Wendelstein 7-X

IPP Max-Planck-Institut für Plasmaphysik

LabVIEW Report 28/01/2021

P. Hacker

HELMHOLTZ SPITZENFORSCHUNG FÜR GROSSE HERAUSFORDERUNGEN

EUROfusion

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Reviewed LabVIEW DAQ routine

- reviewed the LabVIEW DAQ routine to minimize lag, calculation overhead and optimize comfort of use for simplicity
- started from ‘original’ master branch that included all changes from frequency selection, power calculation, register settings and real time feedback
- build two new DAQ programs that include a number of changes:

  - removed all disable and if structures that were originally used for debugging
  - only manual acquisition time input
  - two trigger settings: start of VI time, CODAC last trigger
  - timing inputs to [s], time display as needed in [s, ms, ns]
  - samples to exclude from acquisition fix to 1000, included in start/time calculation of acquisition itself
  - DAC range settings now only either global or individual via file input (10-80mV)

Reviewed LabVIEW DAQ routine

- reviewed the LabVIEW DAQ routine to minimize lag, calculation overhead and optimize comfort of use for simplicity
- started from ‘original’ master branch that included all changes from frequency selection, power calculation, register settings and real time feedback
- build two new DAQ programs that include a number of changes:

  - calibration values for integrity check can be calculated from current measurement or either input for lab tests via file (provided one with OP1.2b 95% quantile)
  - calibration values now in [A^2, Ohm, s]
  - raw signal display (only, no adjusted or power per channel) in [mV]
  - offset measurement for integrity check, display in [mV]
  - reduced archive upload, only necessary data

Reviewed LabVIEW DAQ routine

- reviewed the LabVIEW DAQ routine to minimize lag, calculation overhead and optimize comfort of use for simplicity
- started from 'original' master branch that included all changes from frequency selection, power calculation, register settings and real time feedback
- build two new DAQ programs that include a number of changes:

- new timing settings: assuming that there is an intrinsic timing error from internal measurement, i.e. inside DAQ loop, of ~0.04ms

HEX	DECIMAL	FREQ [Hz]	T [ms]
x4F	79	1318	0.7584
x63	99	1052	0.9504
xA2	162	643.0	1.5552
x148	328	317.6	3.1488
x294	660	157.8	6.336

Reviewed LabVIEW DAQ routine

Raw_wRTF

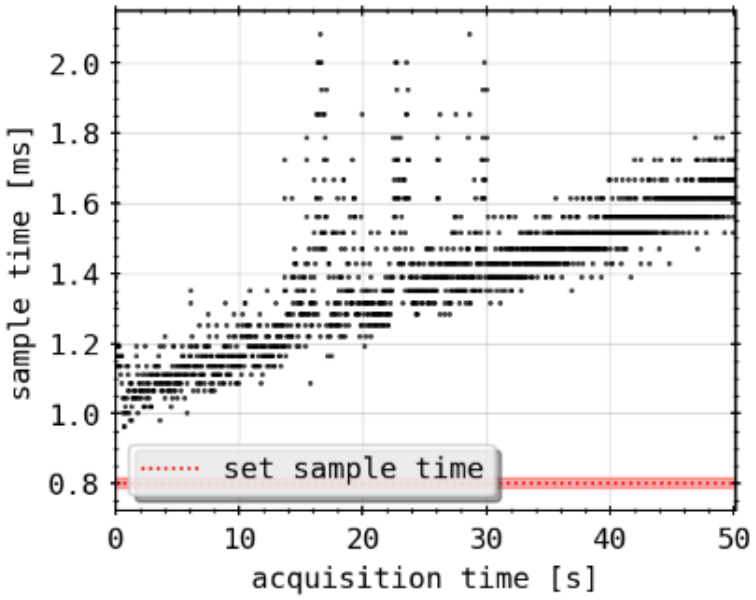
- real time feedback plot with full P_rad of both camera arrays and single channel/fast P_rad
- geometry input via file
- power calculation now only via FIFO, no Savitzky Golay

Raw_w/oRTF

- removed voltage out, power calculation, P_rad routine, geometry input entirely

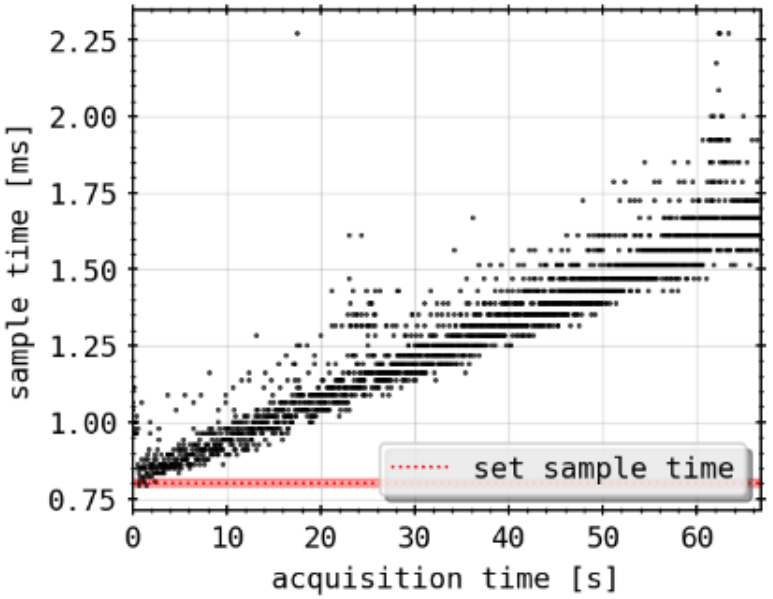
Reviewed LabVIEW DAQ routine: Performance

master

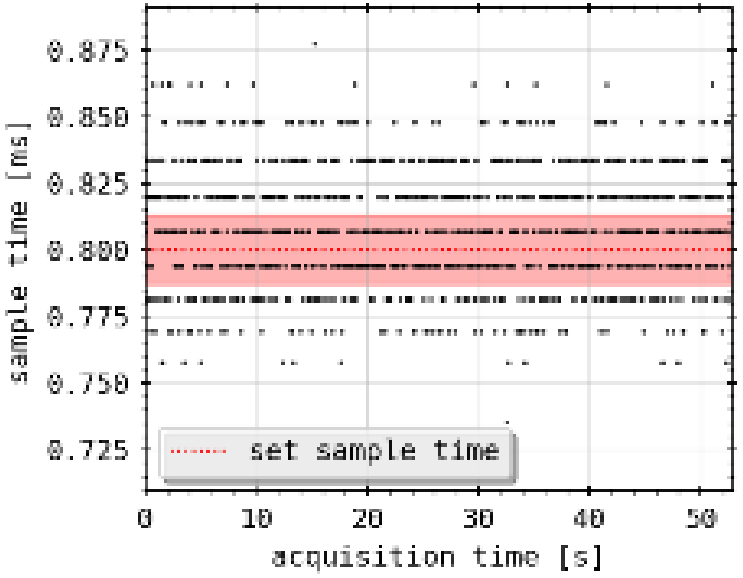


Raw_wRTF

0.8ms



Raw_w/oRTF



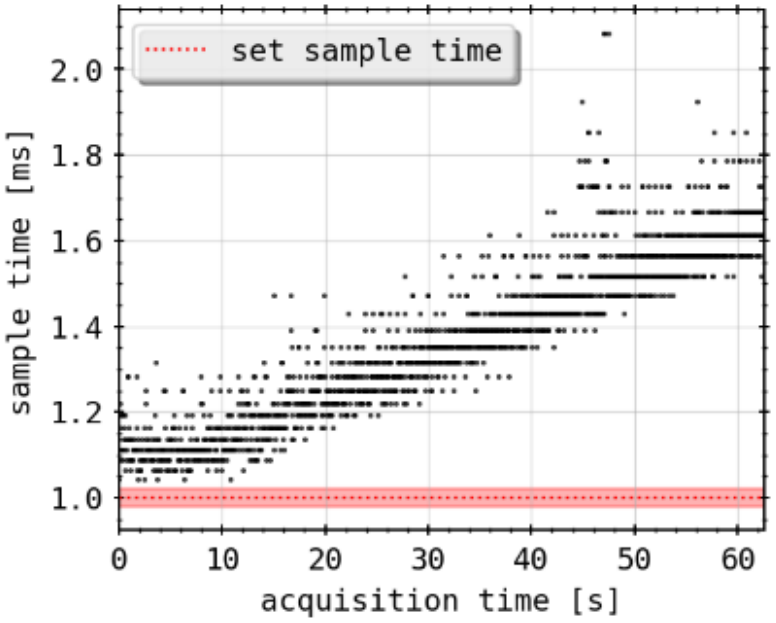
Reviewed LabVIEW DAQ routine: Performance

