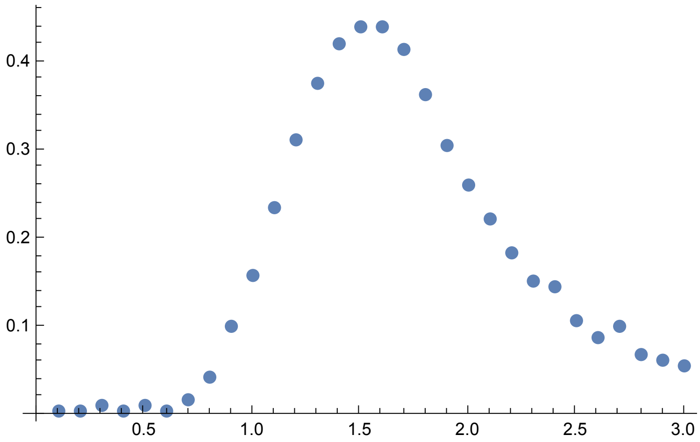
Time Jitter Measurement with Saclay laser data from morning of March 10th

Giomataris, Gustavsson,
Ferrer Ribas, Papaevangelou and White

We used a beam of ~ 0.8×10^8 γ's / pulse with wavelength of 286 nm, 120 fs pulse width and a rep. rate of 1 MHz, derived from a primary TiS laser in Gustavsson's lab. Photons entered the chamber through a quartz window coated on the inside with 10 nm Al (negative electrode). Photoelectrons then pass through a 200 μm drift gap (~ 100 V / mm) and are then amplified and detected in a 50 μm micro-bulk structure. For this test the gas was Neon-Ethane (10 % ?) and we were operating in sealed mode. We initially estimated the qe of the Al layer to be about 10^{-6} (ie the window is essentially transparent to this UV wavelength, though opaque to vivible). We also had been running with a flash lamp the day before and could estimate the number of pe / pulse to also be of order 10's-100 based on gain at these operating conditions. But we expect to document the conditions more thoroughly when we also report the CH4 results (which are expected to give lower time jitter).

Here we show that the PhotoDiode [laser monitor] trigger is so stable, since it' s measured risetime is ~550 picoseconds - consistent with the scope bandwidth - that we can ignore trigger jitter. For example the measured centroid of the pulse is stable to 29 picoseconds rms.
So in the following we just time relative to the trigger.

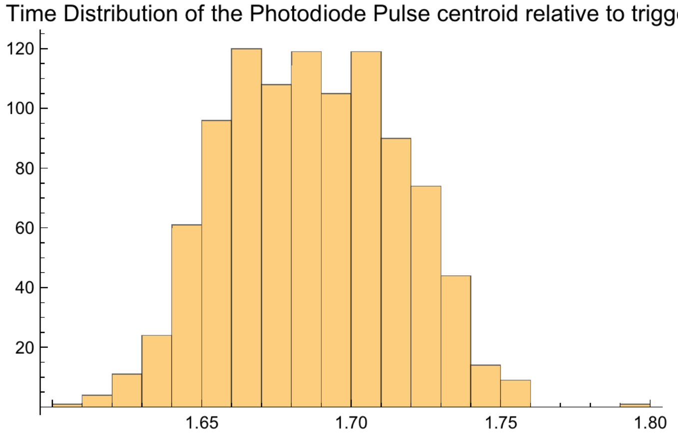
```
tft = Range[30] * .1;
ListPlot[Transpose[{tft, Take[Drop[v2[[3]], 340], 30]}]]
```

