

# アンテナ近傍界測定法(5Gでは、アンテナ3次元放射パターン測定が必要)

IEEE Std. 1720-2012

IEEE Recommended Practice for Near-Field Antenna Measurements

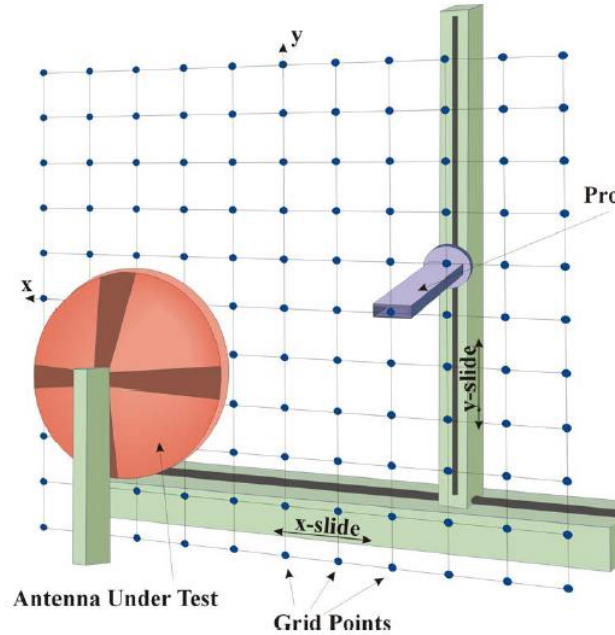


Figure 1—Illustration of rectangular PNF scanning

## 平面走査近傍界測定法

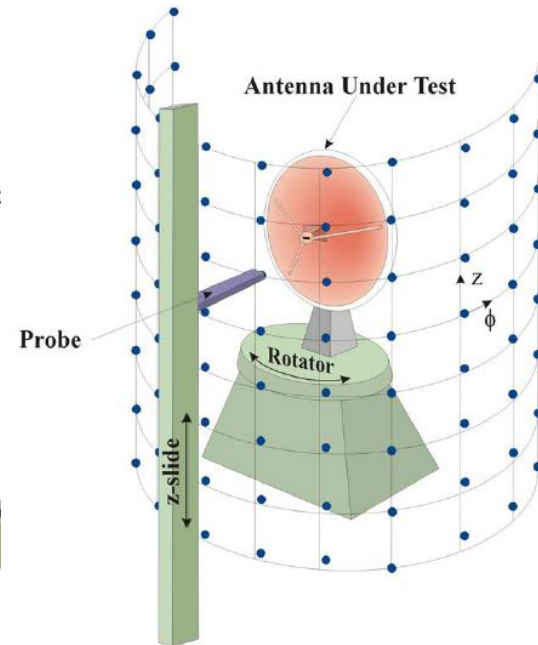


Figure 2—Illustration of CNF scanning configuration

