

First Sub-Topical Group Meeting 09/11/2019

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- + Laboratory Results: taken from Dasen's laboratory measurements, given each a linear fit function of $\tau(n) = \omega \cdot n + \beta = T_{\text{new}}(n)$
- + Measurement Results: time base as measured by LabVIEW itself based off of the CPU time inside the loops/program
- + Manual Method: mapped HEXOS to measured bolometer radiation and assumed a similar function in time as above

Time Equation: Lab results

taking measurements either from laboratory with laser or internal timing from LabVIEW as reference for actual timetrace:

$$t(n) = T_{\text{start, old}} + \Theta_{\text{pre DAQ}} + (S_{\text{new}} + \omega) \cdot n$$

with:

$T_{\text{start, old}}$: first timestamp of measurement, old

S_{new} : new sample time

ω : slope of fit from laboratory results

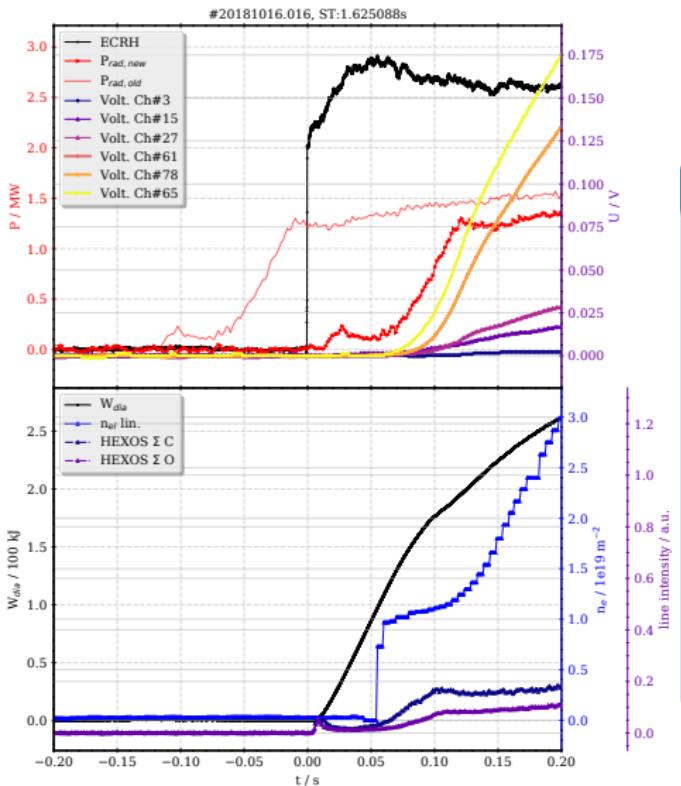
n : number of sample

$$\Theta_{\text{pre-DAQ}} = (S_{\text{new}} - S_{\text{old}} + \omega) \cdot N_{\text{skip}}$$