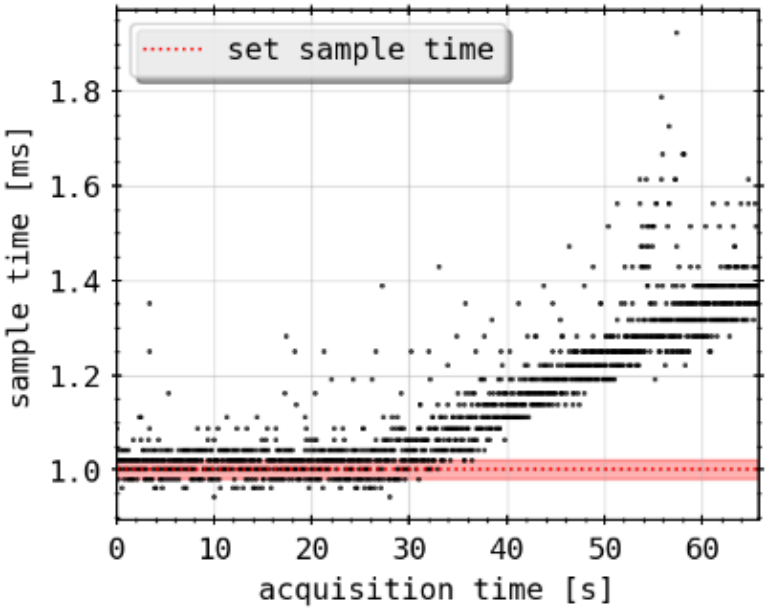
master

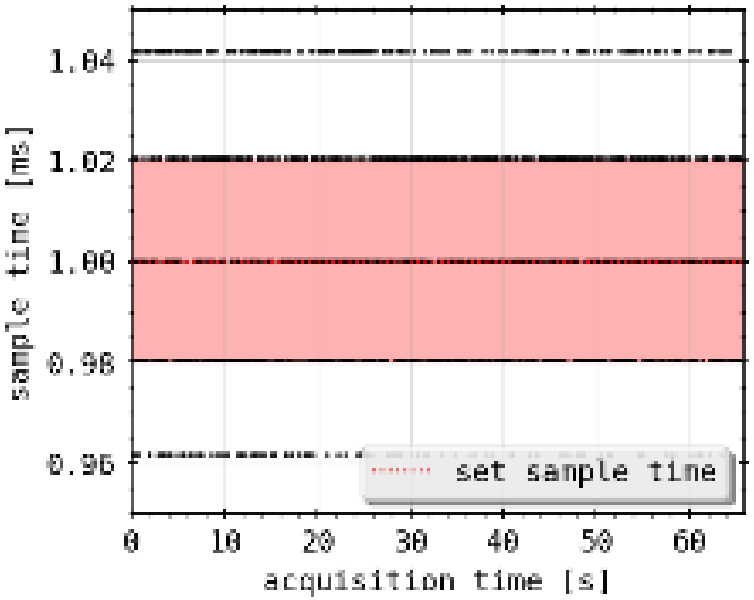
Raw_wRTF

Raw_w/oRTF

1.0ms







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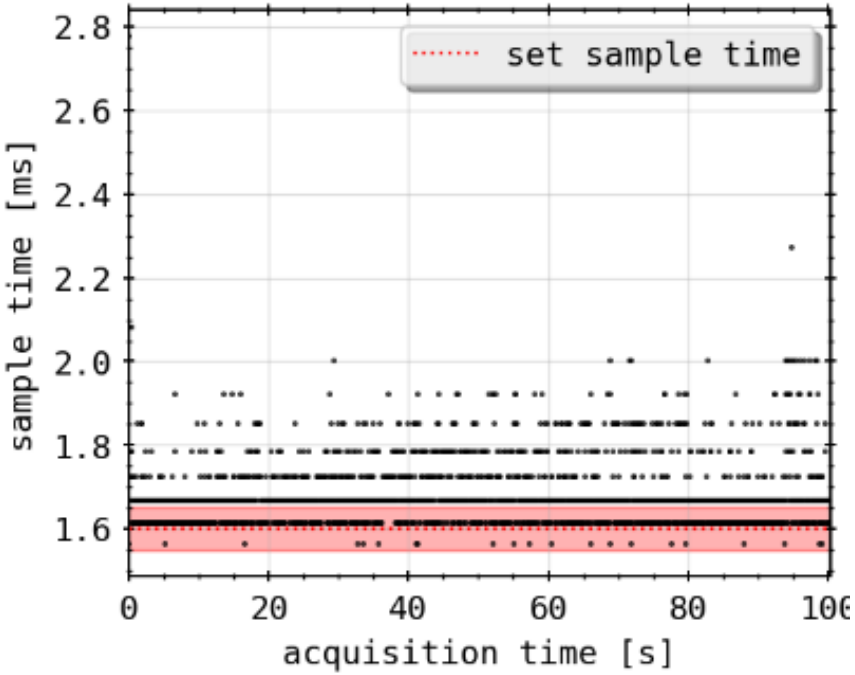
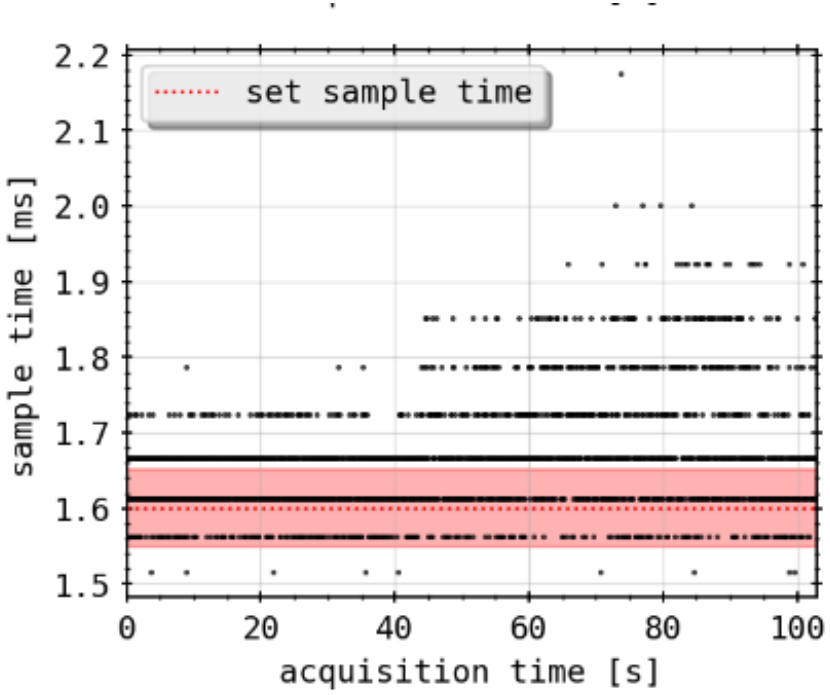
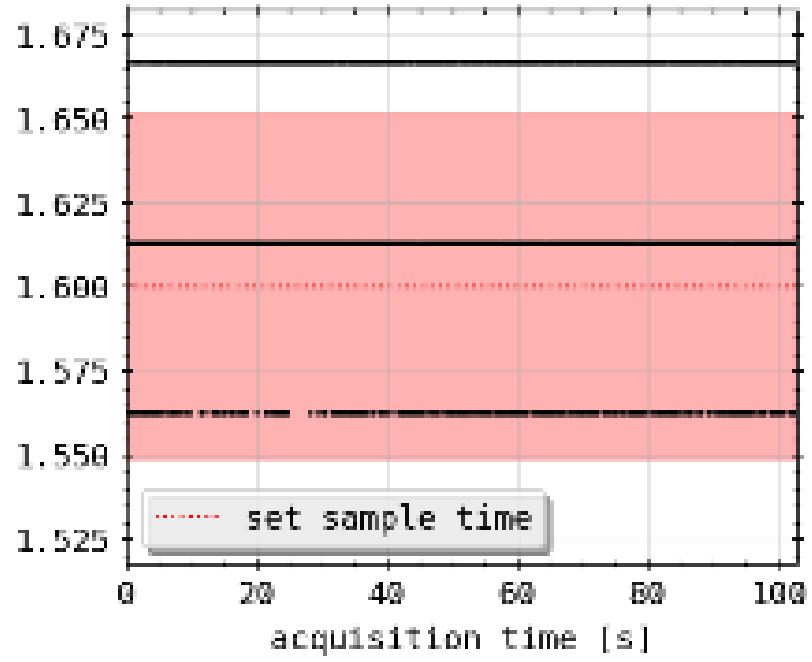


