Analysis of calibration runs and how it enters MGDO

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Some general remarks on the calibration

- **GERDA Phase-I:**

  ➡ 12 detectors = 4 strings, each 3 detectors

- **With 3 x 20 kBq ^{228}Th sources, we need about 0.5 h calibration time per layer**

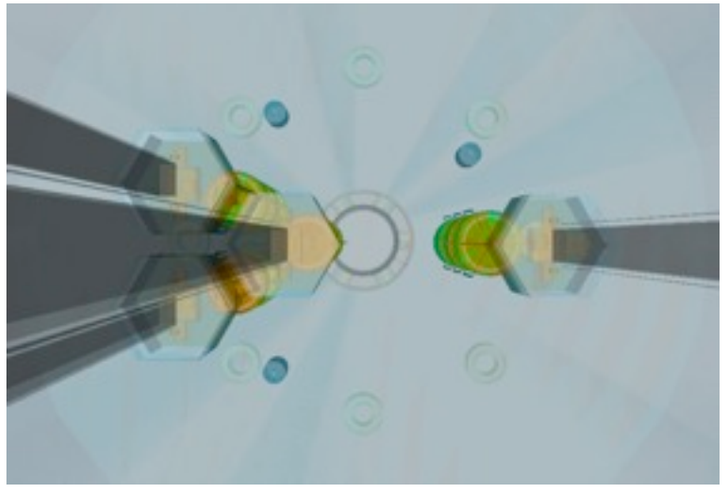
  ➡ total weekly calibration time = 1.5 hours + 0.5 hours

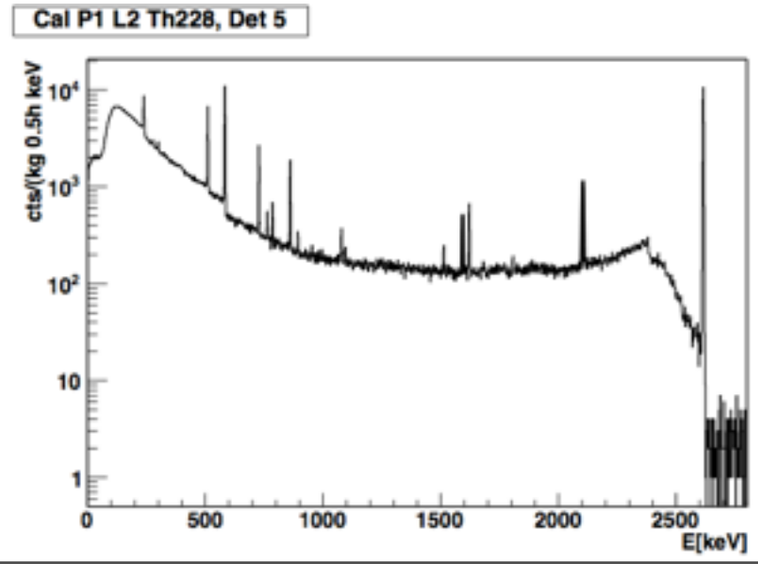
- **Data size:** 4 channels x 6 kB/(event channel) = 24 kB/event