S_{old} : old sample time

N_{skip} : skipped samples before $T_{\text{start, old}}$

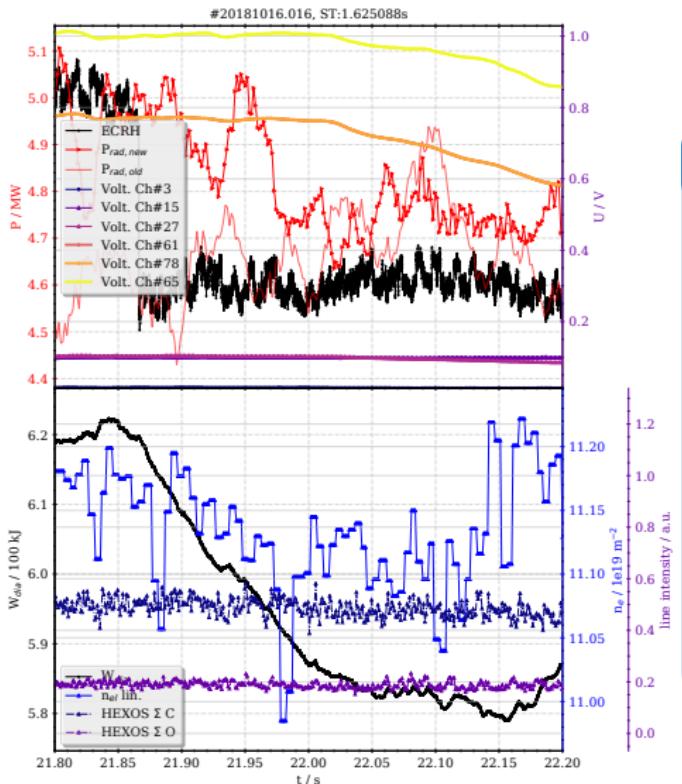
Laboratory Results: 1.6 ms



Info: lab method

- + from lab results,
 $N_{\text{skip}} = 1000$, $\omega = 0$
- + 1.56% error,
 $S_{\text{new}} = 1.625\ 088 \text{ ms}$
- + shift around T1/T4:
 $131.25 / 617.2 \text{ ms}$
- + samples and time
before T1: 5169,
 8.4001 s

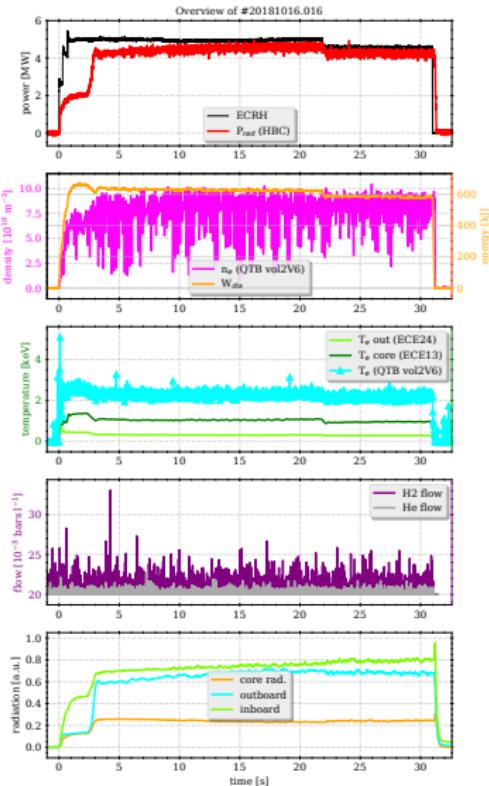
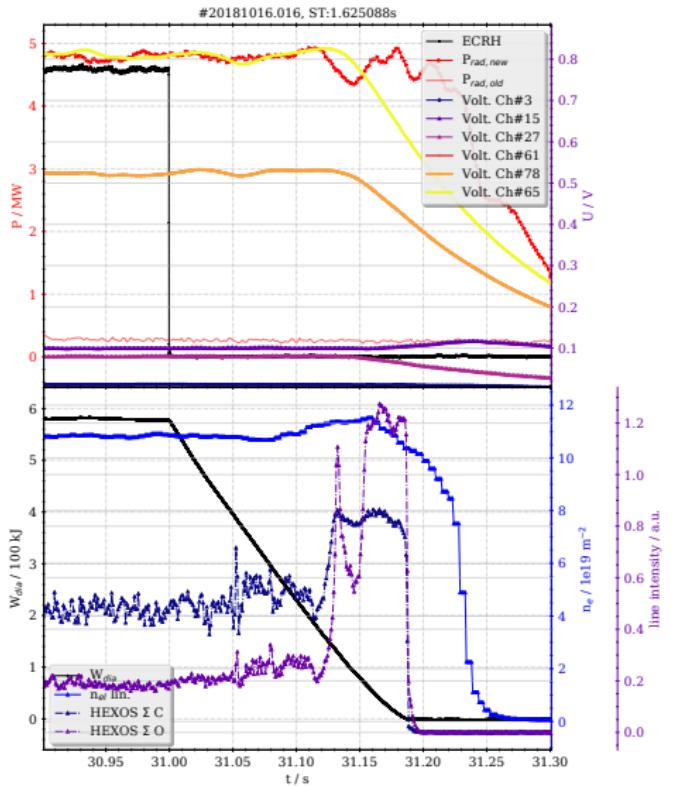
Laboratory Results: 1.6 ms



