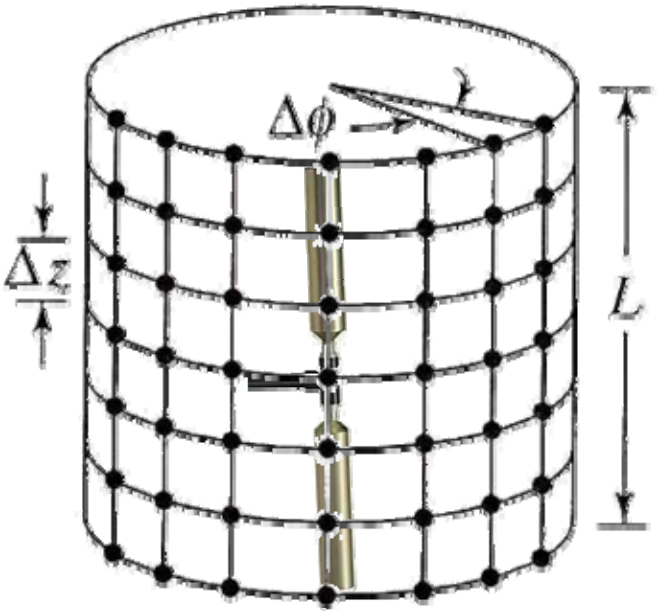
$$\Delta x < \frac{\lambda}{2}$$

$$\Delta y < \frac{\lambda}{2}$$

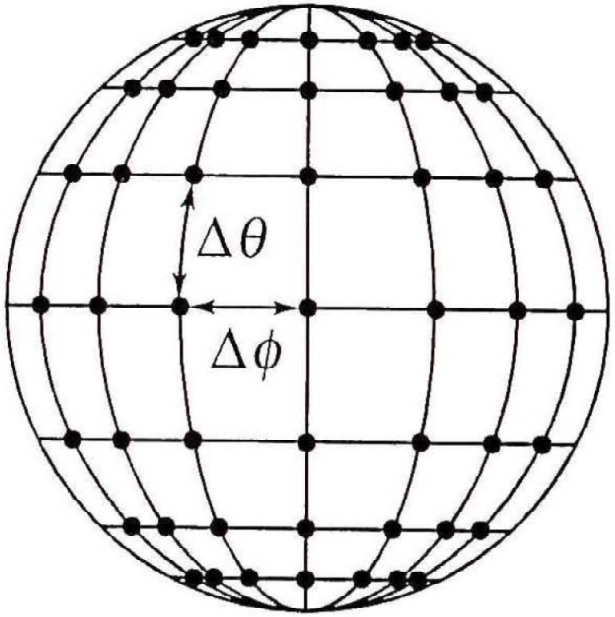
Misure in campo vicino

$$\Delta\phi < \frac{\lambda}{2(a+\lambda)}$$

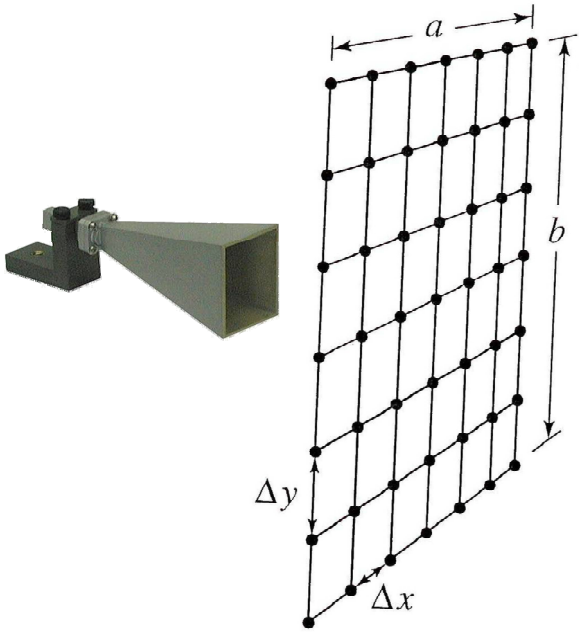
$$\Delta z < \frac{\lambda}{2}$$



$$\Delta\phi < \frac{\lambda}{2(a+\lambda)}; \Delta\theta < \frac{\lambda}{2(a+\lambda)}$$



