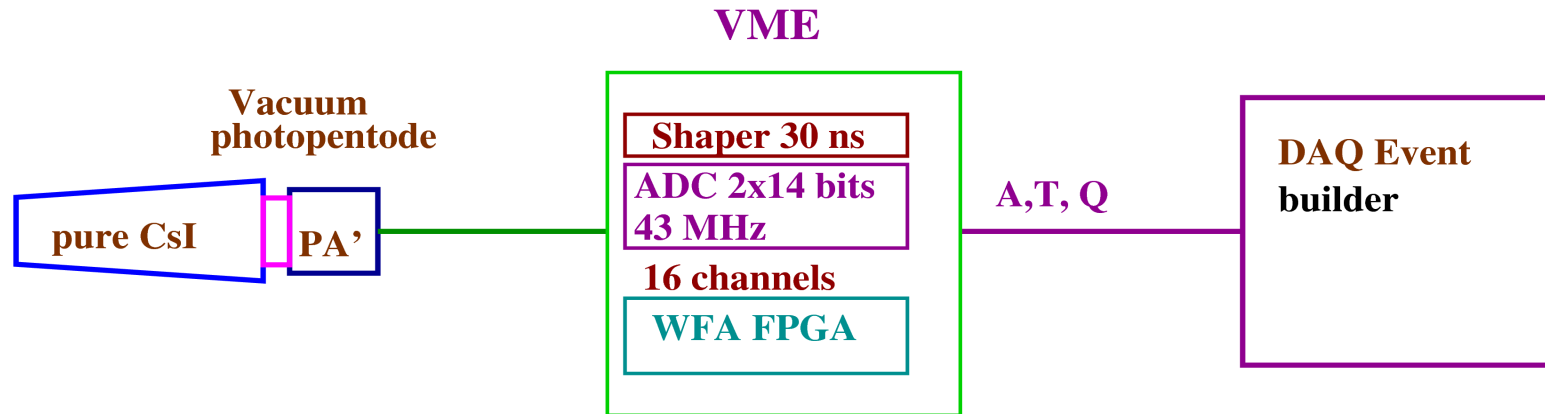
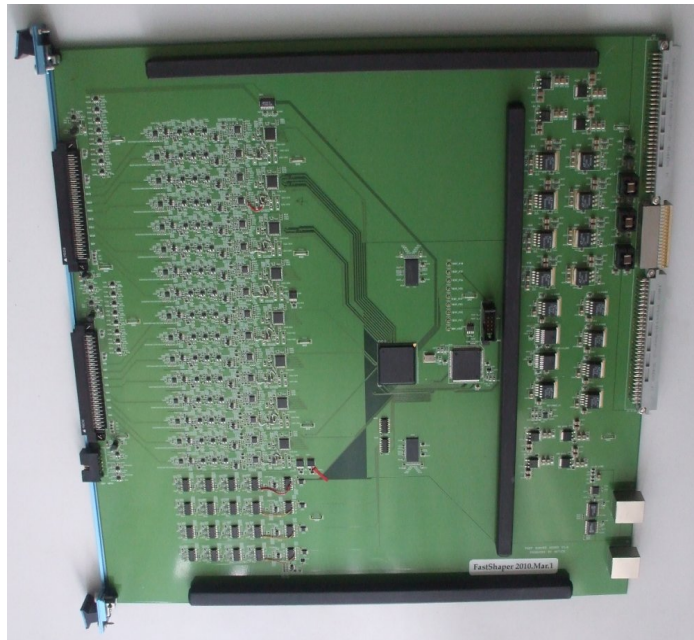


Frontend



- Pipeline readout, on-board waveform analysis approach (successfully realized at Belle II ECL)
- Preamplifier is located in the counter, shaping digitization and analysis is implemented in the VME 9U Shaper-DSP board located nearby the detector. Shaper: CR + (RC)⁴ with the **shaping time of 30 ns**. Amplitude, time and pedestal are fitted in FPGA of the Shaper-DSP board. The data from the Shaper-DSP boards are sent to the DAQ via optical link (directly or via intermediate collector board)
- The temperature variation of the LY of CsI(pure) is 1.5%/°C, hence, thermostabilization of the calorimeter is needed, the temperature map should be monitored with the accuracy of (0.1 – 0.2) °C

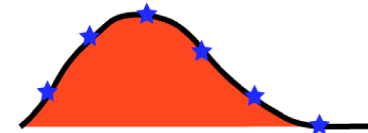


Algorithm details

$$\chi^2(A, p, t_0) = \sum_{i,j} (y_i - Af(t_i - t_0) - p) S_{ij}^{-1} (y_j - Af(t_j - t_0) - p) \rightarrow \min$$

$$S_{ij} = \overline{(y_i - \bar{y})(y_j - \bar{y})}$$

$f(t)$ – counter response



$$Af(t_i - t_1 - \Delta t) = Af(t_i - t_1) - A\Delta t f'(t_i - t_1) = Af(t_i - t_1) + Bf'(t_i - t_1)$$

where t_1 – initial time (trigger time)

$$\sum_{i,j} f_i S_{ij}^{-1} (y_j - Af_j - Bf'_j - p) = 0$$

$$\sum_{i,j} f'_i S_{ij}^{-1} (y_j - Af_j - Bf'_j - p) = 0$$

$$\sum_{i,j} S_{ij}^{-1} (y_j - Af_j - Bf'_j - p) = 0$$

$$A = \sum_i \alpha_i y_i$$

$$B = \sum_i \beta_i y_i \Rightarrow \Delta t = -B / A$$

$$p = \sum_i \gamma_i y_i$$