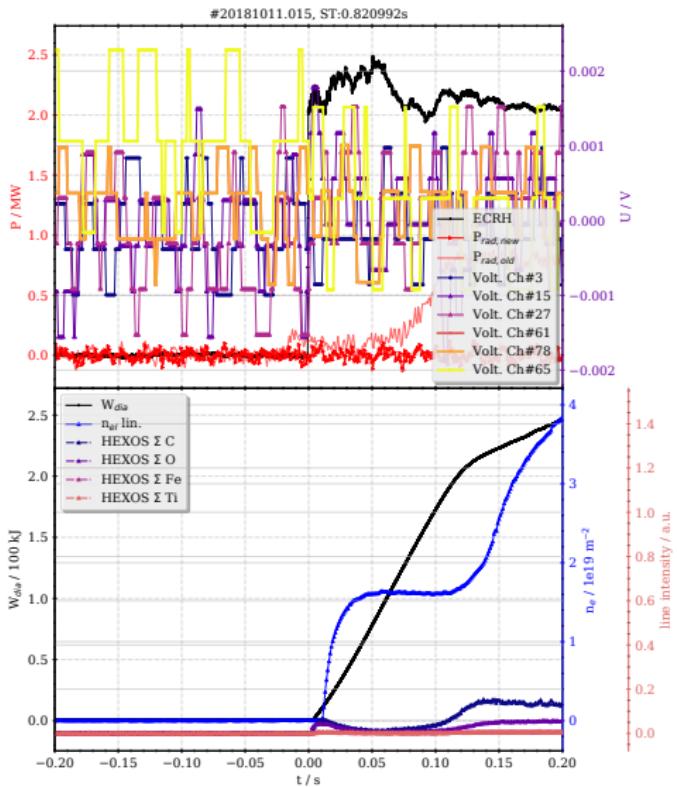
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 $131.25 / 617.2 \text{ ms}$
- + samples and time
before T1: 5169,
 8.4001 s

Laboratory Results: 1.6 ms



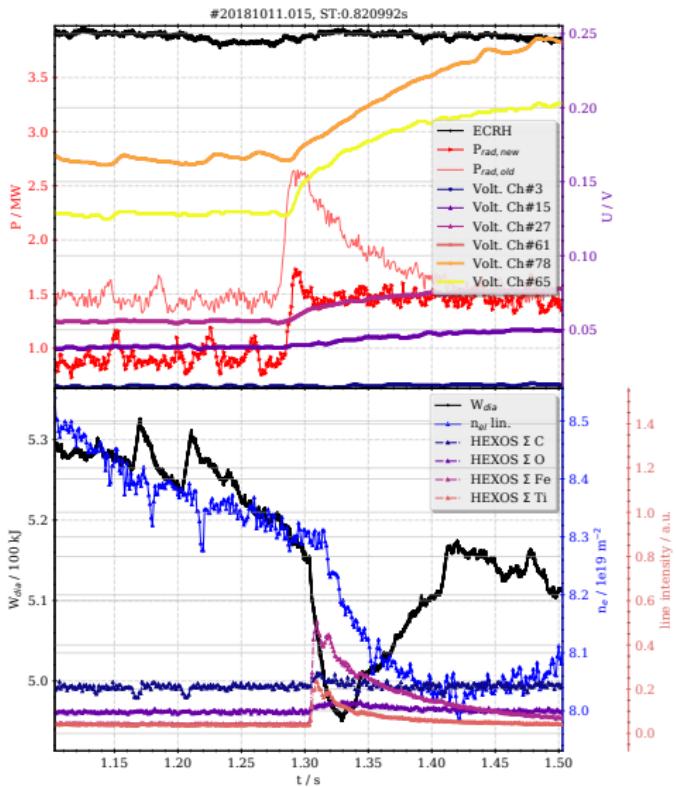
Laboratory Results: 0.8 ms



Info: lab method

- + from lab results,
 $N_{\text{skip}} = 1000$,
 $\omega = 1.005 \cdot 10^{-6}$
- + 2.62% error,
 $S_{\text{new}} = 0.821 \text{ ms}$
- + shift around T1/T4:
262.51 / 475.17 ms
- + samples and time
before T1: 12180,
9.9997 s
- + Fe/Ti LBO injections