- 5.5 x 10^6 events/(4 channels) x 24 kB/event ≈ 132 GB per layer

- for 3 layers: 3 x 132 GB = 396 GB for one calibration run

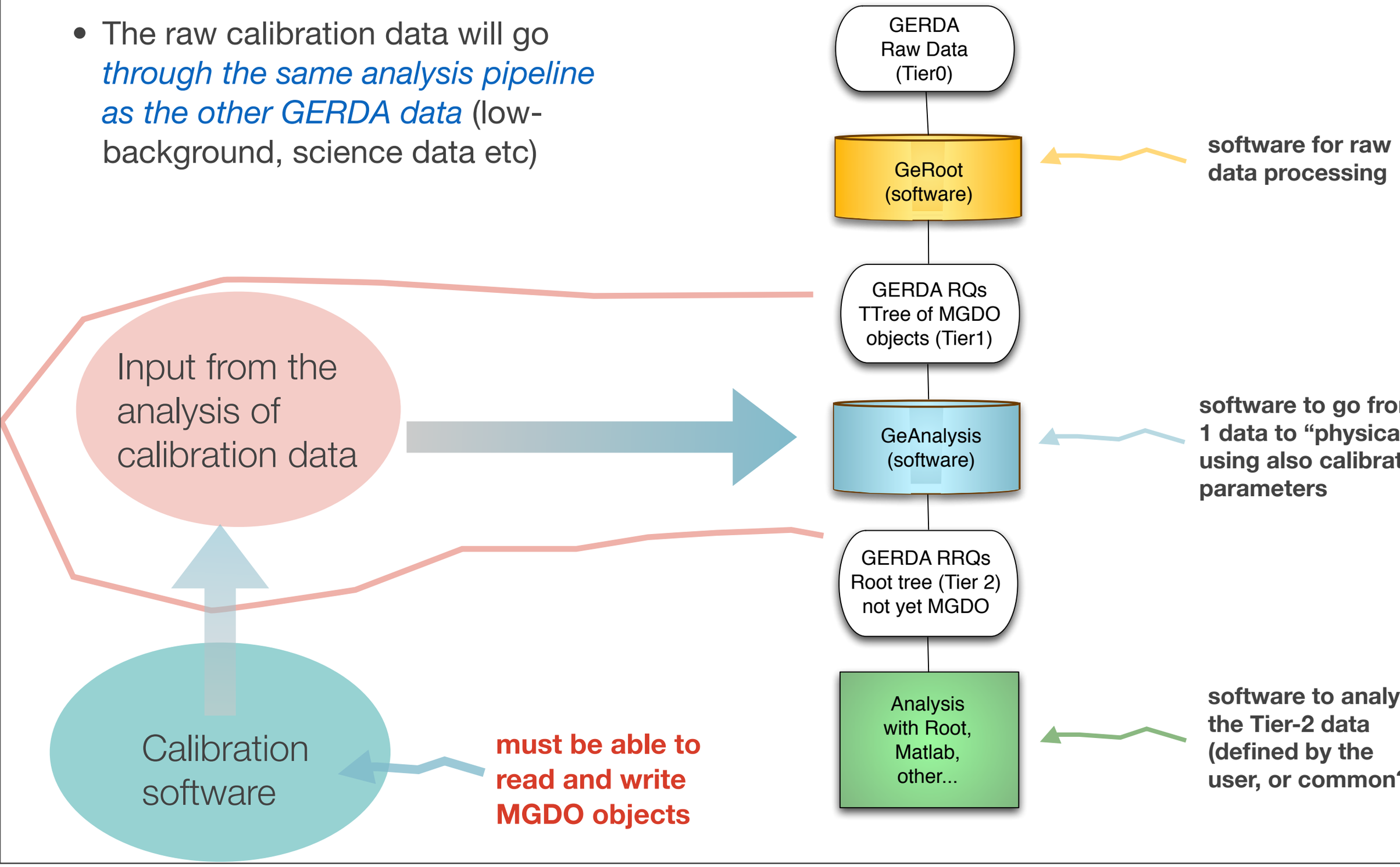
- For each channel, we would like to get: conversion from amplitude in volts to amplitude in keV, the energy resolution as a function of energy, the stability of the peak positions in time, the evolution of the peak areas in time, etc





Analysis of calibration data: general overview

- The raw calibration data will go *through the same analysis pipeline as the other GERDA data* (low-background, science data etc)

