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Vibration tests on the CryoAC Detector assembly for the X-IFU Athena X-ray observatory

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We present an extension on vibration analysis of the 50 mK Cryogenic focal plane Anti-Coincidence (CryoAC) detector designed for the X-IFU Athena X-ray observatory. The detector is composed of a silicon suspended absorber coupled with a few Ir/Au Transition Edge Sensors (TES) linked via silicon bridges to a gold-plated silicon frame (rim). The detector was fabricated through Deep Reactive Ion Etching (DRIE) from a single 500 μm silicon wafer. The final geometry will have a segmented structure with four distinct absorbers. To ensure mechanical resilience for space missions, we conducted tests that involved vibrating the entire detector assembly, including the hexagonal silicon chip, its mounting bracket with thermal bondings, and the cold front-end electronic PCB with signal bondings. We replicated vibrations performed on single chips using SRON's vibrational mask, which included both in-plane and out-of-plane excitations. This provided comprehensive insights into the mechanical behavior of the detector under various conditions. The extension not only validated the mechanical response but also provided valuable data for optimizing detector design and assembly for spaceborne applications.

Collaboration

Role of Submitter

I am the presenter

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