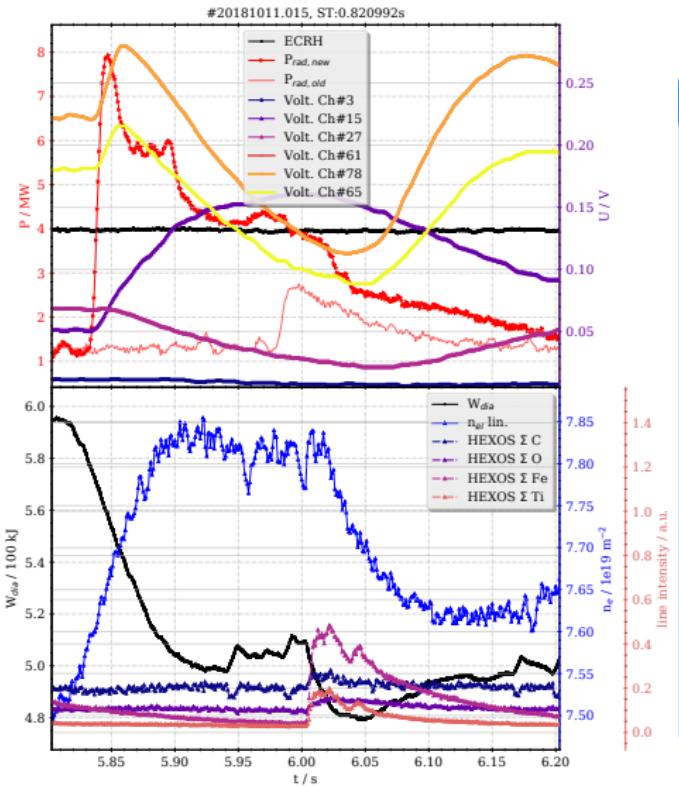
Laboratory Results: 0.8 ms



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262.51 / 475.17 ms
- + samples and time
before T1: 12180,
9.9997 s
- + Fe/Ti LBO injections

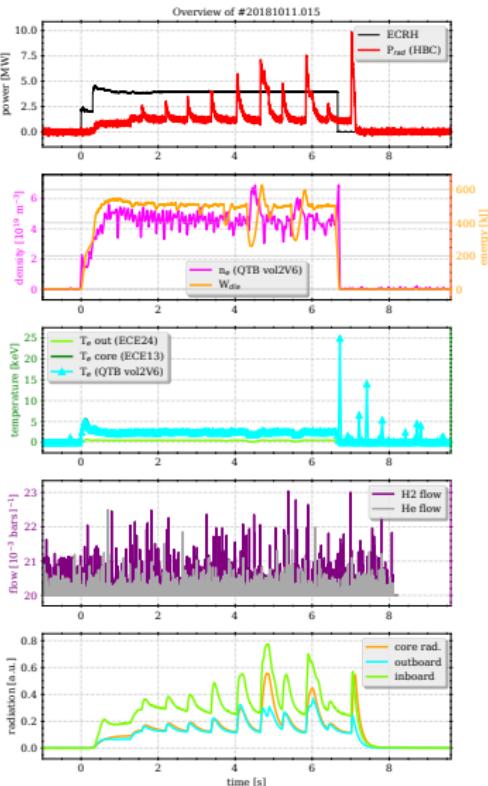
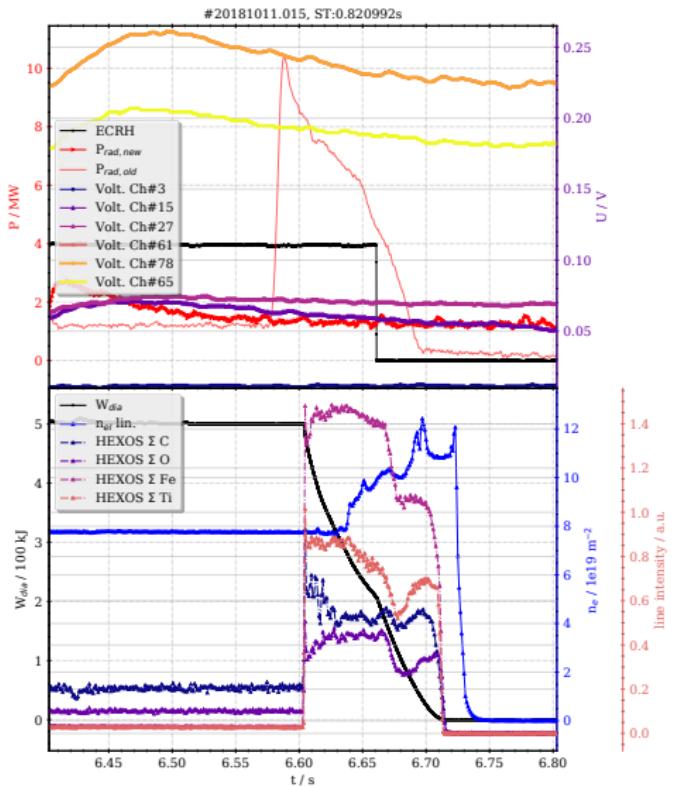
Laboratory Results: 0.8 ms