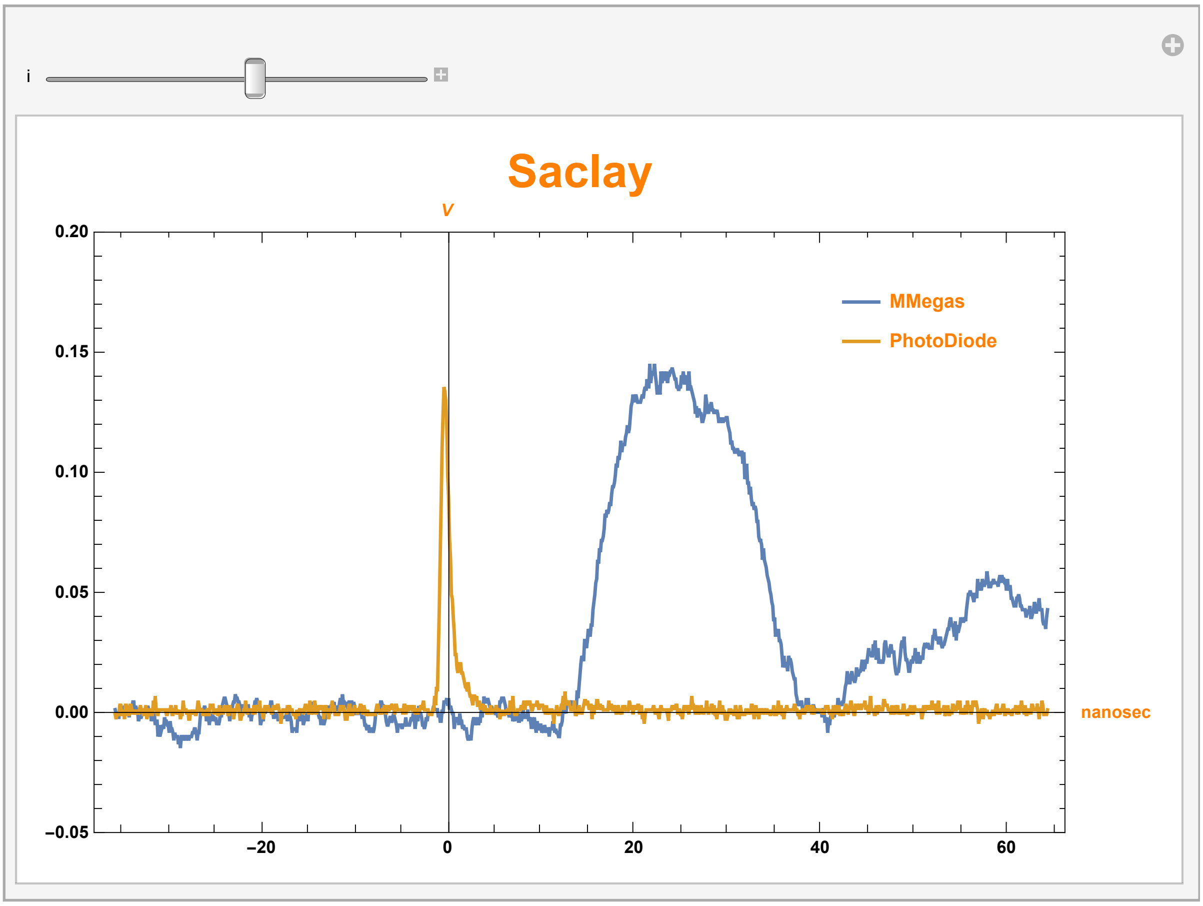



```
rmsa = RootMeanSquare[meana - mma]
```

```
0.0288653
```