## 円筒走査近傍界測定法

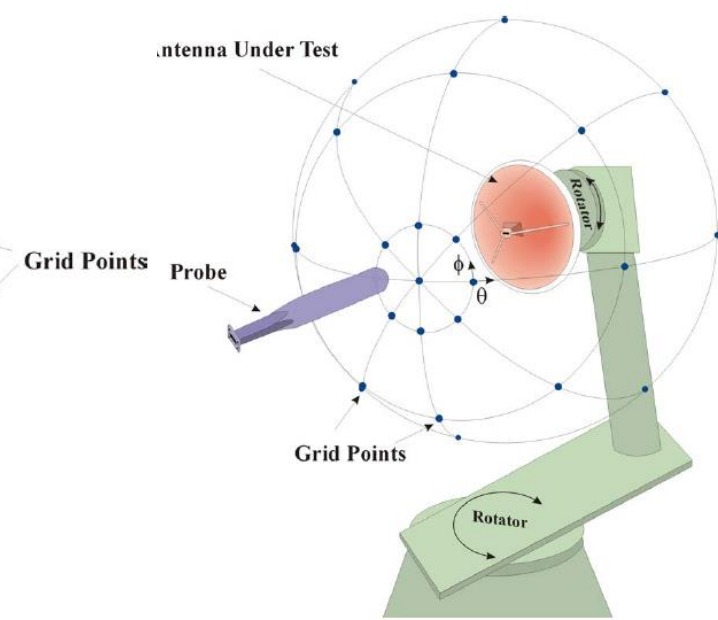


Figure 3—Illustration of the roll-over-azimuth SNF scanning configuration

## 球面走査近傍界測定法

### 利点:

- コンパクト
- 被測定アンテナとプローブ間距離は5波長程度必要

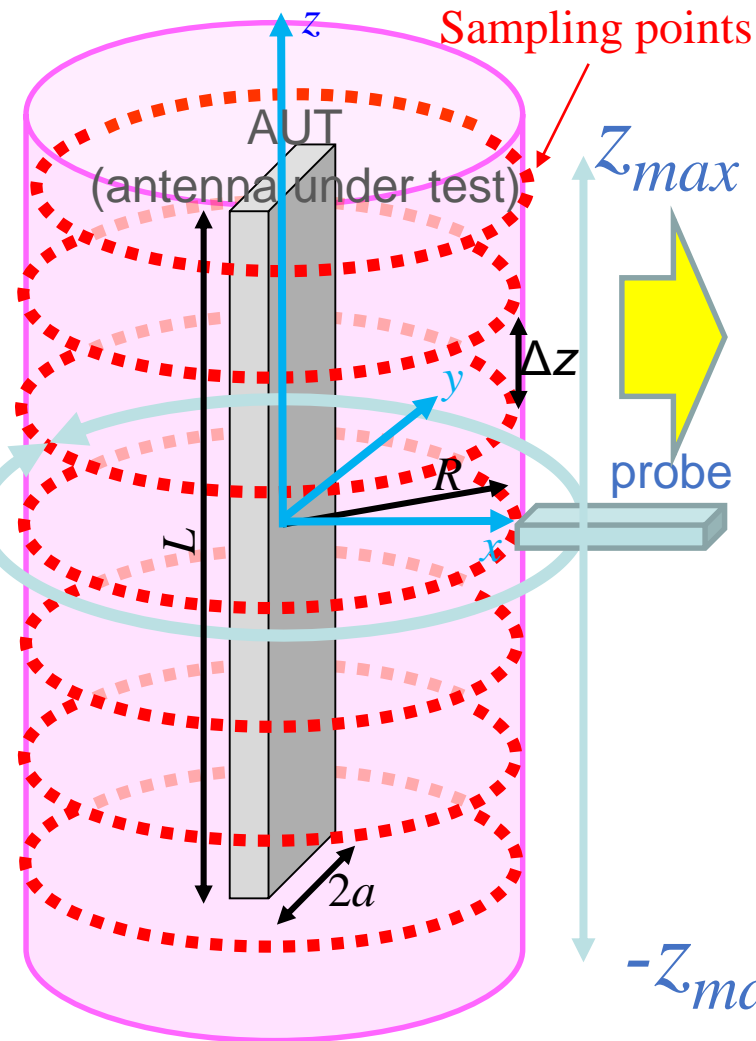
### 欠点:

- 低周波数に不向き
- 高周波数(ミリ波)では、アンテナよりミキサのサイズが大きく、その影響排除が困難
- 低周波数ほどプローブアンテナサイズ大
- プローブアンテナが狭帯域