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 $N_{skip} = 1000$,
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- + 2.62% error,
 $S_{new} = 0.821 \text{ ms}$
- + shift around T1/T4:
262.51 / 475.17 ms
- + samples and time
before T1: 12180,
9.9997 s
- + Fe/Ti LBO injections

Laboratory Results: 0.8 ms



Time Equation

taking HEXOS lines for reference to map timeline/peaks to:

$$t(n) = T_{\text{start, old}} + \Theta_{\text{pre DAQ}} + (S_{\text{old}}) \cdot n \cdot G$$

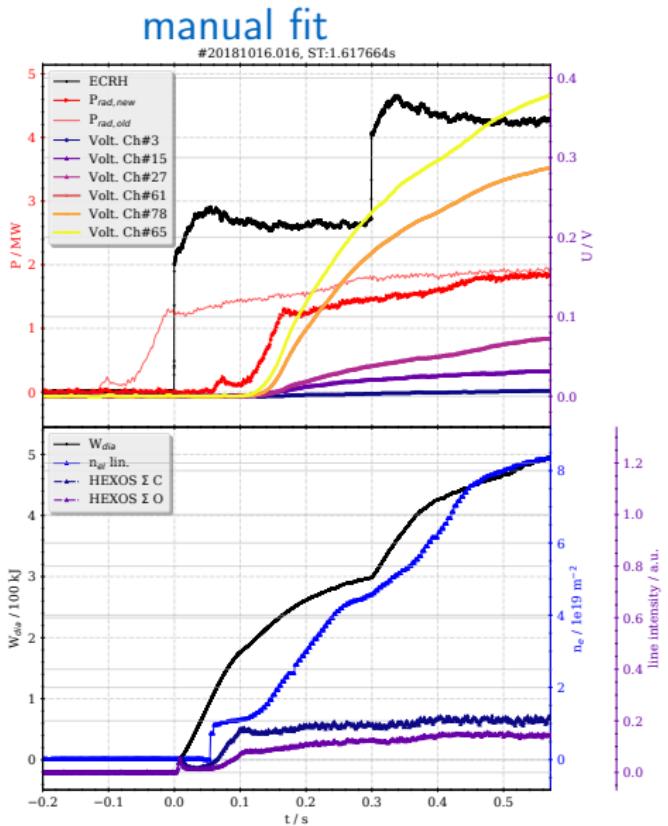
with:

G : global scaling factor from HEXOS fit

$$\Theta_{\text{pre-DAQ}} = (S_{\text{new}} - S_{\text{old}} + \omega) \cdot N_{\text{skip}} + \sigma_{\text{of}}$$

