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X-ray spectroscopic performance of a matrix of silicon drift diodes

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Using ^{55}Fe and ^{241}Am sources we characterized the spectroscopic performance of a matrix of Silicon Drift Diodes (SDD). The matrix consists of a completely depleted volume of silicon wafer subdivided into 5 identical hexagonal cells. The back side is 5 implanted arrays of increasingly negatively biased concentric p+ rings. The front side, common to all 5 cells, is a shallow and uniformly implanted p⁺ entrance window. Ionizing radiation impinging the detector bulk generates electrons that drift towards small readout n⁺ pads placed on the back side in the center of each cell. The total sensitive area of the matrix is 135 mm², the wafer thickness is 450 μm. We report on the layout of the experimental set-up, as well as the spectroscopic performance measured at different temperatures and bias conditions.

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