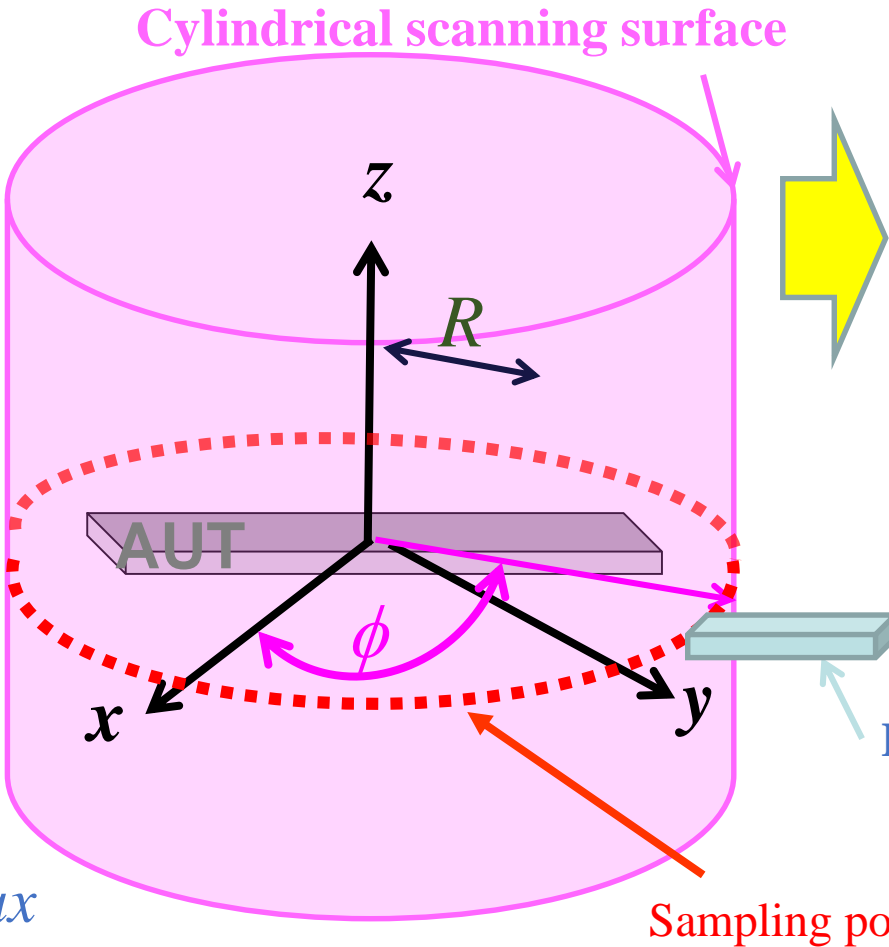
光電界プローブでアンテナ極近傍界測定を実現

# Single-cut near field to far field transformation(NF-FF)

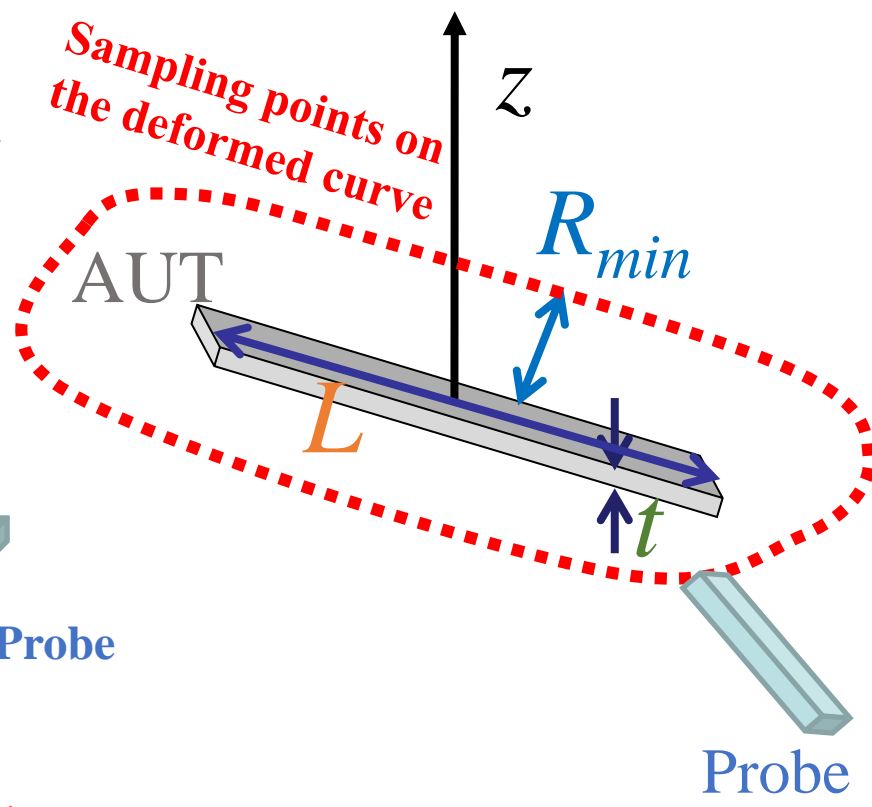
Conventional NF-FF method