Raw_wRTF

1.6ms



Raw_w/oRTF



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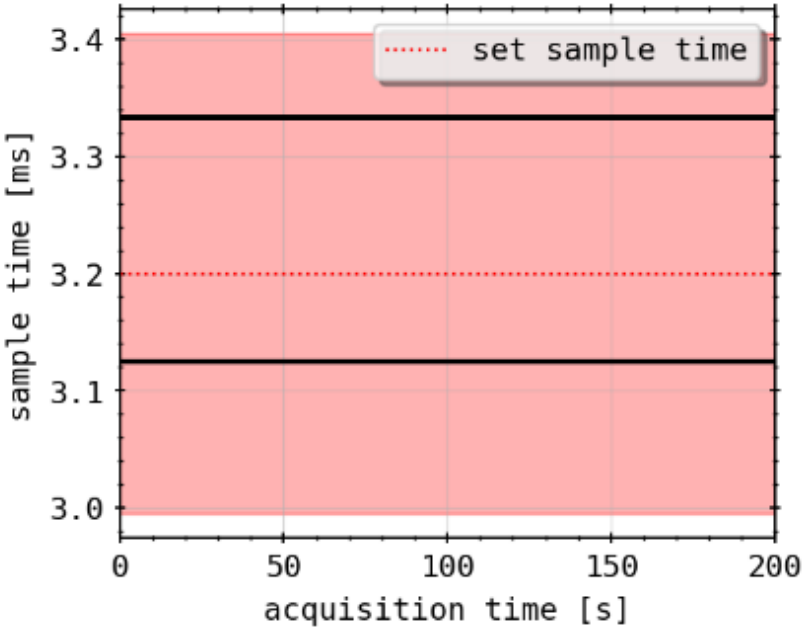
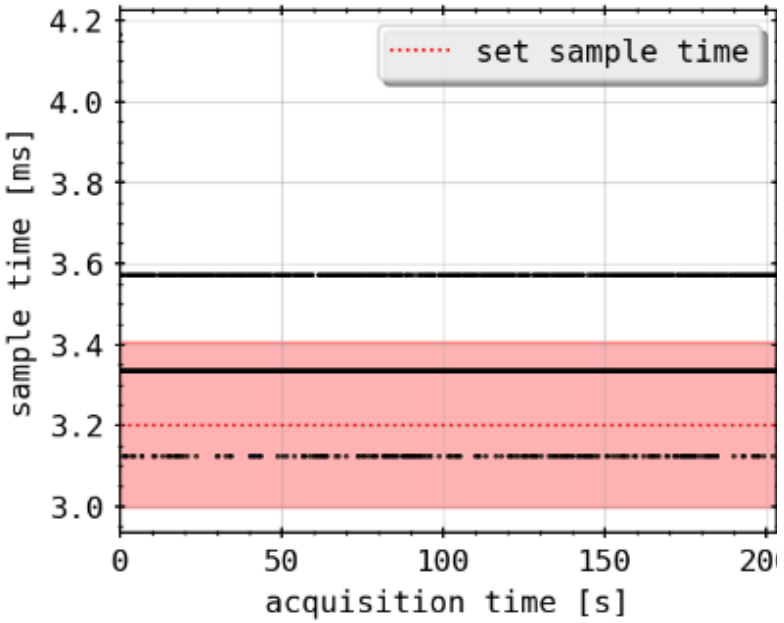
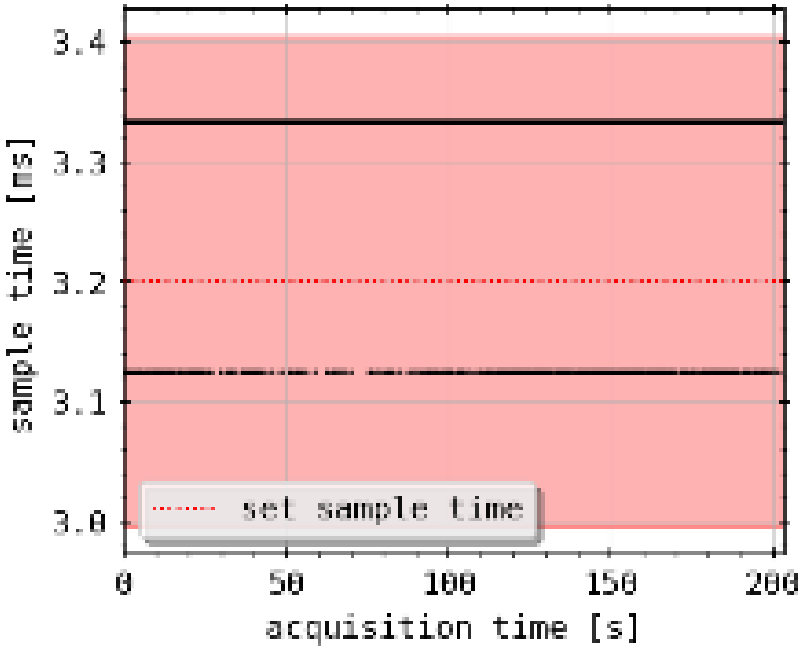