Misure in campo vicino

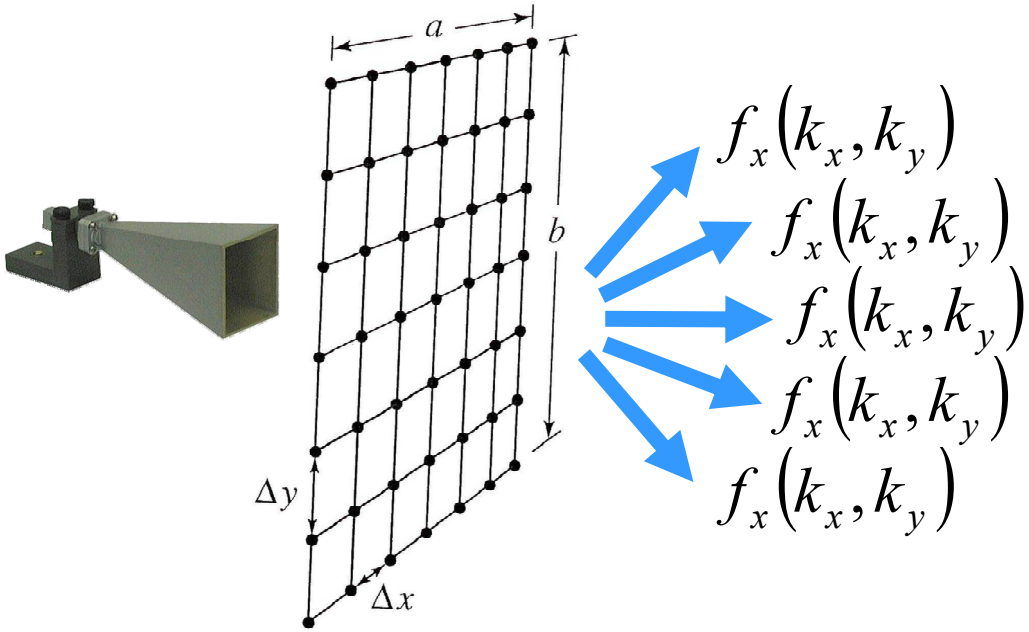


$$\overline{E}(x,y,z)$$

$$\overline{E}(x,y,z=0)$$

$$E_x(x,y,z=0); E_y(x,y,z=0)$$

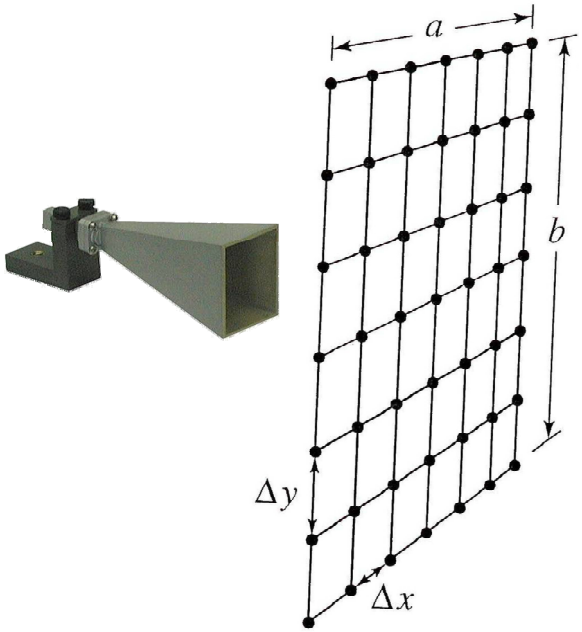
Misure in campo vicino



$$f_x(k_x,k_y) \approx \int_{-b/2}^{b/2}\int_{-a/2}^{a/2} E_x(x,y,z=0)e^{j(k_x x+k_y y)}dxdy$$

$$\overline{E}_{ff}(r,\theta,\phi) \approx j\frac{ke^{-jkr}}{2\pi r}\left(\cos\theta\,\overline{f}(k_x,k_y)\right)$$