Time Distribution of the Photodiode Pulse centroid relative to trigger

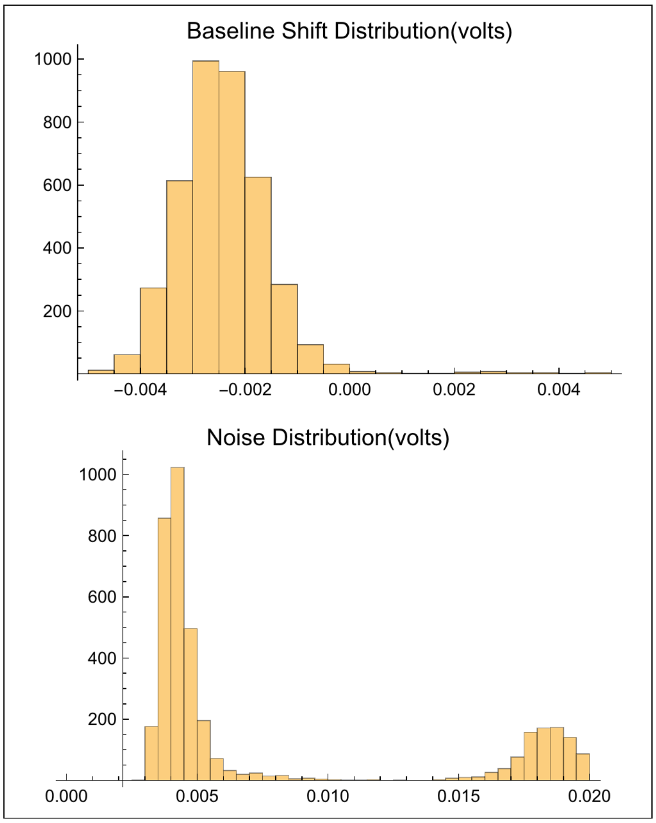





```
nevents = 4000;
inbase1 = Table[Mean[Take[v1[[i]], 400]], {i, nevents}];
innoise1 =
  Table[RootMeanSquare[Take[v1[[i]], 400] - inbase1[[i]]], {i, nevents}];
```

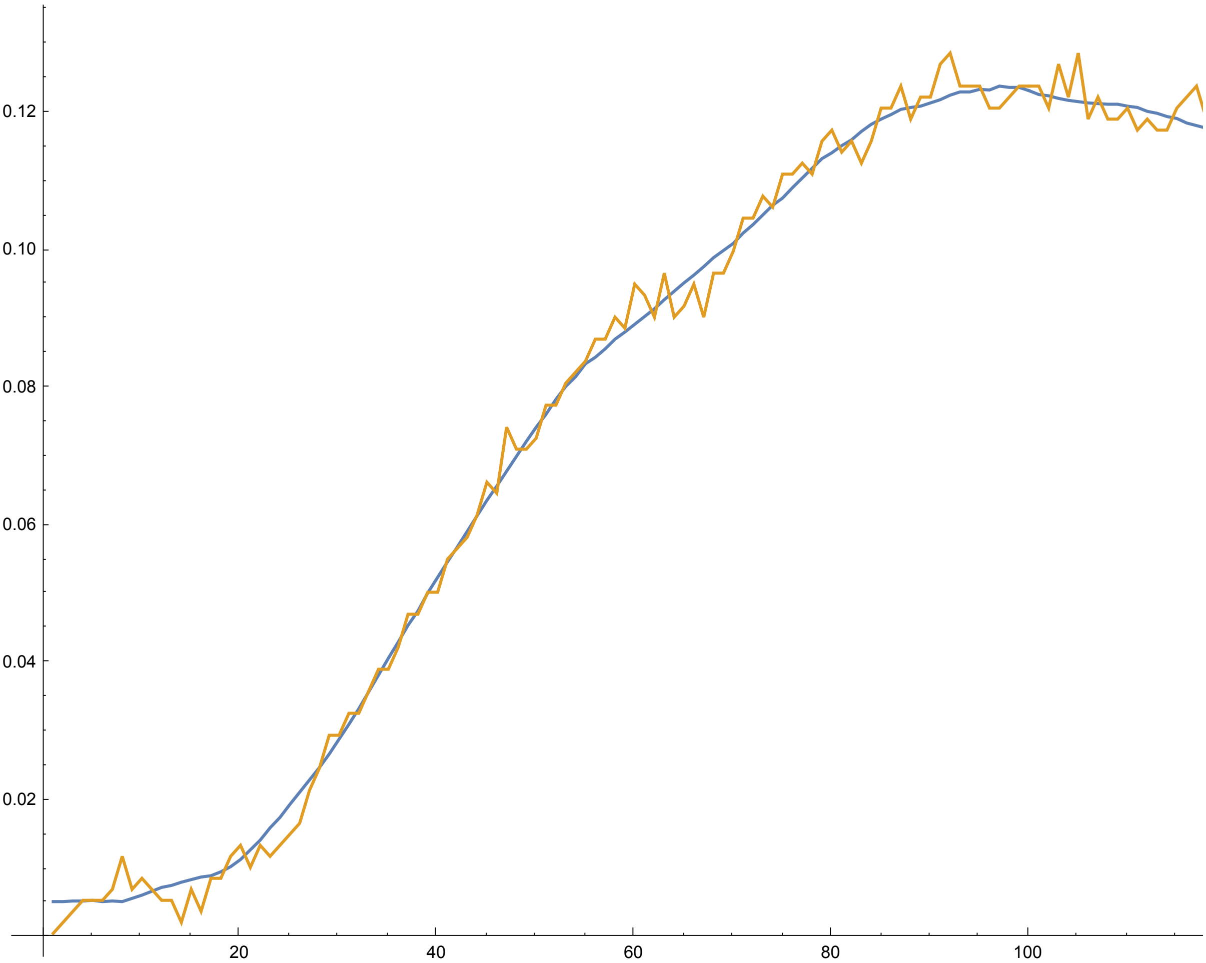
The run at Saclay had periods of heavy rf interference and periods of quiet. The pickup, when it was present, had a frequency around 60 - 100 MHz. We selected against noisey periods in the run by cutting on the noise distribution plotted below (measured in the 40 nsec prior to the chamber signal).

