Characterization and optimization of EDELWEISS-III FID800 heat signals

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Thermal Model with 6 Baths

NTDs parameters, electron-phonon decoupling and thermal link to the bath characterization

Detector response in time domain, first order perturbation in temperatures, extraction of C's and G_ab

Detector response in frequency domain, noise sources and energy resolutions

Conclusions

A 6 bath thermal model has been developed to explain the EDELWEISS-III FID800 heat pulses. It shows a good agreement with the data both for steady states and pulses.

First conclusion is that FID800 detectors are sensitive to alien phonons and exhibit a large parasitic heat capacity limiting strongly their sensitivities.

Systematic studies are planned to measure the heat capacities of all FID800 elements (underlayer, aluminum electrodes, gold pad for thermal link, glue for NTDs).

The model will help the R&D focusing on heat resolution improvement to reach an energy resolution of $\sigma_H = 100 eV$ necessary to probe low mass WIMPs ($W<100 GeV/c^2$).