Misure in campo vicino



$$M = \frac{a}{\Delta x} + 1$$

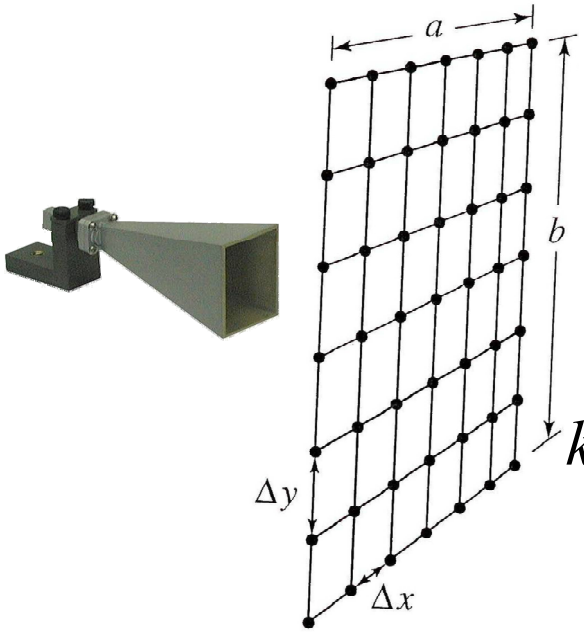
2^n ~ -30 dB

$$\Delta x = \frac{\pi}{k_x^{\max}} \qquad k_x = \frac{2\pi}{a} m$$

zero-padding

$$k_x^2 + k_y^2 \le k^2$$

Misure in campo vicino



Horn a 10 GHz

$$k = \frac{2\pi}{\lambda} \approx 210 \quad \left[m^{-1}\right]$$

$$k_x = k \sin\theta \cos\varphi \rightarrow k_x^{\max} = k \sin 30° \approx 105 \quad \left[m^{-1}\right]$$

$$\Delta x \approx 3 \quad [cm]$$

$$M = \frac{a}{\Delta x} + 1$$

$$\Delta\theta = 0.5° \rightarrow \Delta k_x = 1.8 \quad \left[m^{-1}\right] \rightarrow a \approx 3.5 \quad [m]$$

