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Noise reduction techniques for the CUORE experiment

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CUORE is a ton-scale underground array of 988 TeO_2 crystals operated as bolometers at about 10 mK in the INFN Gran Sasso National Laboratories (LNGS). Its main scientific goal is searching for $0\nu\beta\beta$ decay of ^{130}Te . Each crystal is equipped with an NTD thermistor whose voltage is low-pass filtered, amplified and continuously digitized at a sampling frequency of 1 kHz. The standard data processing is based on building and applying an optimum filter on waveforms extracted with time windows of 10 s. The conflicting requirements of reducing the pile-up and enhancing the discrete Fourier Transform resolution forbid a significant enlargement of the time window. Both coherent and non-coherent noise components at low frequency were identified. A complete removal of such noise components would yield a resolution improvement of $\sim 18\%$. The most recent noise reduction techniques, including the implementation of an Infinite Impulse Response notch filter will be presented.

Less than 5 years of experience since completion of Ph.D

Y

Student (Ph.D., M.Sc. or B.Sc.)

Y

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