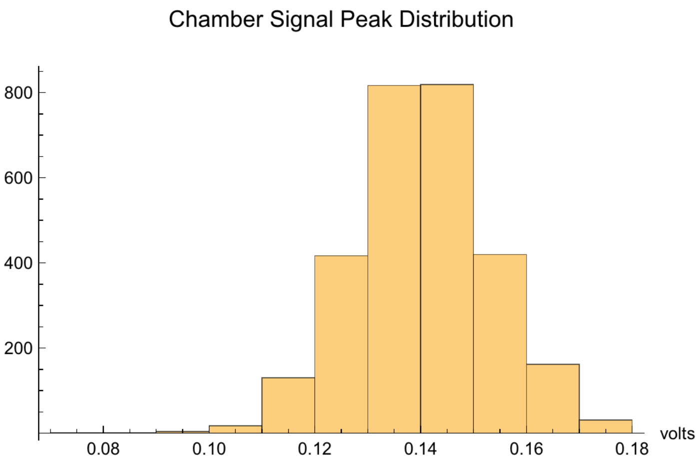
```
GraphicsColumn[{Histogram[inbase1, {-.005, .005, .0005},
   PlotLabel → "Baseline Shift Distribution(volts)"],
  Histogram[innoise1, {0, 0.02, .0005},
   PlotLabel → "Noise Distribution(volts)"]}, Frame -> True]
```



Effect of filtering on a typical waveform.