Raw_wRTF

3.2ms



Raw_w/oRTF



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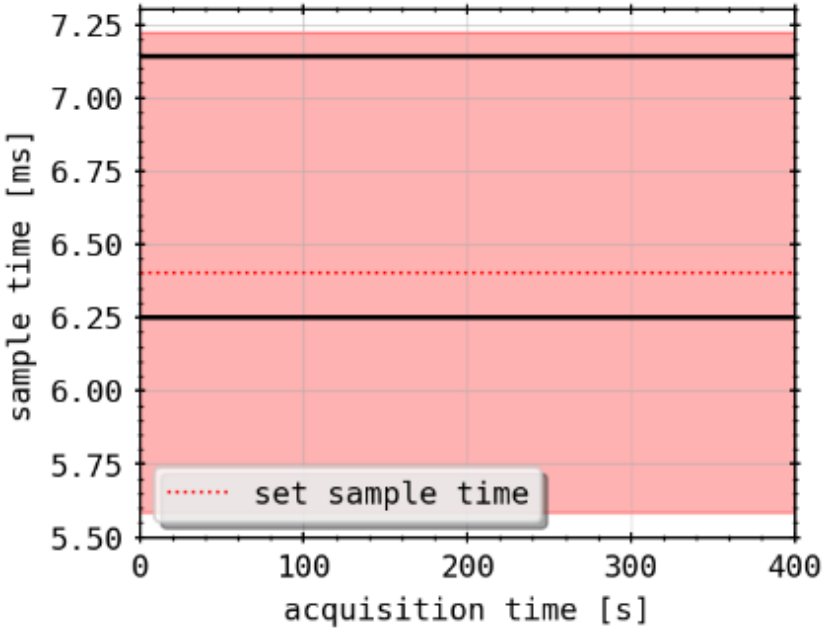
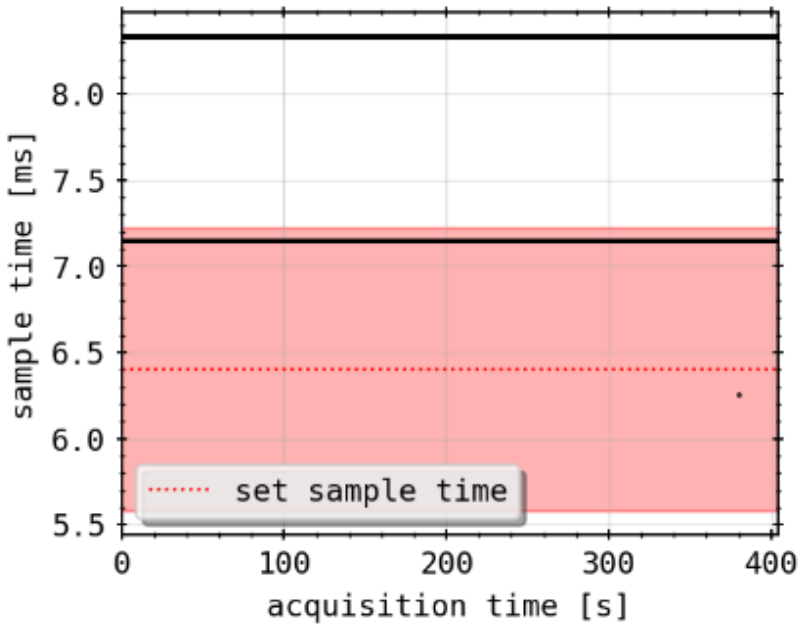
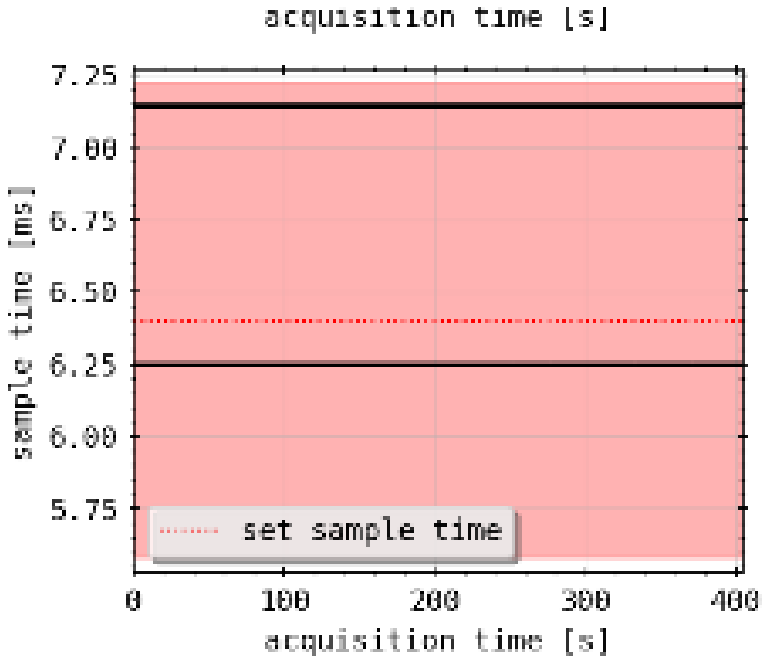


Raw_wRTF

6.4ms



Raw_w/oRTF

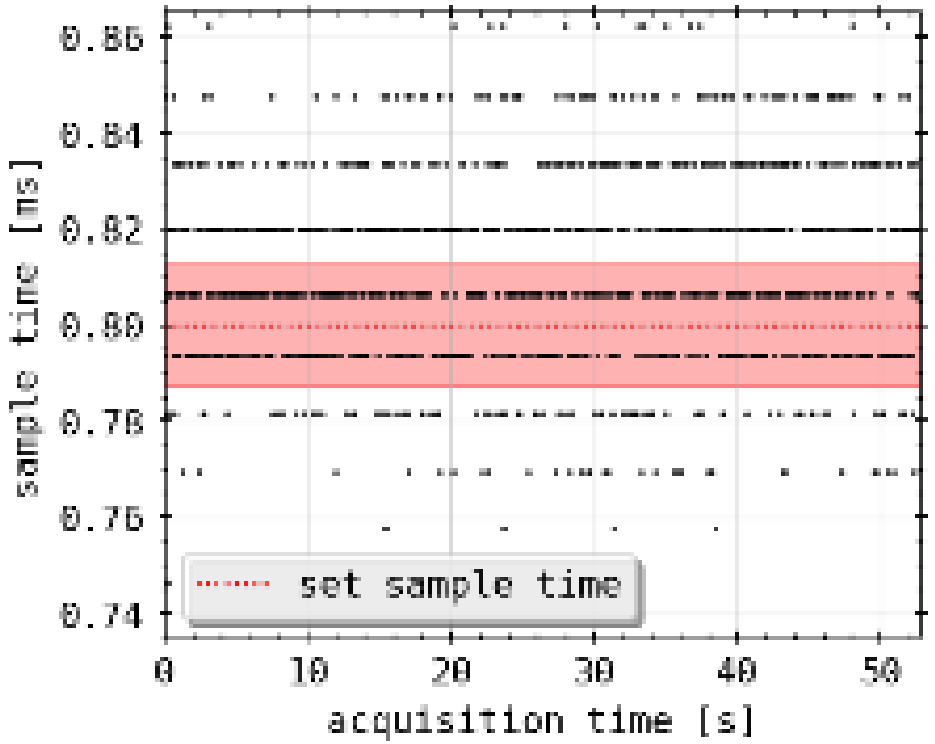


Reviewed LabVIEW DAQ routine: Performance

raw_woRTF

0.8ms

unloaded



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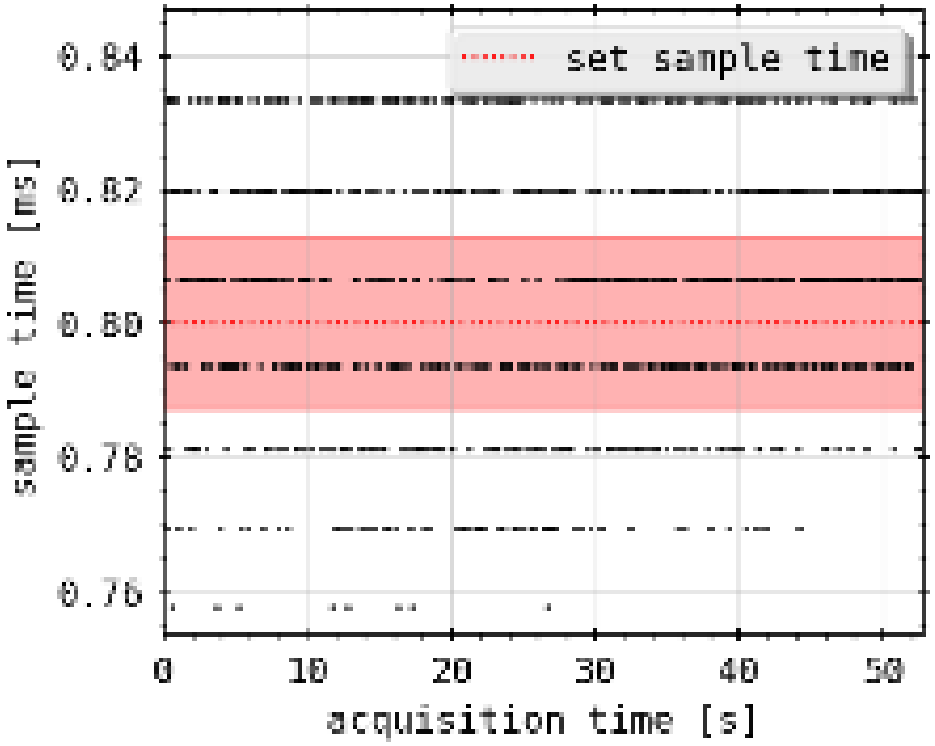

