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

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At the Karlsruhe Institute of Technology (KIT) the microwave detector experiment CROME (Cosmic Ray Observation via Microwave Emission) has been built up. It was 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 final setup used high-gain parabolic reflector-type antennas which are illuminated either with crosspolarized 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 after the design of A. Kumar (Reduce cross-polarization in reflector type antennas, A. Kumar, Microwaves 1978). Due to the expanded near field region

beyond 100m of high-gain antennas, calibration procedures are challenging.

To optimize the signal to noise ratio (SNR) we have developed a L-band feed for obtaining a homogeneous illumination of a parabolic reflector-type antenna. We also present a novel method to calibrate such high-gain antennas based on an airborne calibration transmitter mounted on a GPS-controlled model helicopter. Using this method the design parameters of the feed were verified.

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