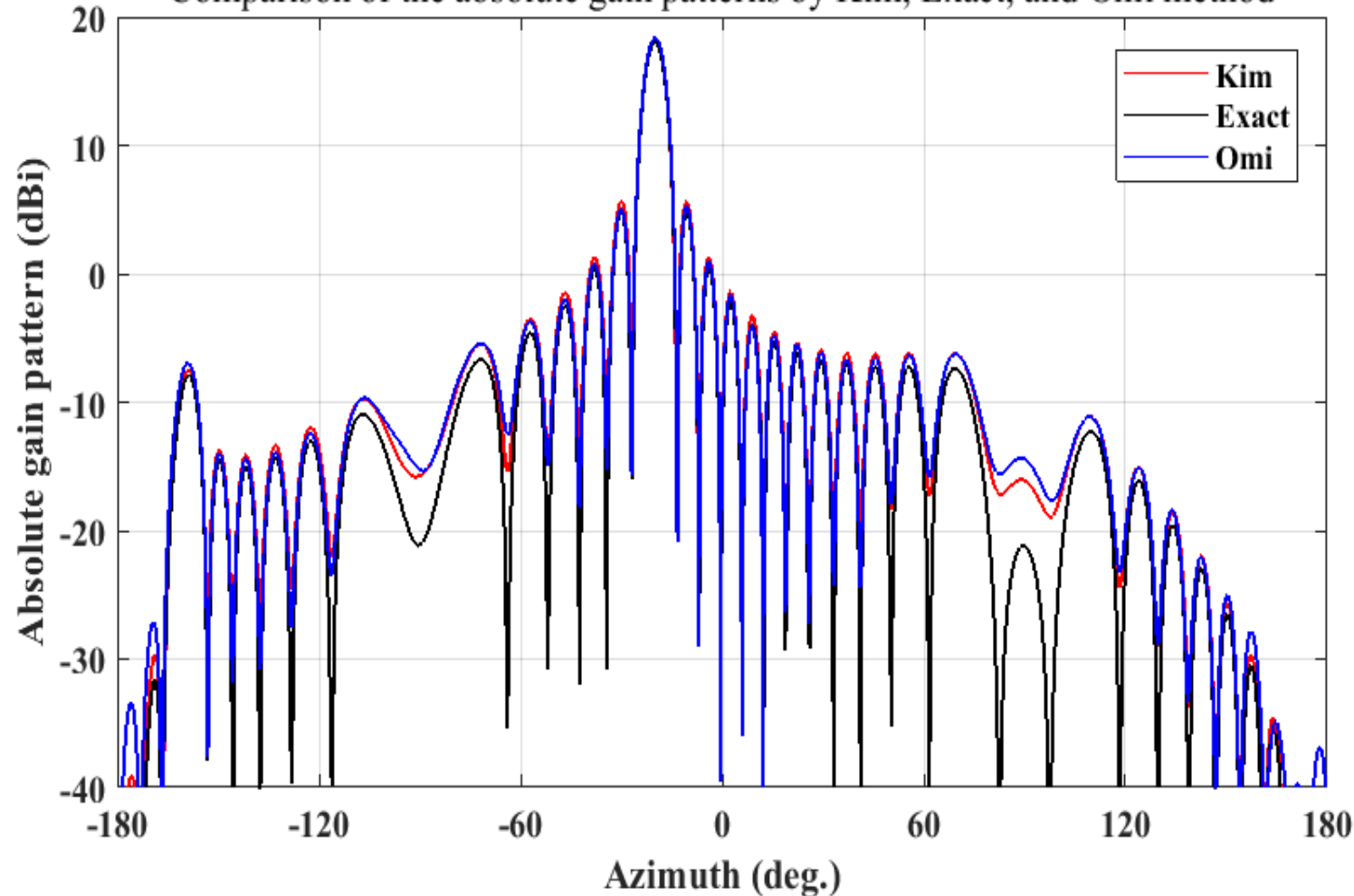
Single cut NF-FF method  
 ⇒ It can reduce measurement time.  
 This method proposed by Dr. J. H. Kim,  
 Prof. Sierra and Dr. S. Omi