Reviewed LabVIEW DAQ routine: Performance

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1.0ms

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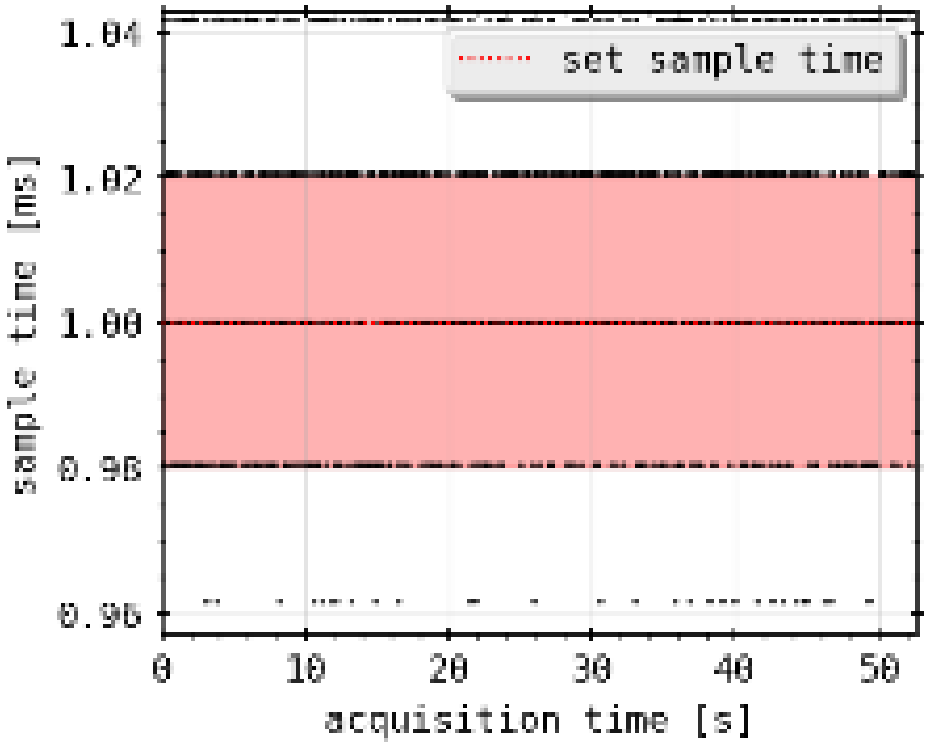

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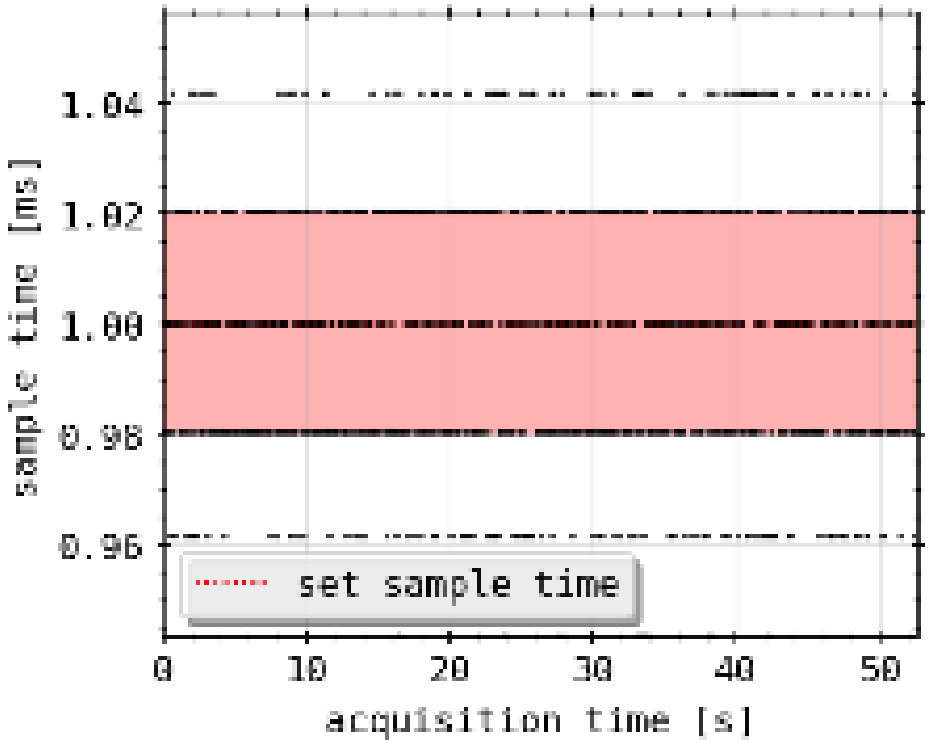
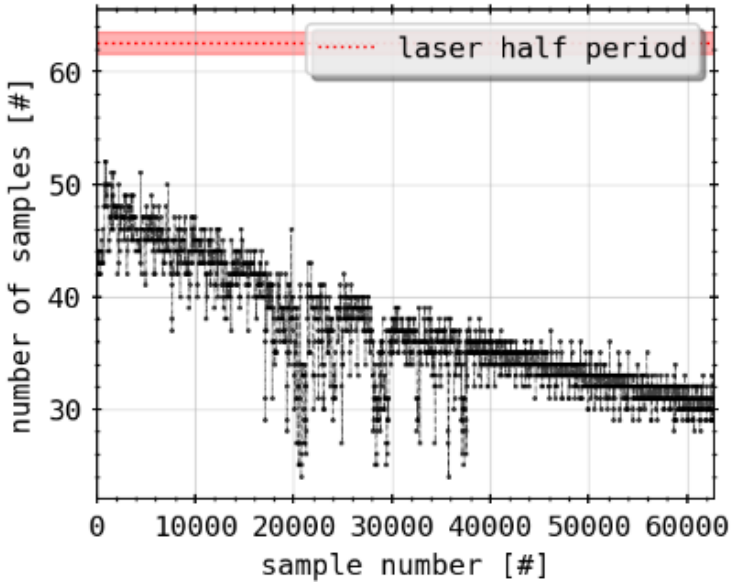