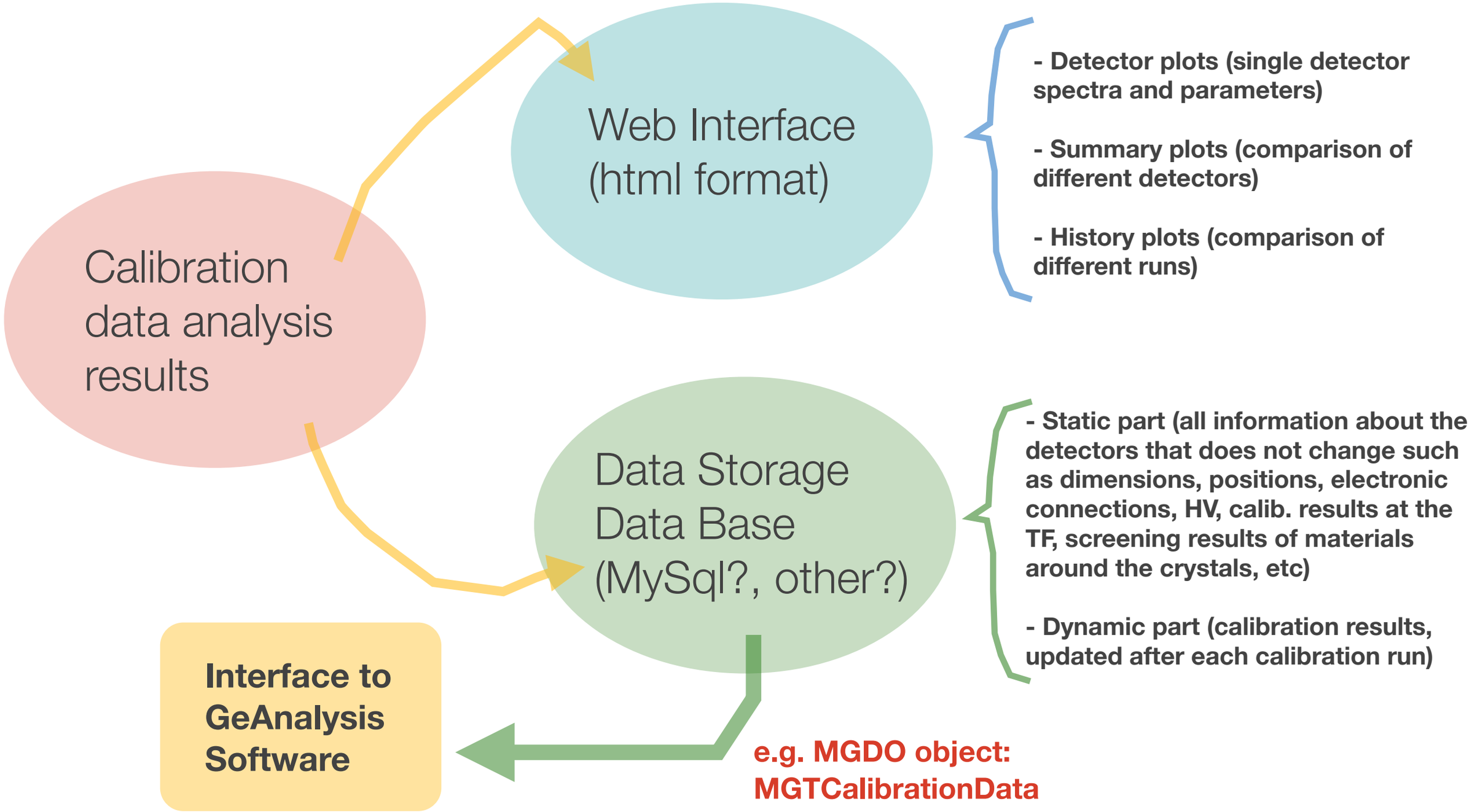


Analysis of calibration data: details

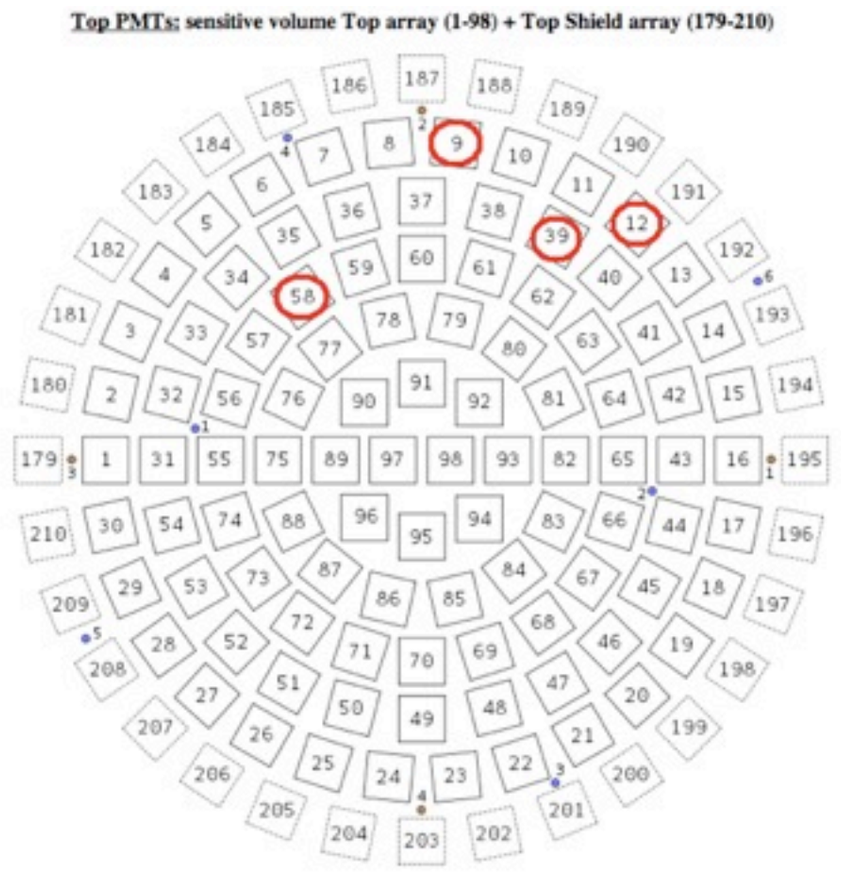
- Extract the basic information (RQs, or Tier-1) from the *MGTEvent MGDO object* (MGWaveform, DigitizerData, ...)
- Calculate the RRQs, or Tier-2 quantities: conversion to energy in keV, pulse shape parameters such as rise-time, baseline noise, saturation, etc
- **Look at the calibration spectra:**
  - ➡ fit the full energy peaks
  - ➡ calculate the energy resolution of the full-energy peaks
  - ➡ calculate the total number of events under each peak
  - ➡ look at the stability of all the parameters in time
- **Feed the *calibration data bases* with the relevant information,** which then flows back into the GERDA Analysis Software

