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THCOBRA Detector Operating in Mixtures of Kr/Xe

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THCOBRA based detectors have been studied during the past years aiming to improve the performance for X-ray imaging applications. Efforts have been made to improve portability, spatial resolution, gain and detection efficiency by implementing a purification system and characterizing the detector operation with different gas mediums, such as NeCH4 (95/5) and pure Kr. When operating in a gas flow mode using NeCH4 (95/5), a charge gain of 104, an energy resolution of about 22% (FWHM for 8 keV), and a spatial resolution close to1.2 mm (for about 4 keV) were achieved [1]. Some of these properties were improved operating the detector in sealed mode with pure Kr: an energy resolution of 23% (FWHM for 5.9 keV) and a spatial resolution of 650 um (for 16.5 keV) were determined [2].
Recently, to improve spatial resolution and detection efficiency [3, 4], the detector's performance was assessed operating in mixtures of Kr and Xe, namely 98/2, 95/5 and 90/10, with the best results achieving an energy resolution of 20% (FWHM for 5.9 keV) for the 98/2 mixture and a spatial resolution of ˜350 um (for energies between ˜16 and ˜22 keV) for the 90/10 mixture. The detector stability also increased, since the applied voltage to the detector decreased considerably to achieve similar gains, even when adding small portions of Xe.
These results, that show an improvement of detector performance comparing with the previously obtained, will be presented. Complementary results regarding charge gain and count rate evaluation for the three Kr/Xe mixtures will also be shown and compared with data from previous detector configurations.

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