σ_{of} : offset from HEXOS fit

Manual Results: 1.6 ms

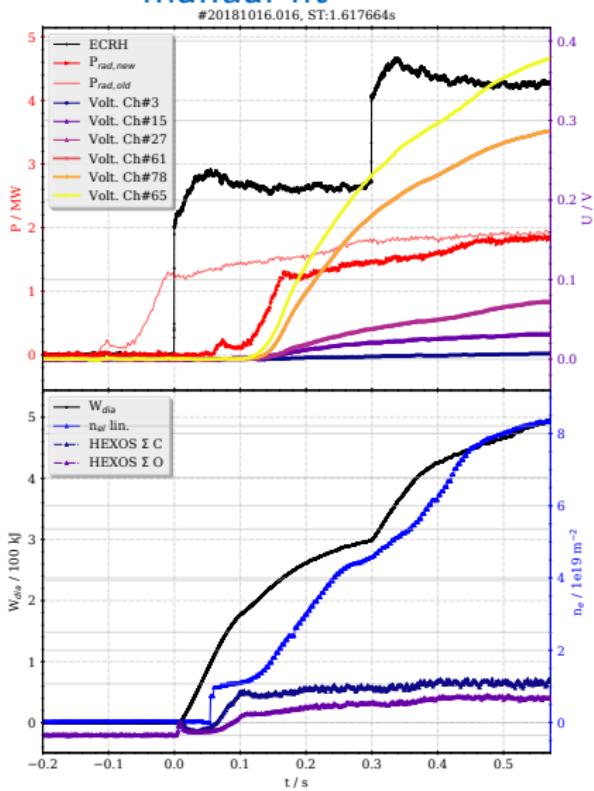


Info: manual method

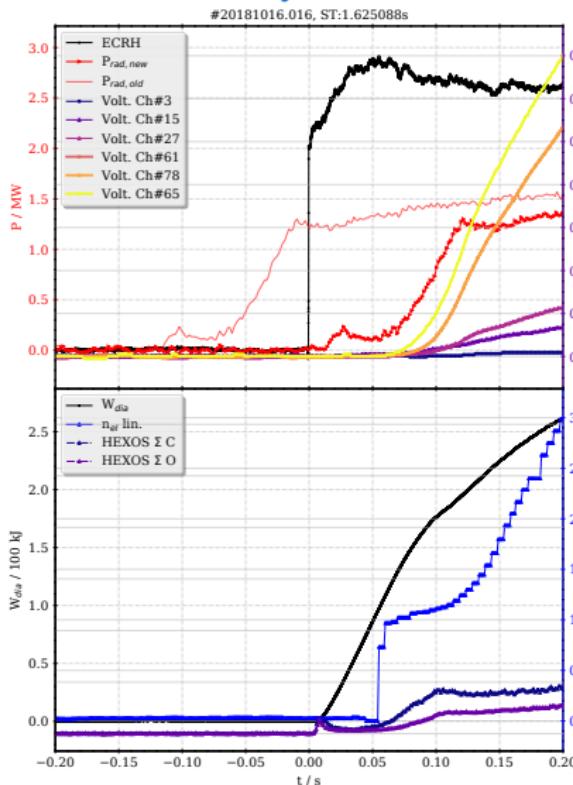
- + from HEXOS,
 $N_{\text{skip}} = 1000, \omega = 0$
- + 0% error,
 $S_{\text{new}} = 1.6 \text{ ms}$
- + shift around T1/T4:
 $177.324 / 519.433 \text{ ms}$
- + samples and time
before T1: 5140,
 8.31479 s
- + $\sigma_{\text{of}} = 84 \text{ ms},$
 $G = 1.011$

