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Germanium detector configuration, readout and signal processing of the GERDA phase II experiment

The Germanium Detector Array (GERDA) experiment, investigating neutrino-less double beta decay of 76Ge at the Gran Sasso National Laboratory of INFN - Italy is currently upgrading to phase II, in order to improve both its sensitivity and background rejection capabilities.
Many technological improvements are foreseen during the planned upgrade; among what most concerns the core of the GERDA experiment there will be: i) the complete rearrangement of the Germanium naked detector array configuration and its handling in the cryogenic (liquid Argon), hostile environment; ii) the major redesign of the cryogenic front-end preamplifiers (CC3), that will be specifically suited to the new low capacitance Broad Energy (BE) Ge detectors and iii) the optimization of the off-line subsequent digital processing, for better energy estimation and pulse shape discrimination of the HPGe waveforms.
Given the even tighter specifications of the GERDA phase II experiment with respect to phase I (e.g. energy resolution, pulse shape discrimination, etc.) and the even more stringent associated constraints (e.g. lower-background materials, more deployed detectors, flexibility in handing detectors and associated electronics, etc.), the whole design process turns out to be multi-objective, iterative and multi-disciplinary (involving e.g. physics, electronics, mechanics, leading-edge technologies such as nano-structured materials, etc.).
The main steps of this roadmap, a few non-trivial key points (e.g. concerning the design of the very front end electronics) and the overall final results in terms of positive achievements and associated drawbacks will be presented, together with the expected preliminary results of the commissioning phase.

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