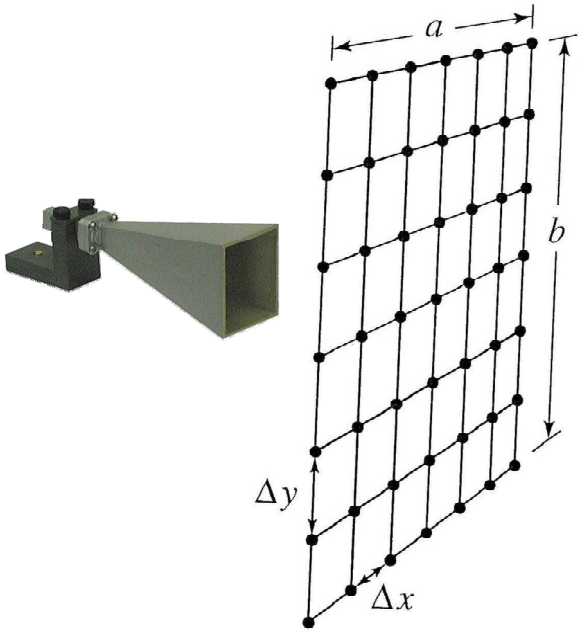
$$\Delta x = \frac{\pi}{k_x^{\max}}$$

$$a \approx 2 \quad [m]$$

$$k_x = \frac{2\pi}{a} m$$

$$M = \frac{a}{\Delta x} + 1 \approx 67 \rightarrow M = 64$$

Misure in campo vicino



Horn a 10 GHz

$$M = 64 \rightarrow MxN = 4096$$

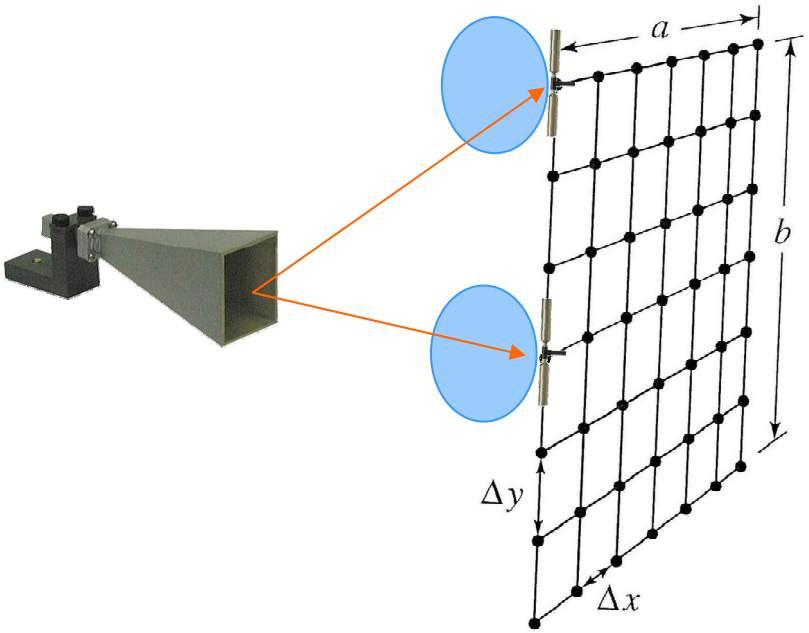
$$T \approx 5 \cdot 4096 \approx 6 \quad [h]$$