Manual Results: 1.6 ms

manual fit

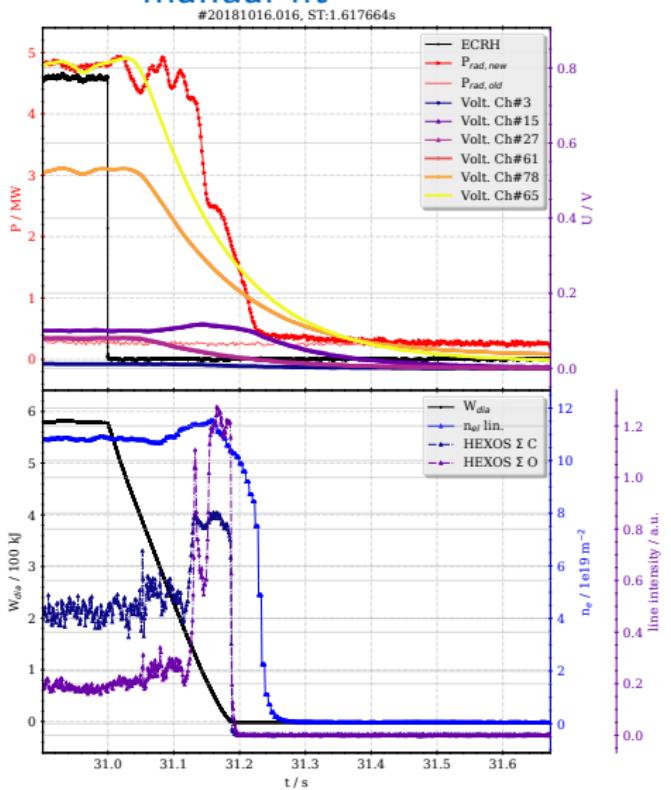


laboratory fit

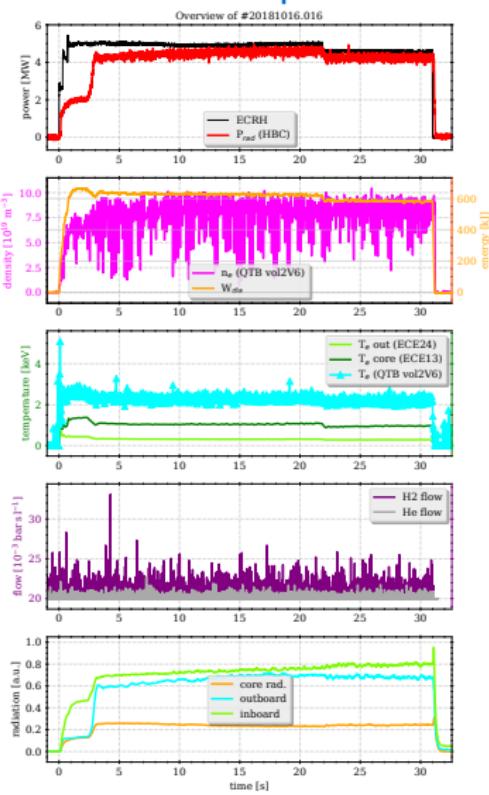


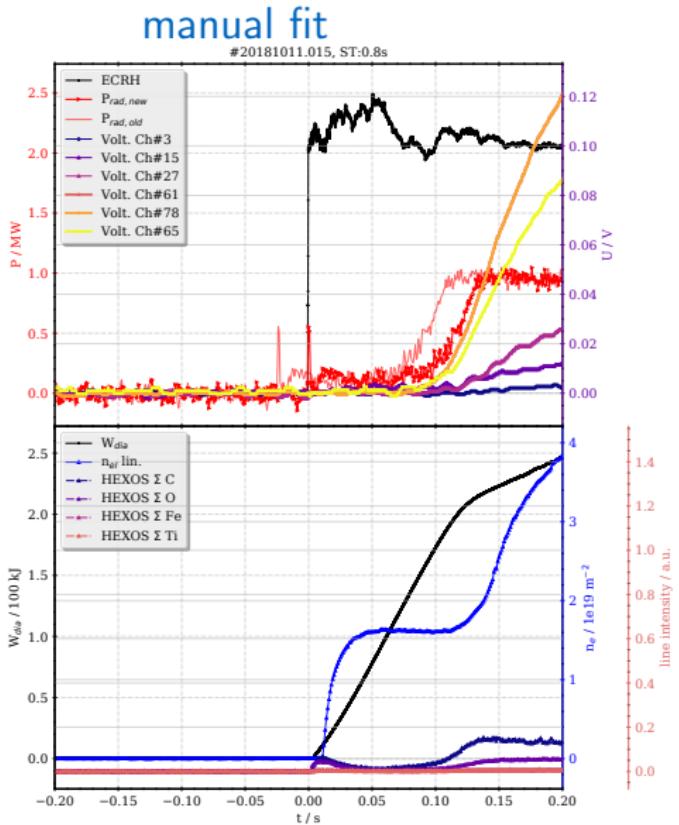
Manual Results: 1.6 ms

manual fit



overview plot





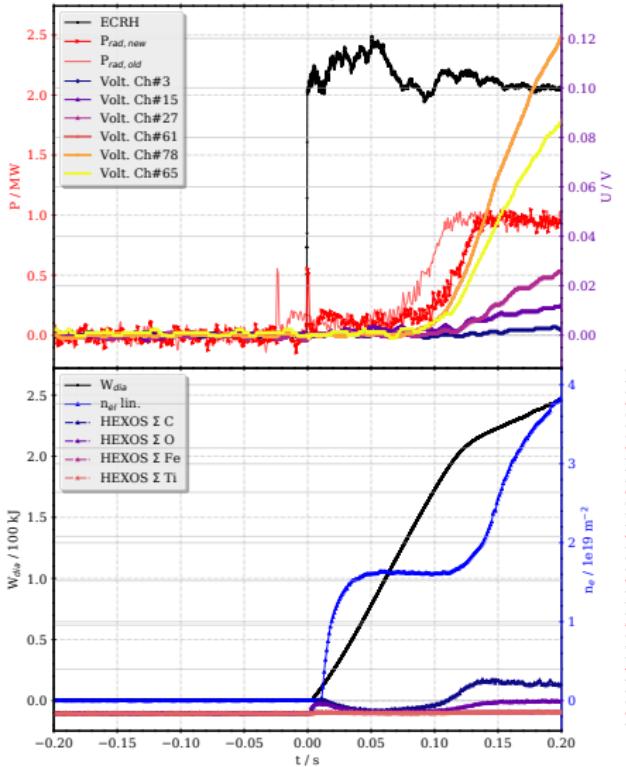
Info: manual method

- + from HEXOS,
 $N_{\text{skip}} = 1000$, $\omega = 0$