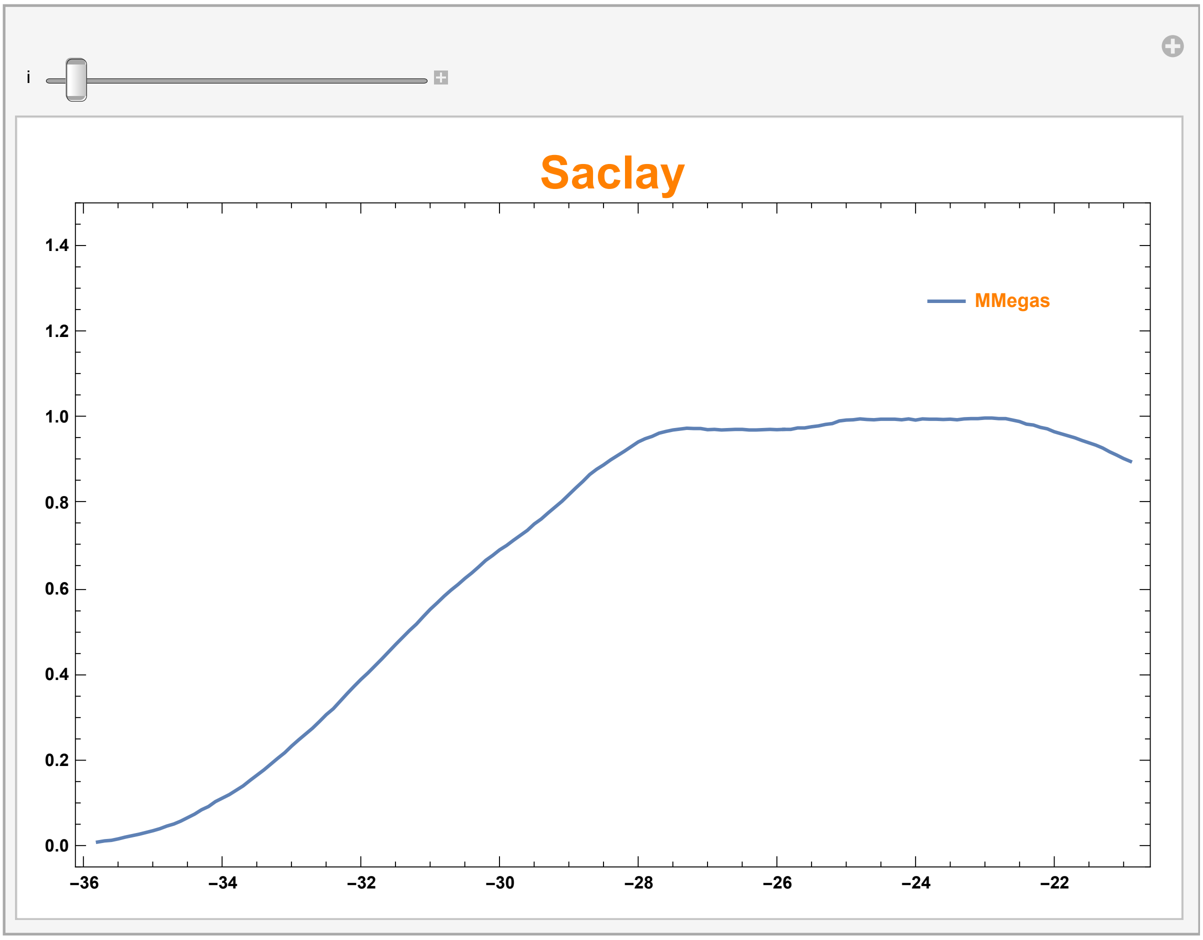
```
ListPlot[{v1fil[[1]], Take[(v1[[1]] - inbase1[[1]]), {481, 630}]}, Joined → True]
```