$$M = \frac{a}{\Delta x} + 1$$

$$\Delta x = \frac{\pi}{k_x^{\max}}$$

$$k_x = \frac{2\pi}{a} m$$

Misure in campo vicino



MISURE IN CAMPO LONTANO

Misure in campo lontano

Dimensione camera anecoica

Attenuazione

Antenna probe

$$f_{\min} < f < f_{\max}$$

Strumentazione

Riflettività materiale assorbente

Riflettività materiale assorbente

Misure in campo lontano

Università di Pavia

Dimensione camera anecoica

Attenuazione

Antenna probe

$$f_{\min} < f < f_{\max}$$

Strumentazione

Riflettività materiale assorbente

Riflettività materiale assorbente

4x3x3 m, piccole sorgenti: r >> λ, 750 MHz

4x3x3 m, grandi sorgenti: r >> $2D^2/\lambda$, D=10λ, 15 GHz

Misure in campo lontano

Dimensione camera anecoica

Attenuazione

Antenna probe

$$f_{\min} < f < f_{\max}$$

Strumentazione

Riflettività materiale assorbente

Riflettività materiale assorbente

antenna horn in band X: 7 GHz

Misure in campo lontano

Dimensione camera anecoica

Attenuazione

Antenna probe

$$f_{\min} < f < f_{\max}$$

Strumentazione

Riflettività materiale assorbente

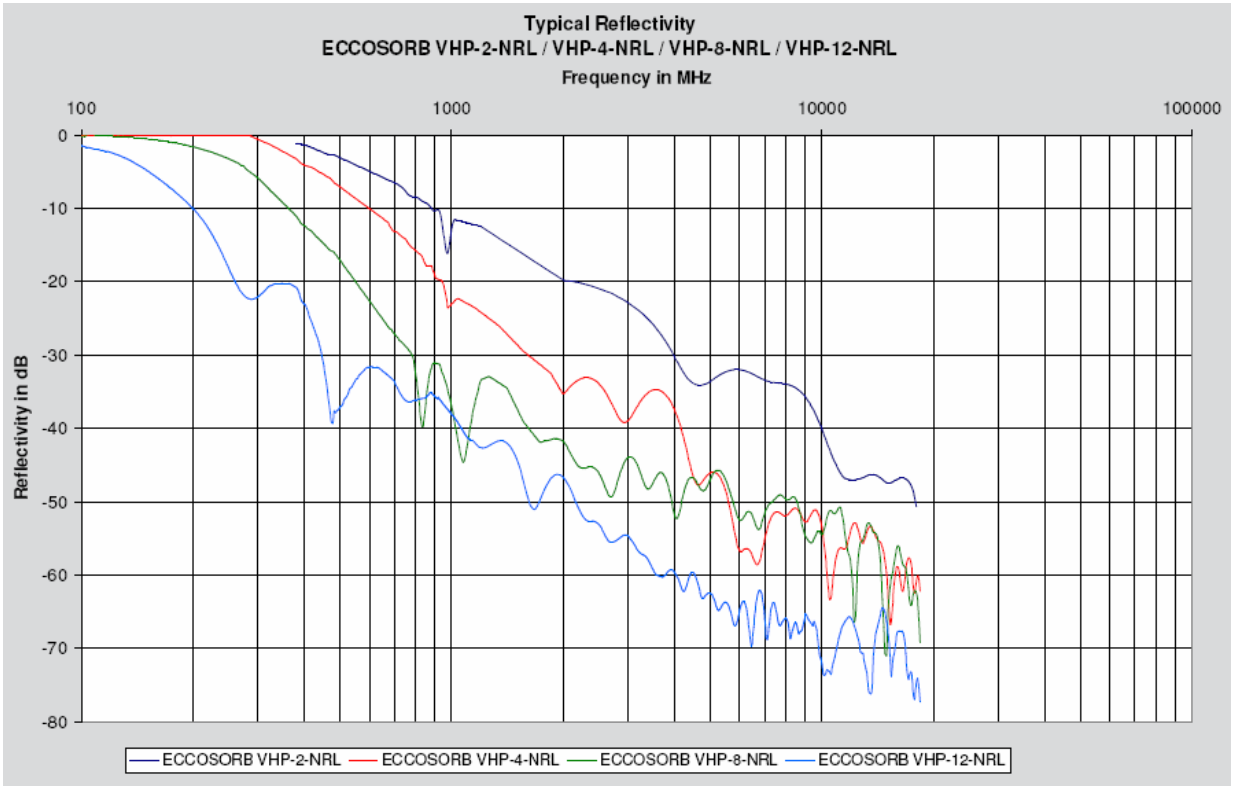
Riflettività materiale assorbente

ECCOSORB VHP-NRL: 3-4 GHz

Misure in campo lontano

Università di Pavia

GUARANTEED MAXIMUM REFLECTIVITY OF ECCOSORB® VHP GRADES										
	120 MHz	200 MHz	300 MHz	500 MHz	1 GHz	3 GHz	5 GHz	10 GHz	15 GHz	24 GHz
VHP-2-NRL							-30	-40	-45	-50
VHP-4-NRL						-30	-40	-45	-50	-50
VHP-8-NRL					-30	-40	-50	-50	-50	-50



Misure in campo lontano

Università di Pavia

Dimensione camera anecoica

Attenuazione

Antenna probe

$$f_{\min} < f < f_{\max}$$

Strumentazione

Riflettività materiale assorbente

Riflettività materiale assorbente

r = 4m, f=50 GHz, spazio libero: -80 dB

Misure in campo lontano

Dimensione camera anecoica

Attenuazione

Antenna probe

$$f_{\min} < f < f_{\max}$$

Strumentazione

Riflettività materiale assorbente

Riflettività materiale assorbente

cablaggi: 40 GHz, VNA: 40 GHz, connettori: 25 GHz

Misure in campo lontano

Dimensione camera anecoica

Attenuazione

Antenna probe

$$f_{\min} < f < f_{\max}$$

Strumentazione

Riflettività materiale assorbente

Riflettività materiale assorbente

ECCOSORB VHP-NRL: 100 GHz (?)