Reviewed LabVIEW DAQ routine: Performance

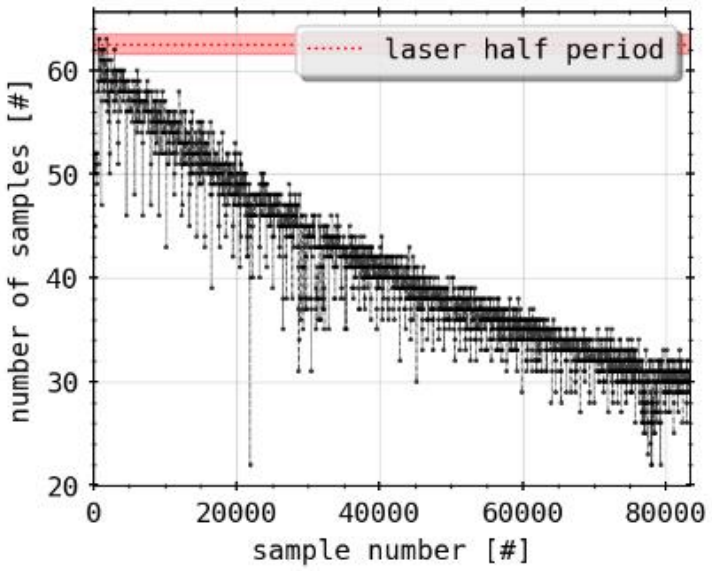
samples per laser half period

master

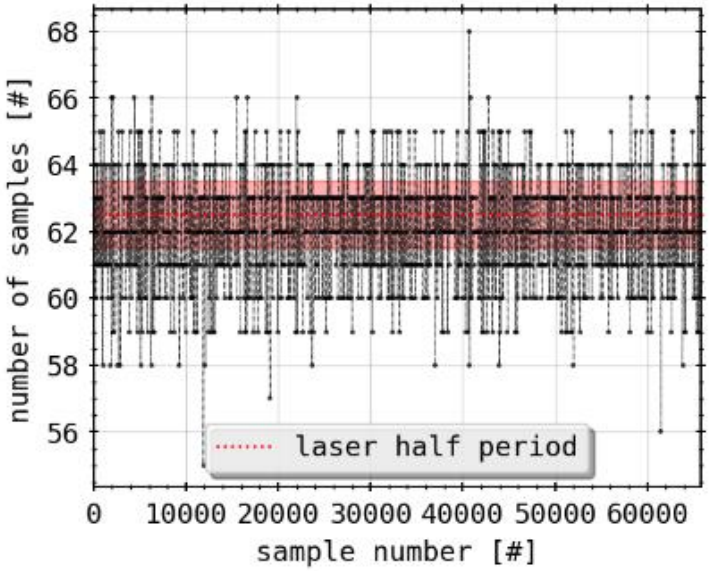


Raw_wRTF

0.8ms



Raw_w/oRTF



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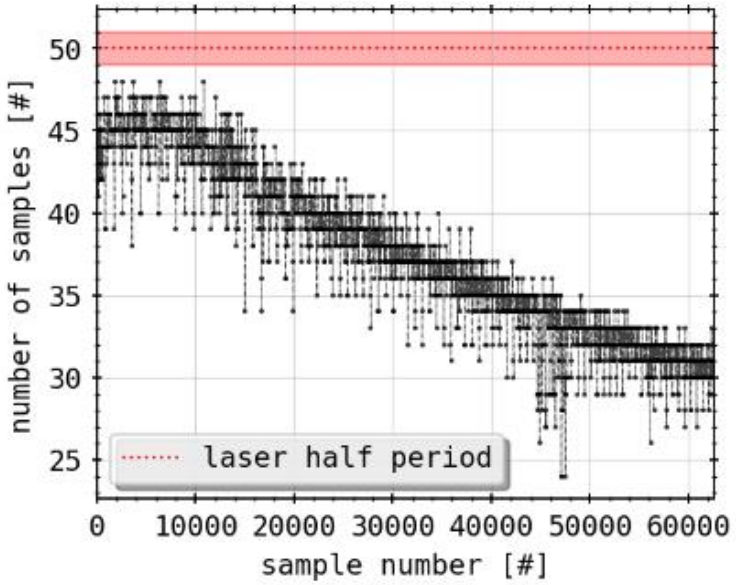
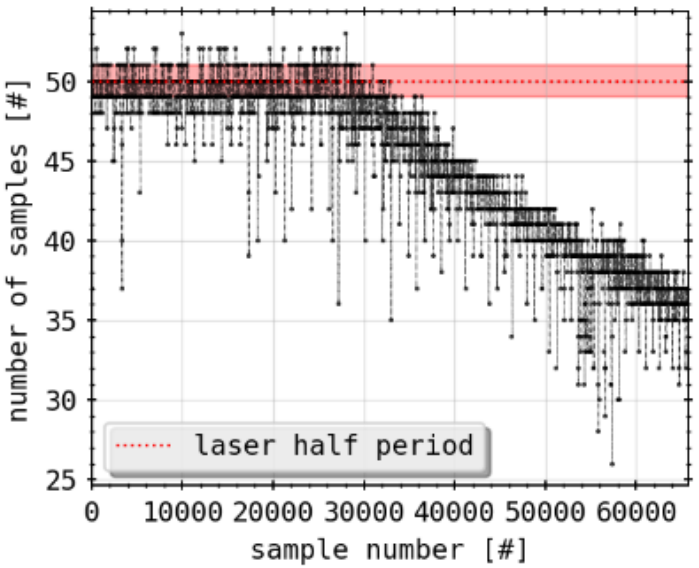
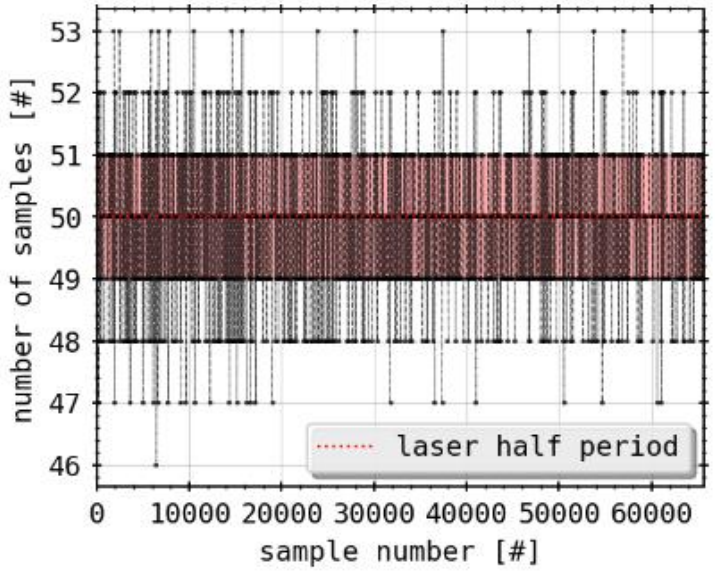


Raw_wRTF

1.0ms



Raw_w/oRTF



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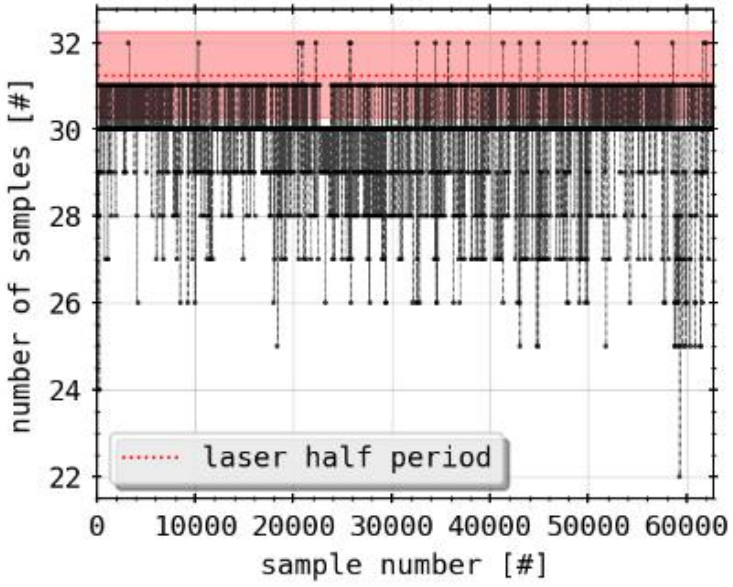
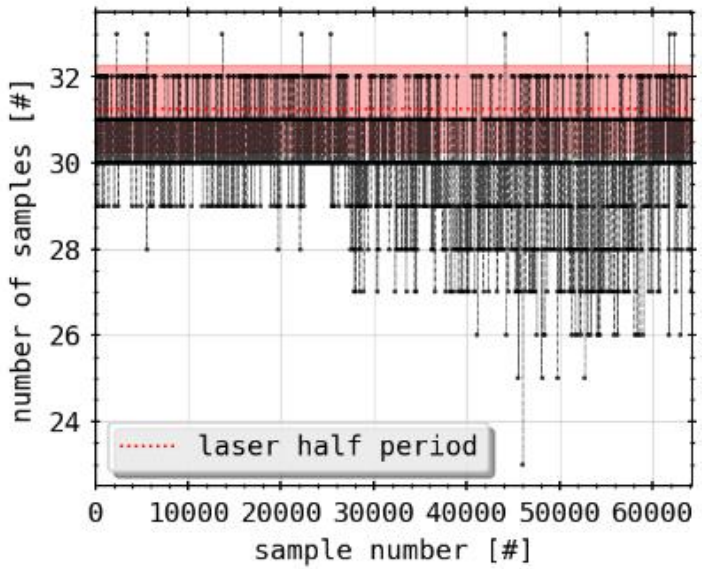
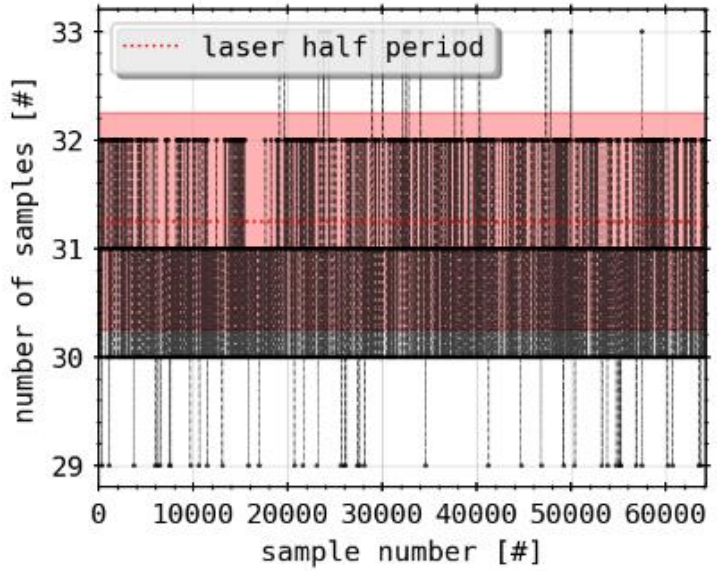