New single cut NF-FF method that can  
 use sampling points on the deformed  
 curve.  
 ⇒ It can reduce measurement space  
 and time.  
 This method proposed by Dr. S. Omi

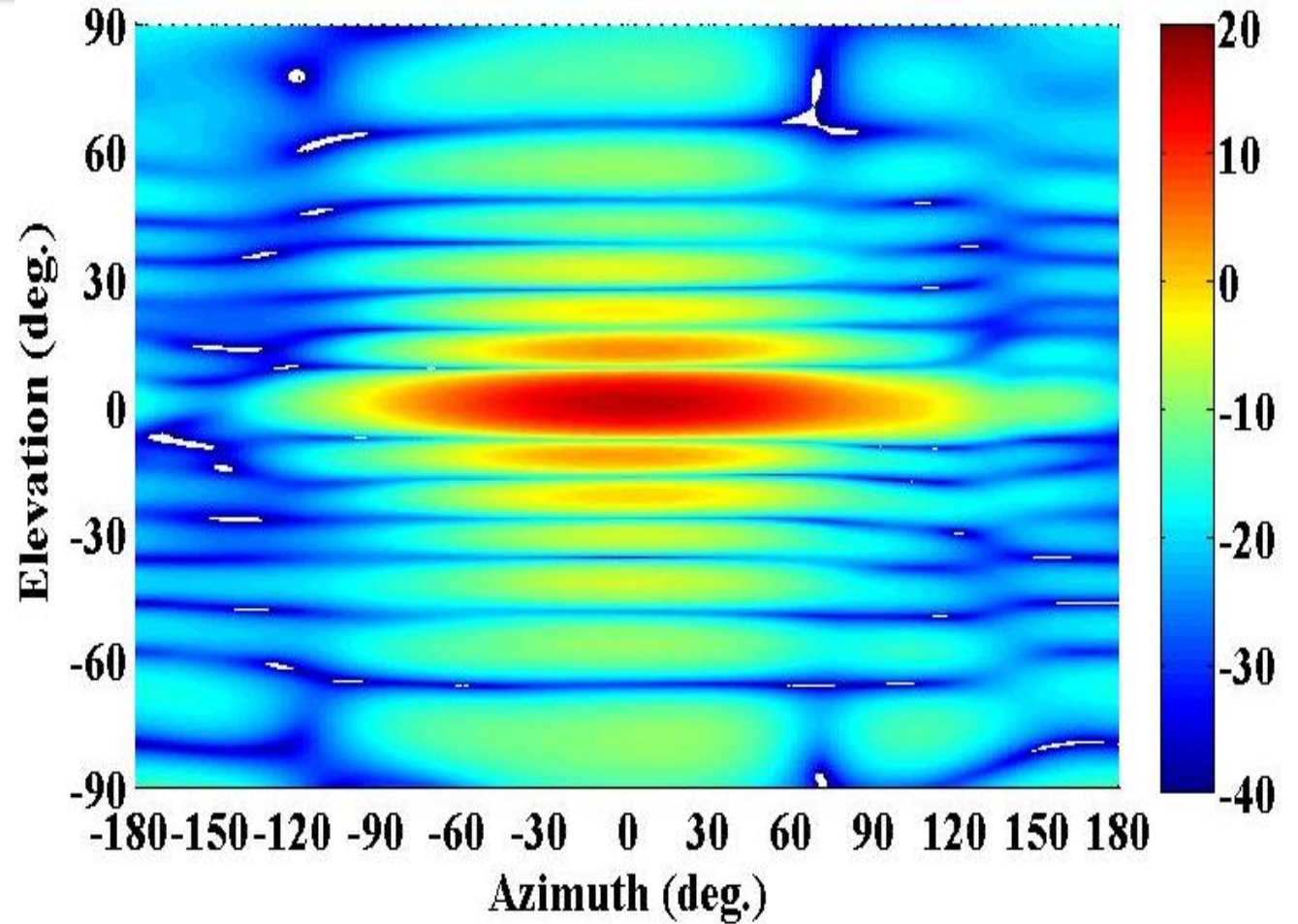
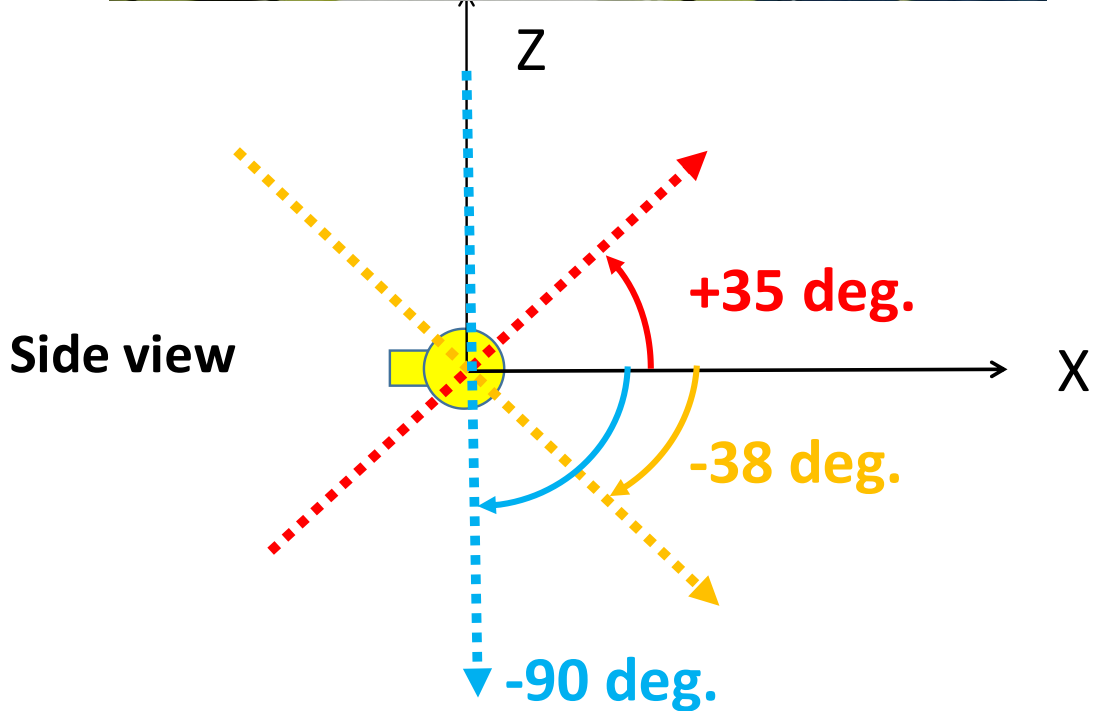


