Comprehensive laboratory characterization of the AMKID instrument

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***Abstract*—Deployment of a complex instrument requires extensive and precise laboratory measuremnt to asses on instrument quality. In this talk we will review the case of the AMKID instrument, a large field of view incoherent detector camera designed for the APEX telescope. We will present different experimental techniques developed to evaluate the performance of the optical setup, the camera sensitivity, and the inference of external magnetic fields on measuremnt quality. Finnally we will show the current status of the commissioning of AMKID, which is on track for scientific operations in 2024, preliminary telescope results show a good agreement with the laboratory measuremnts, providing a prove of quality of the experimental system described in this talk**

***Keywords*—Incoherent detectors, astronomical instruments, experimenta methods.**

I. INTRODUCTION

THE APEX telescope Microwave Kinetic Inductor (AMKID) instrument is a wide-field camera operating in the sub-millimeter window. It is a dual-color instrument composed of two arrays at 870 and 350 μm. Both arrays are diplexed in polarization and can operate simultaneously. The instrument is designed to be installed at the APEX telescope [1], making use of the superb observation conditions of the Chajnantor plateu. This fact is especially relevant for the high frequency band, as regular operation at 350um requires precipitable water vapour to be lower than 0.5mm. The instrument covers a field of view of 15' x 15' with an unprecedent number of pixels: 2.800 pixels at the low frequency band and 13.800 pixels at the high frequency band. Before deployment at the telescope, the instrument was extensively tested in laboratory enviroment. Performed measurements and analysis include optical quality and alignment, optical performance, instrument sensitivty, and detector pick-up from external magnetic fields, between others. To precisely assest the instrument performance a dedicated experimental setup was built to mimic the instrument (telescope) operational conditions. The setup includes, among others, a wire-scanner: a device designed to perform fast and reliable instrument characterization at the telescope focal plane.

In this talk we will present the design of the laboratory enviroment, the main test and simulatiuons we performed, and the achieved results. Finnally we will show the current status of the commissioning of AMKID at the APEX telescope, which is on track for scientific operations in 2024.

Fig. 1. The AMKID instrument installed in the laboratory test system. The setup allows to tilt the instrument to its normal operation conditions. A large Liquid Nitrogen load provide a background loading similar to the expected atmosphere load.

REFERENCES

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