Raw_wRTF

1.6ms



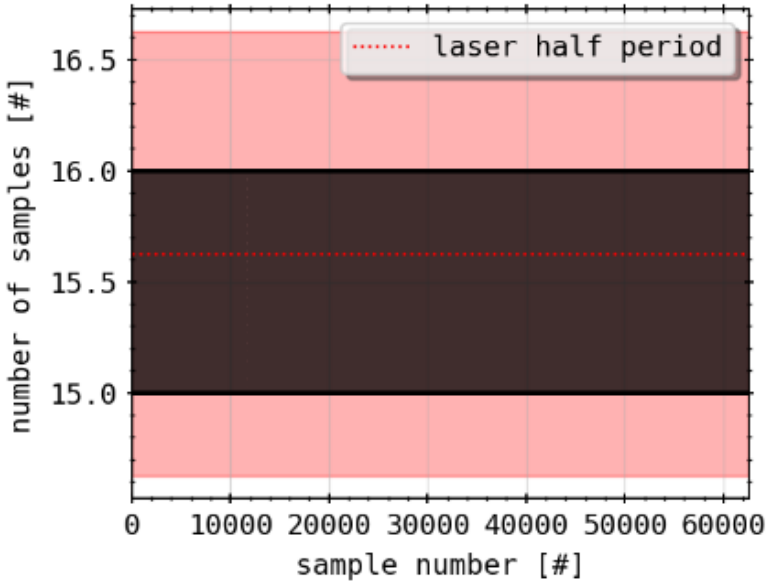
Raw_w/oRTF



Reviewed LabVIEW DAQ routine: Performance

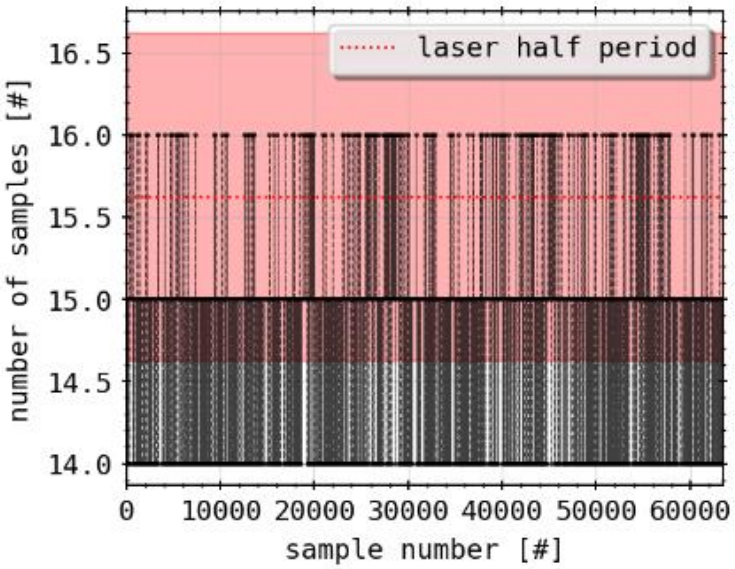
samples per laser half period

master

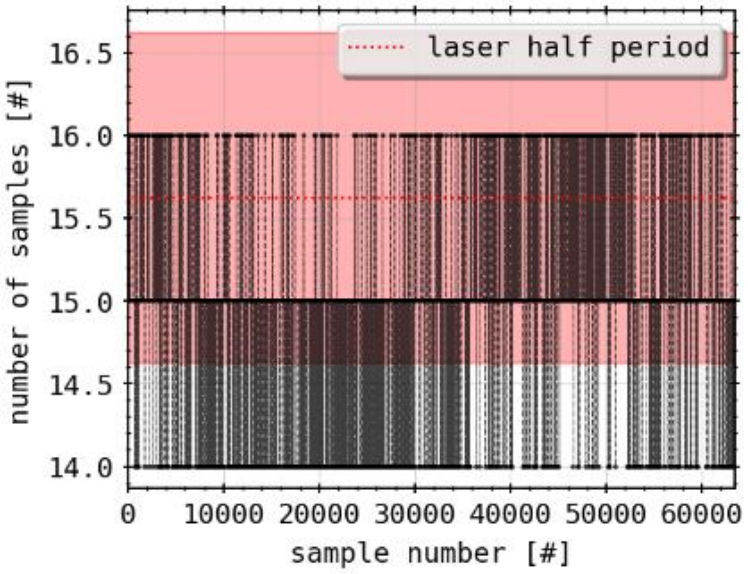


Raw_wRTF

3.2ms



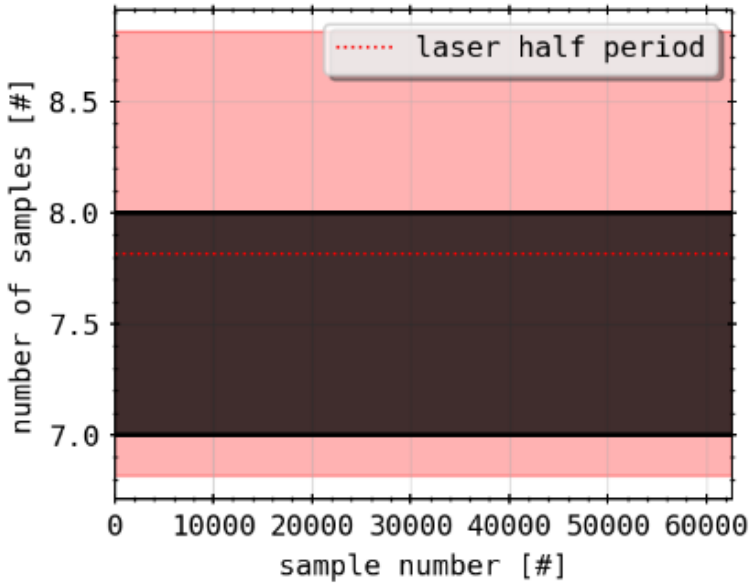
Raw_w/oRTF



Reviewed LabVIEW DAQ routine: Performance

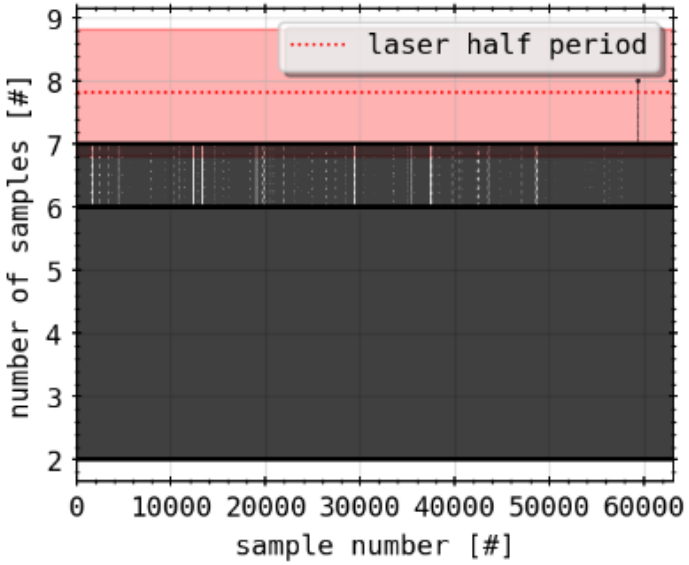
samples per laser half period

master

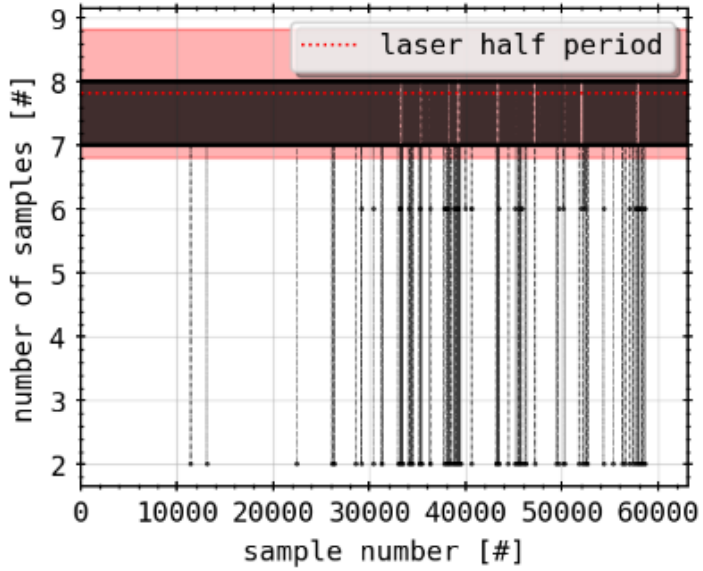


Raw_wRTF

6.4ms



Raw_w/oRTF

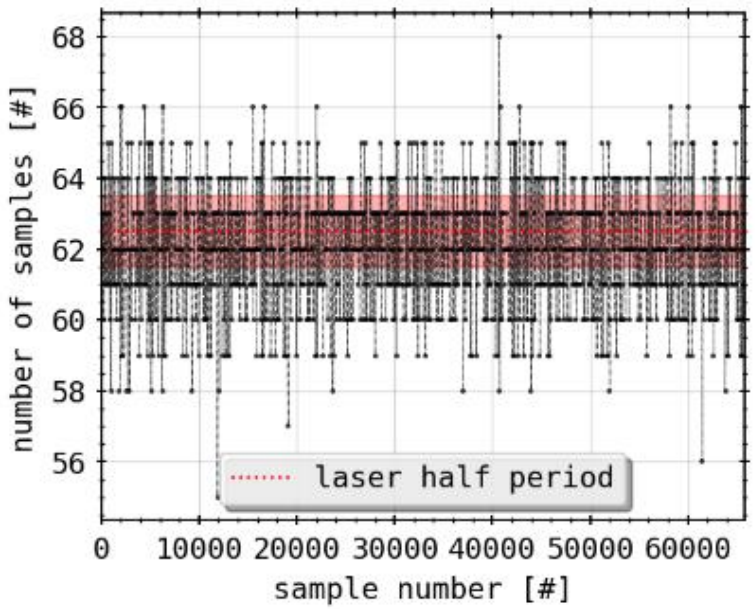


Reviewed LabVIEW DAQ routine: Performance

raw_woRTF

0.8ms

unloaded



