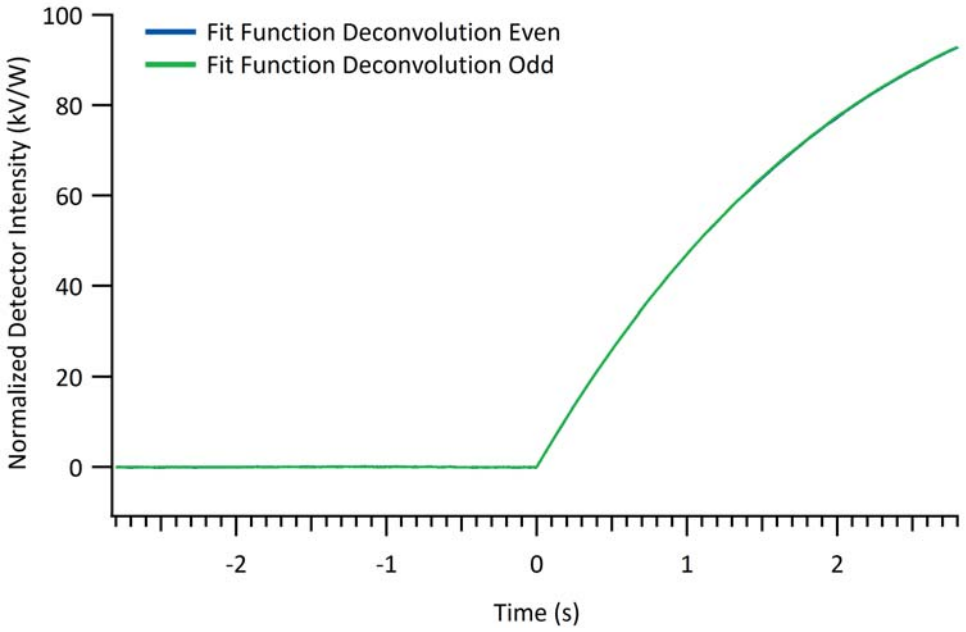


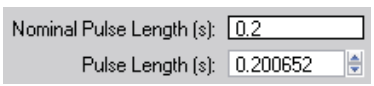
Figure 3.9: Constitution of Fit Waves for Deconvolution — The fit waves contain 1.4 nominal frame lengths for calorimetric experiments before and after the chopper opens. This represents the system response to a Heaviside function.

3.5.4 Laser Reference

In a first step the pulse length is detected from the laser reference measurement. Linear approximations before $y_\mathrm{b} = a_\mathrm{b} + b_\mathrm{b} \cdot t$ and after $y_\mathrm{a} = a_\mathrm{a} + b_\mathrm{a} \cdot t$ the nominal positions of the pulse are calculated excluding the close vicinity of the nominal peak start position, as shown in Figure 3.10. The position of the start t_s and end t_e is defined as the times both corresponding lines intersect

$$\begin{aligned} y_{\mathrm{b},\{\mathrm{s,e}\}} &= y_{\mathrm{a},\{\mathrm{s,e}\}} \\ a_{\mathrm{b},\{\mathrm{s,e}\}} + b_{\mathrm{b},\{\mathrm{s,e}\}} \cdot t_{\{\mathrm{s,e}\}} &= a_{\mathrm{a},\{\mathrm{s,e}\}} + b_{\mathrm{a},\{\mathrm{s,e}\}} \cdot t_{\{\mathrm{s,e}\}} \\ t_{\{\mathrm{s,e}\}} &= \frac{a_{\mathrm{a},\{\mathrm{s,e}\}} - a_{\mathrm{b},\{\mathrm{s,e}\}}}{b_{\mathrm{b},\{\mathrm{s,e}\}} - b_{\mathrm{a},\{\mathrm{s,e}\}}} \end{aligned} \tag{3.7}$$

and their difference yields the pulse length $\delta t = t_\mathrm{e} - t_\mathrm{s}$.



Subsequently, the normalized fit wave is generated. If the coated sample measurement has been processed the temperature induced sensitivity change is determined which can be used for the reconstruction of the energy input if the deconvolution

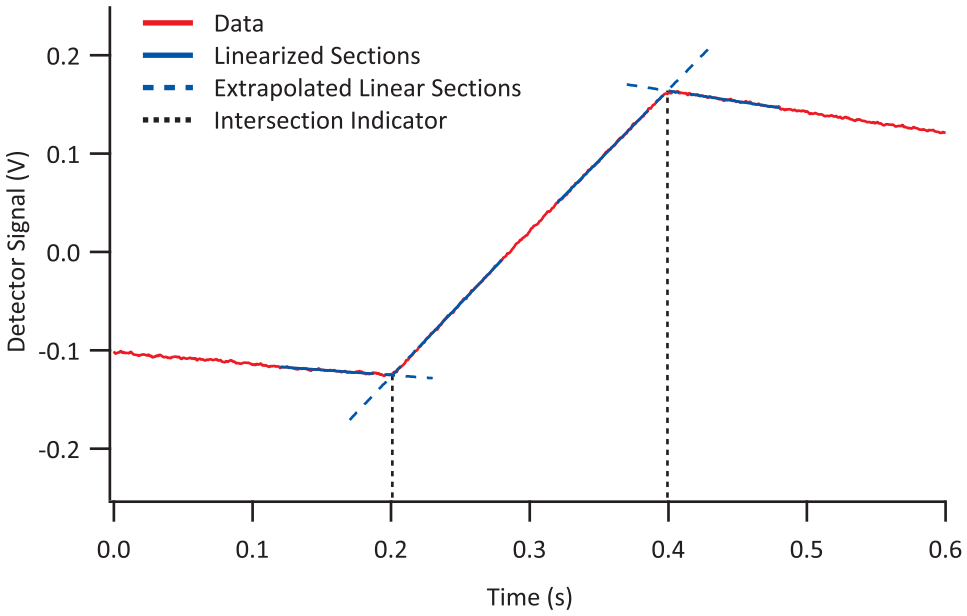


Figure 3.10: Pulse Length Determination — The detector signal (red dots) from a laser reference measurement is linearized (blue solid lines) before and after the start and the end of the nominal peak position. The close vicinity is excluded to avoid artifacts from a shifted pulse. The pulse length is calculated from the start and end points (dotted black lines) obtained from the intersections of the extrapolated line pairs (blue dashed lines).

reference was measured at a different temperature than the measurement to be processed.

The sensitivity is identical to the ratio of the normalized averaged peaks and very close to unity for experiments carried out at ambient temperature. The sensitivity rises for experiments conducted at approximately 100 K up to around 2.5 and is expected to drop in case of elevated temperatures below unity, which is the value for isothermal measurements. This emphasizes the necessity for a well defined and stable temperature of the detector polymer for all measurements. This is especially critical for measurements after the coating process, since the sample experiences heating from the evaporator. In case the transmission measurement is processed the transmission of the window is calculated, see Section 3.5.5.