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The CUORE data acquisition system

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Large mass bolometers are excellent detectors for the search of rare events, such as neutrinoless double beta decay or dark matter interactions. Currently the experiment which brought the bolometer technique to its greatest expression in terms of size and modularity, is CUORE: an array of 988 tellurium dioxide bolometers with a total active mass of 741 kg. The experiment started taking data in April 2017 at the Laboratori Nazionali del Gran Sasso (LNGS), Italy, with the scientific goal of searching for neutrinoless double beta decay of ^{130}Te . Given the increasing number of channels to be acquired, readout chain and data acquisition (DAQ) system become important aspects of the construction of bolometer arrays. In CUORE the bolometer signal is read out by the front end electronics, followed by the DAQ system which has four main roles: signal digitization, application of the trigger algorithms, data storage and the electronic devices control. Apollo was initially developed for CUORE but its high modularity and flexibility make it suitable also to other experiments, regardless of the specific characteristics of the setup such as the number of channels and the bolometer characteristics. Indeed it has been used not only in CUORE but also in its predecessor CUORE-0, some R&D projects and upgrades as CUPID-0.

In this poster, after a brief description of bolometric detectors and their typical signals, both the hardware and the software implementation of Apollo will be described as well as the achieved performances in CUORE and CUPID-0 setups.

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

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