Comparison of the absolute gain patterns by Kim, Exact, and Omi method



1. J.H. Kim, H.K. Choi, "Antenna radiation pattern measurement at a reduced distance", *IEEE Trans. Instrum. Meas.*, vol. 54, no. 2, 2005, pp. 673-675.
2. R. Corneliuss, T. Salmeron-Ruiz, F. Saccardi, L. Foged, D. Heberling, M. Sierra-Castaner, "A Comparison of Different Methods for Fast Single-Cut Near-to-Far-Field Transformation", *IEEE Antennas Propag. Mag.*, vol. 56, no. 2, 2014, pp. 252-261.
3. S. Omi, T. Uno, T. Arima, "Single-cut near-field far-field transformation technique employing two-dimensional plane-wave expansion", *IEEE Antennas and Wireless Propagation Letters*, vol. 17, no. 8, 2018, pp. 1538-1541.

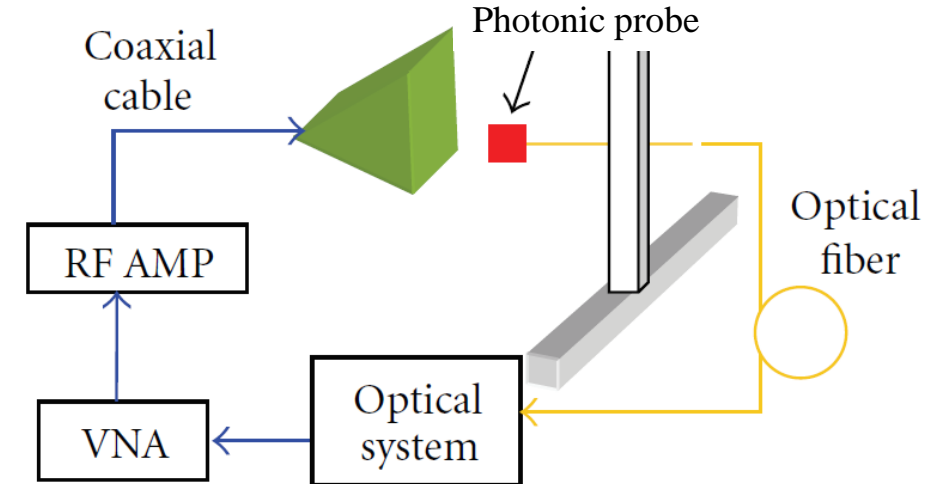
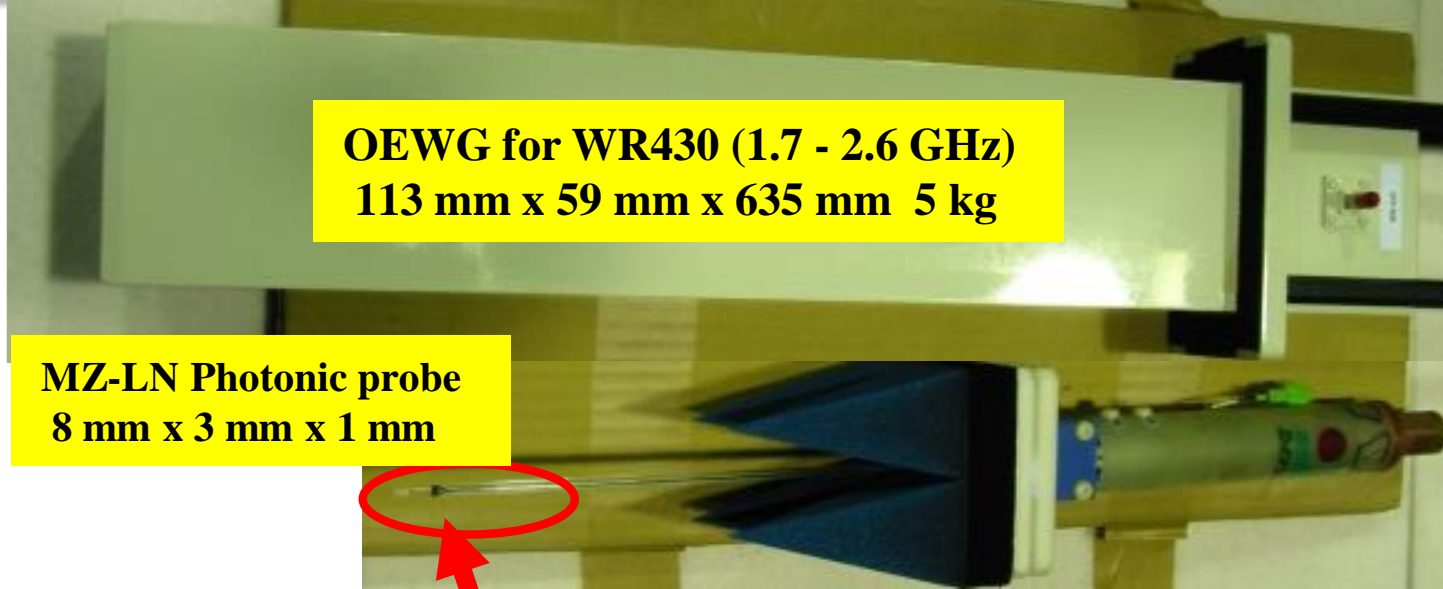
4 cut planes near field measurement for  
Far-Field 3D radiation pattern of base station antenna