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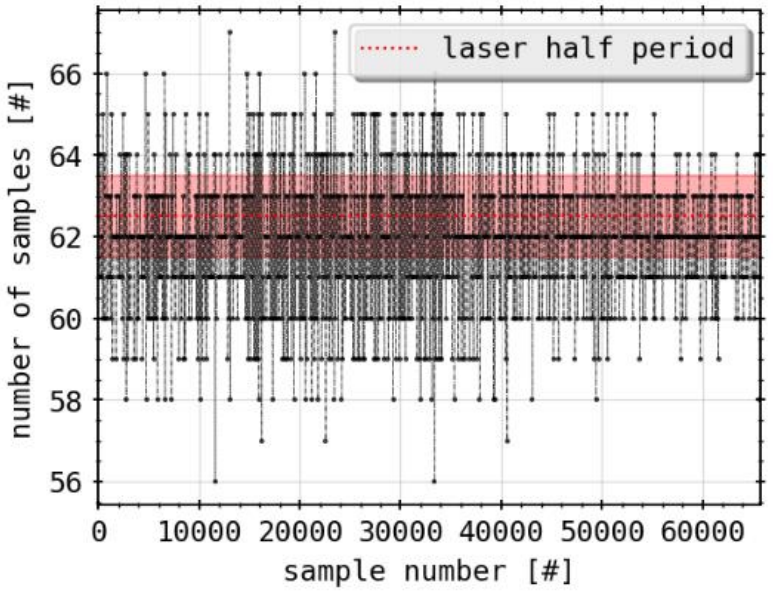

Reviewed LabVIEW DAQ routine: Performance

raw_woRTF

1.0ms

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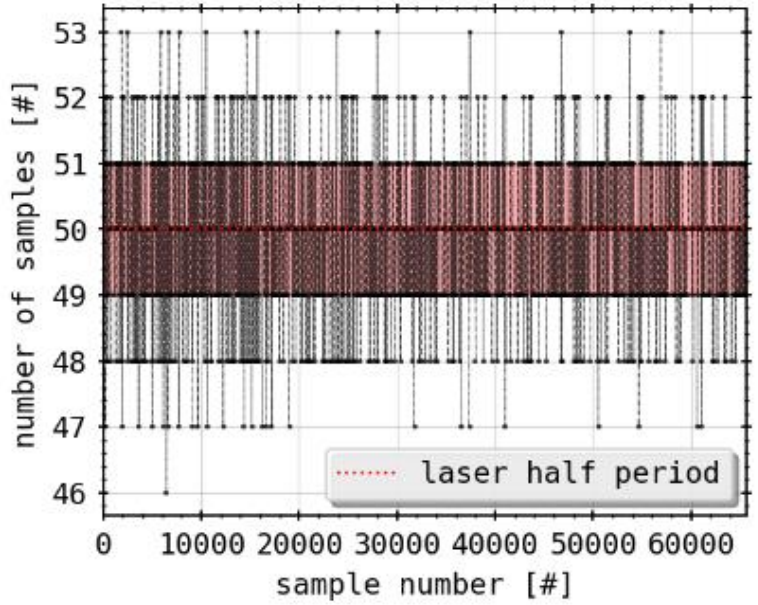

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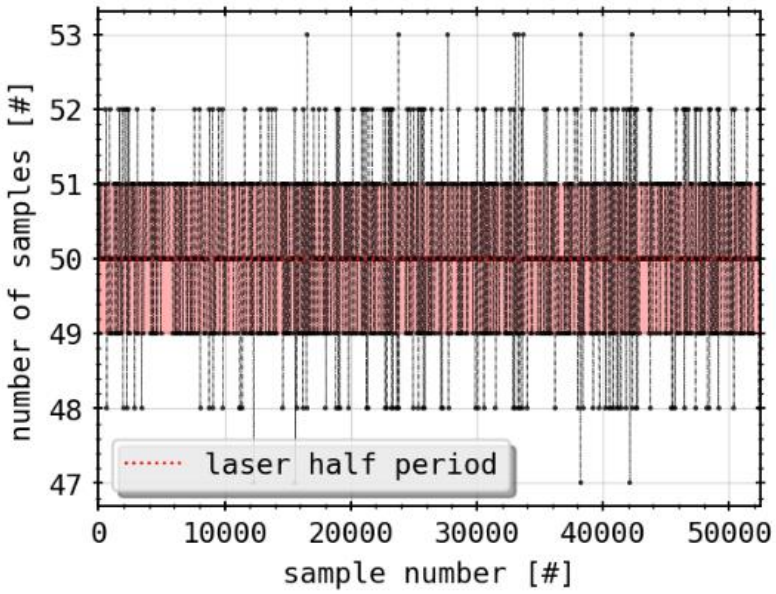

Git-Lab and Changelog.md

- https://git.ipp-hgw.mpg.de/pih/LabVIEW_QSB holds all relevant changes and versions under branches, i.e. master, raw_wRTF and raw_w/oRTF
- Changelog.md includes all information about the VI I was able to acquire and learn throughout the optimization process
- versions as of today (02/05/2020) also located in QSB_Bolometry E5 backup server