

Titel:

Adaptable illumination and calibration of a high-gain antenna for cosmic ray air-shower experiments

Abstract:

At the Karlsruhe Institute of Technology (KIT) the microwave detector experiment CROME (Cosmic Ray Observation via Microwave Emission) has been built up. It is aimed to investigate radio emissions from cosmic ray air showers in L-Band (1.0 to 1.6 GHz) and the extended C-Band (3.4 to 4.2 GHz).

The current setup uses high-gain parabolic dish antennas which are illuminated either with cross-polarized dipoles or circular waveguide feeds. Both illumination techniques show an inhomogeneous illumination. The effect can be compensated by using a circular waveguide feed with movable choke ring called Kumar feed or more common VE4MA feed. Due to the expanded near field region beyond 100m of high-gain antennas, calibration procedures are challenging.

We present a setup for homogeneous illumination in the L-Band based on a 3.4m parabolic dish antenna and the VE4MA feed. We also present a novel method to calibrate high-gain antennas based on an airborne calibration transmitter mounted on a GPS-controlled model helicopter.