MICROPHONIC EFFECTS IN PIN-DIODE X-RAY DETECTORS
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Microphonic noise influences radiation detectors including gas proportional counters, flat electrodes drift chambers, and semiconductor detectors. This noise can have a significant undesirable impact on high energy resolution detectors, such as PIN-diodes and SDDs.

Typically, the microphonic noise comes from mechanical vibrations generated by electrical motors, cryogenic refrigerators and similar machinery. Usually, this equipment produces mechanical vibrations of relatively large amplitudes and low frequencies within 1 – 10 kHz range. Also, microphonic noise can be generated by high voltage power supplies at ultrasonic frequencies, in the range of 30 – 100 kHz at nanometer scale amplitude vibrations. These vibrations from an x-ray source’s high voltage power supply can cause loss of resolution in PIN-diode and SDD semiconductor detector system. The impact of this microphonic noise can be essential problem in design of compact instruments such as handheld XRF spectrometers, etc.

We present methods for measuring the microphonic noise susceptibility of the semiconductor detectors. We will also demonstrate improvements in microphonic noise immunity of the Moxtek Inc. PIN-diode detectors.