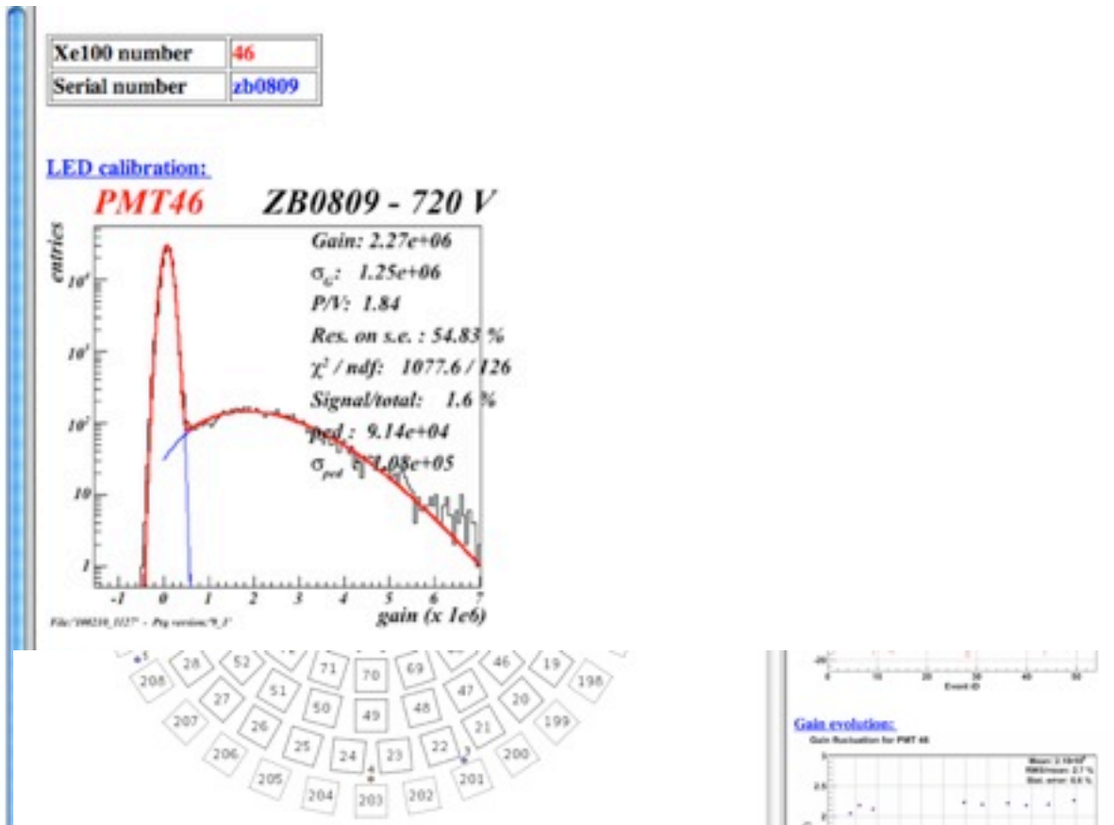
Calibration Data Management

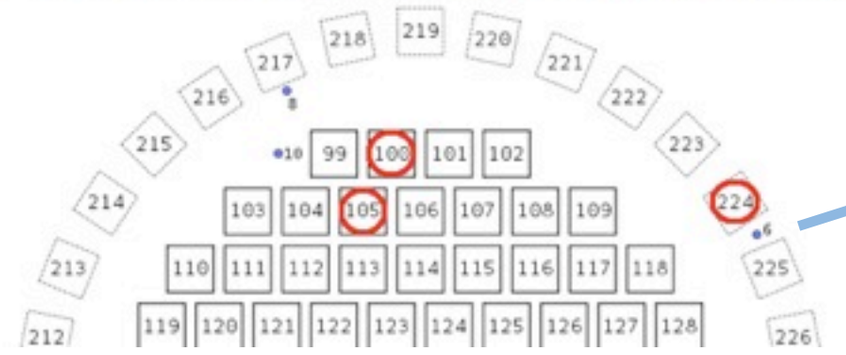
- We suggest to have *two data bases*; one web-based (for visualization) and one (possibly MySql) DB (for storage of calibration parameters, to be accessed by the analysis software)

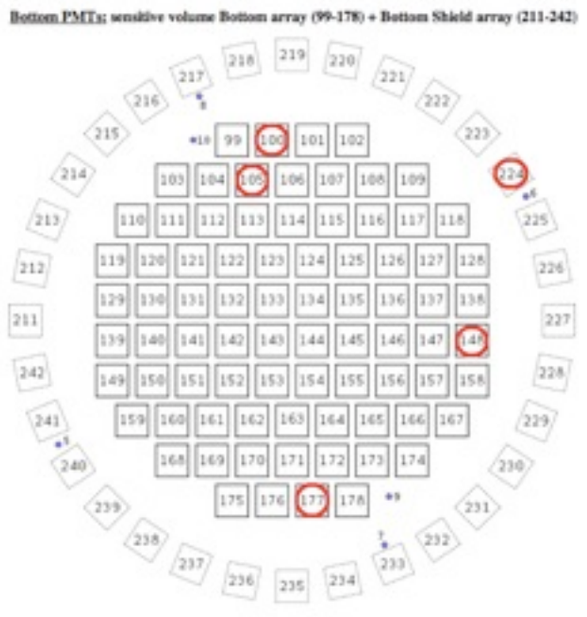


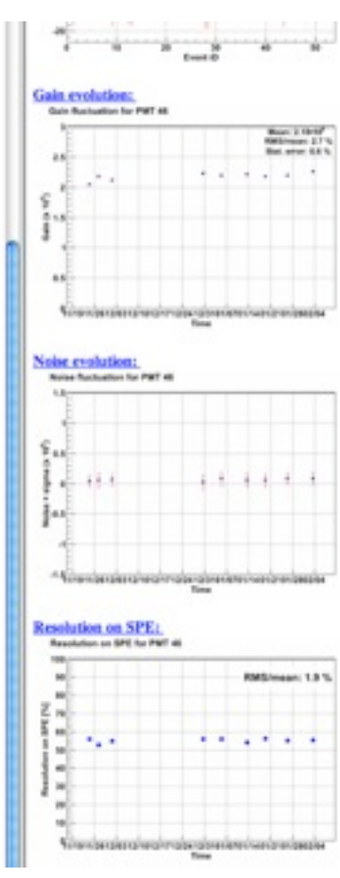
Example of the XENON100 Web Data Base











GERDA Calibration Web Data Base (Visualization)