Misure in campo lontano

Dimensione camera anecoica

Attenuazione

Antenna probe

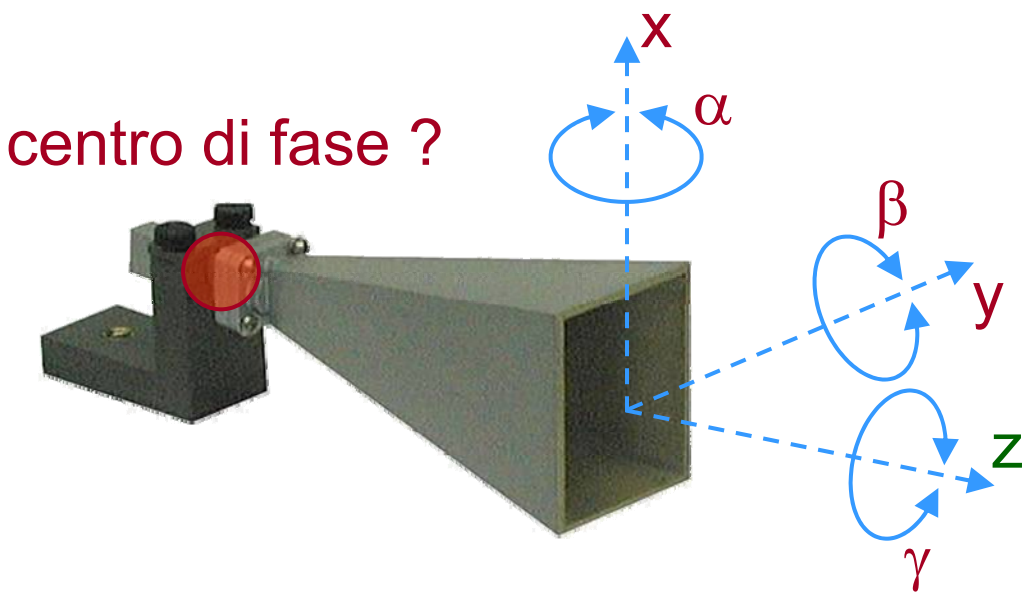
$$3\,\mathrm{GHz} < f < 25\,\mathrm{GHz}$$