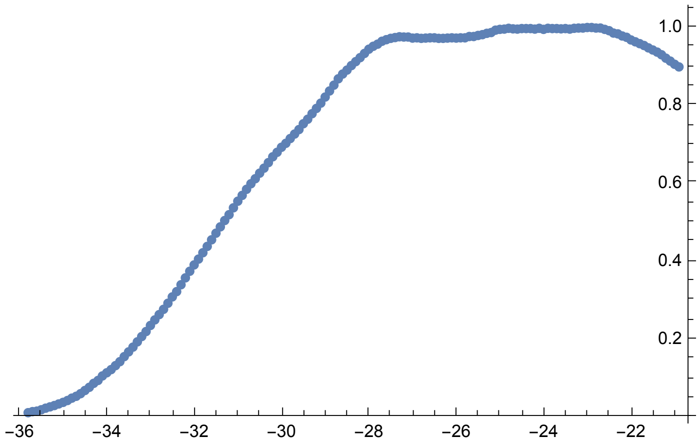


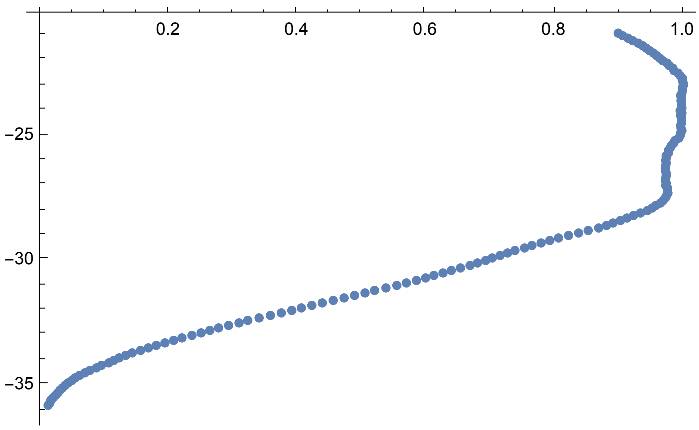



```
v1filnorm = v1fil / pk1;
```

A tool to scan through filtered waveforms.







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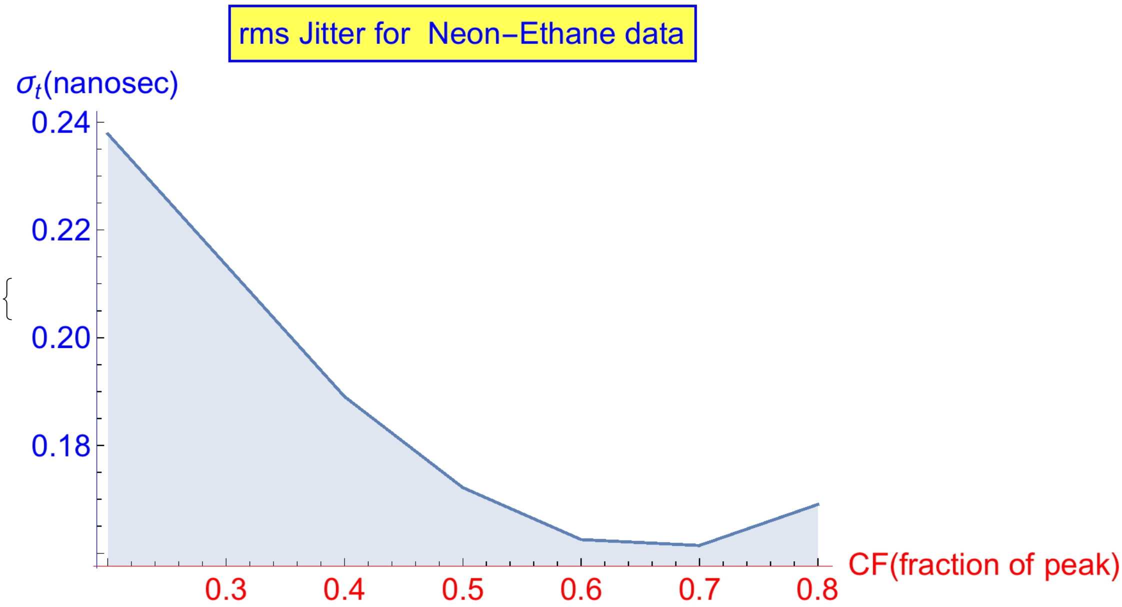

,

0.2	0.23782
0.4	0.18906
0.5	0.172175
0.6	0.162532
0.7	0.161435
0.8	0.16905

}