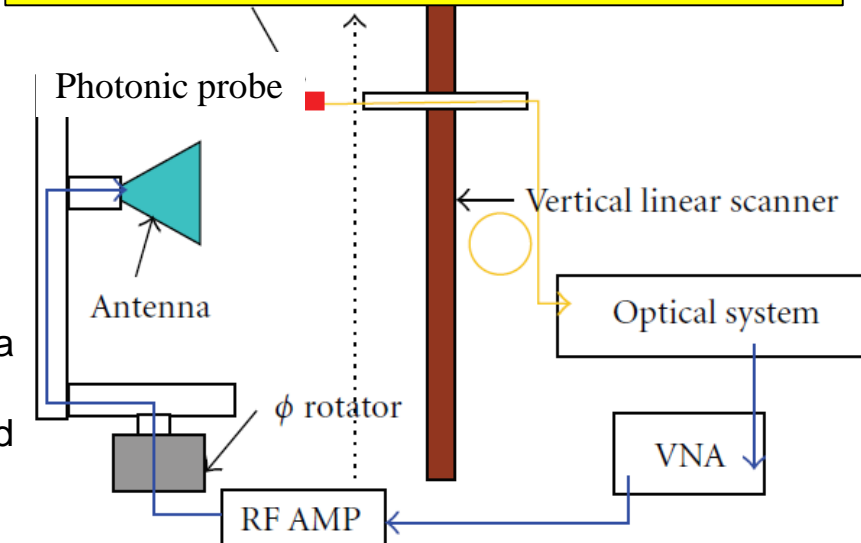
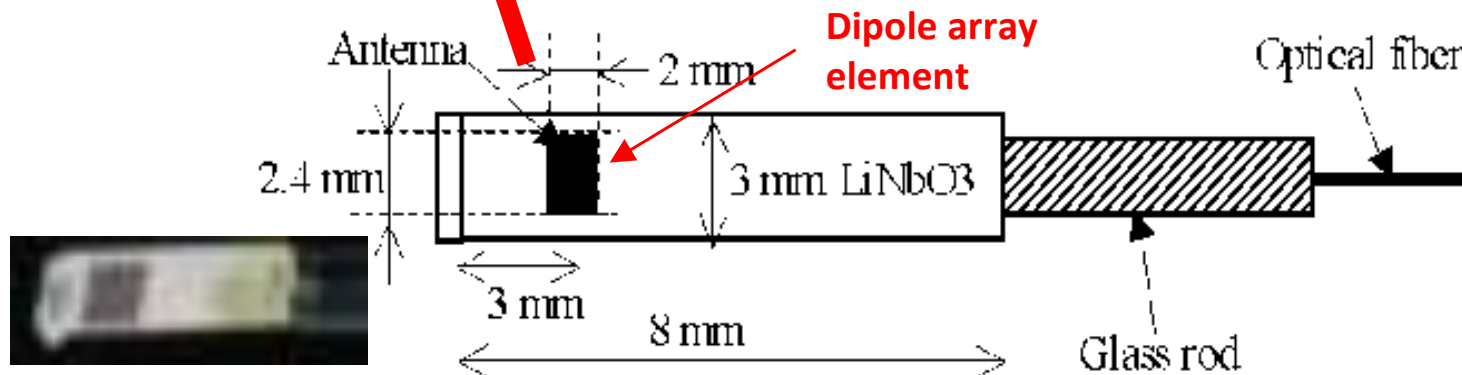
Valid range  
Elevation: full angles  
Azimuth: full angles

# Very-near-field antenna pattern measurement using MZ-LN photonic probe up to 6 GHz (IEC TR63099-1)

Rectangular Planer near field (PNF) scanning configuration Using MZ-LN photonic probe



Cylindrical near field (CNF) scanning configuration Using MZ-LN photonic probe



1. A. Capozzoli, et al, "Dielectric Field Probes for Very-Near-Field and Compact-Near-Field Antenna Characterization", IEEE Antennas and Propagation Magazine, Vol. 51, No.5, October 2009.
2. A. Capozzoli, et al, "Photonic Probes and Advanced (Also Phase less) Near-Field Far-Field Techniques", IEEE Antennas and Propagation Magazine, Vol. 52, No.5, October 2010.
3. IEEE Std 1720™-2012: IEEE Recommended Practice for Near-Field Antenna Measurements

Near field antenna measurement using photonic probe (optical reflection type LN intensity modulator) up to 6 GHz.

