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Design of microelectronic thermal detectors for high resolution radiation spectroscopy

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Abstract

A crystalline, silicon, microelectronic, cryogenic, thermal detector for single quanta of low energy radiation and high resolution spectroscopy is being developed. Its volume is less than 0.1 mm^3. The constituent parts of the detector are integrated in one unit by micromachining. The dependence of the resistance of the thermistor on temperature (*R-T* characteristics) has been studied experimentally. The influence of changes in the implantation dose of the thermistor on the *R-T* characteristics has also been studied. To obtain the best energy resolution of the detector the optimal implantation dose of the thermistor has been determined. The amplified detector pulses were fed into a Macintosh computer via an especially developed computer interface. The operation of the detector was tested by sampling gamma, X-ray and electron spectra from a ^{109}Cd source.

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