Strumentazione

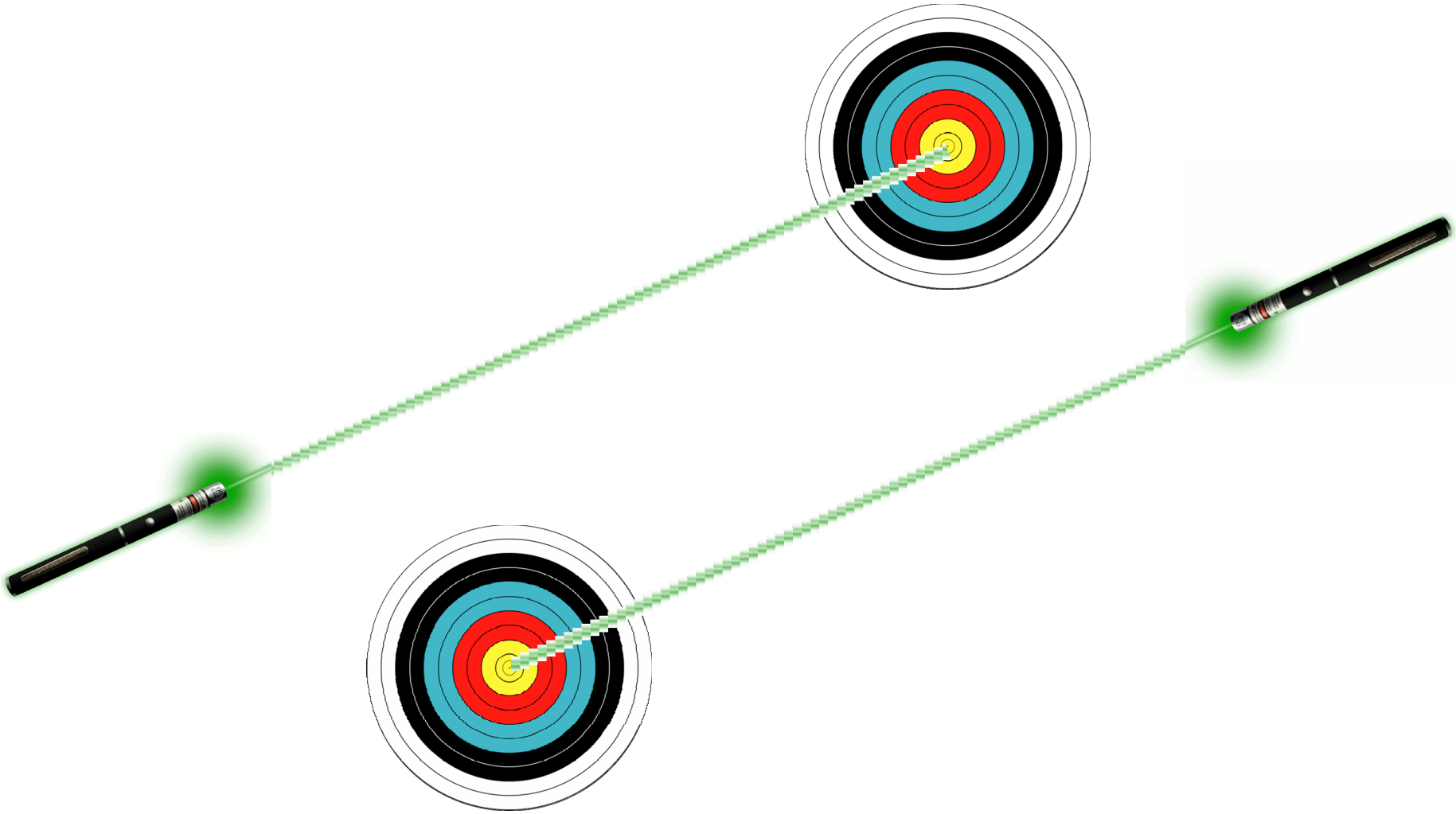
Riflettività materiale assorbente

Riflettività materiale assorbente

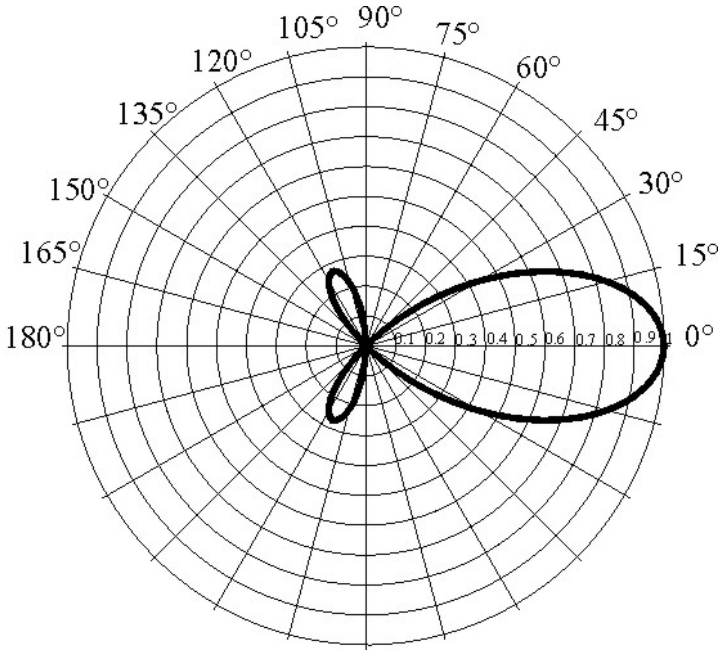
Allineamento



Allineamento



Allineamento



Misure in campo lontano

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