- + 0% error,
 $S_{\text{new}} = 0.8 \text{ ms}$
- + shift around T1/T4:
 $23.891 / 23.891 \text{ ms}$
- + samples and time
before T1: 12470,
 9.976 s
- + $\sigma_{\text{of}} = 23.89 \text{ ms}$,
 $G = 1.0$

Manual Results: 0.8 ms

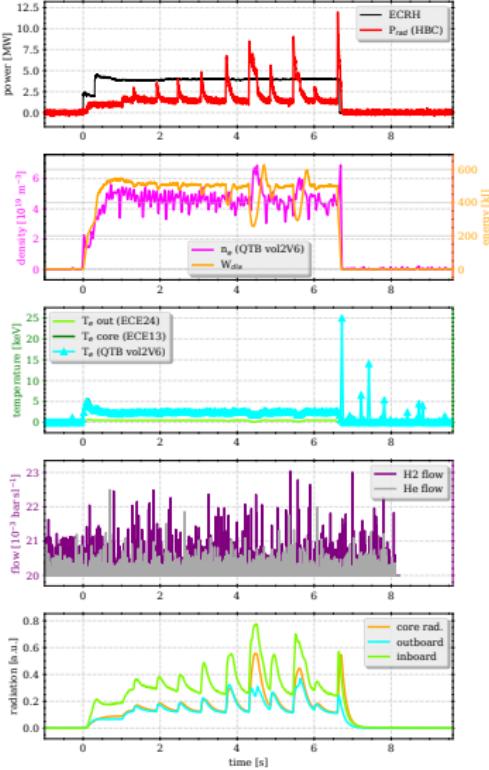
manual fit

#20181011.015, ST:0.8s



manual fit

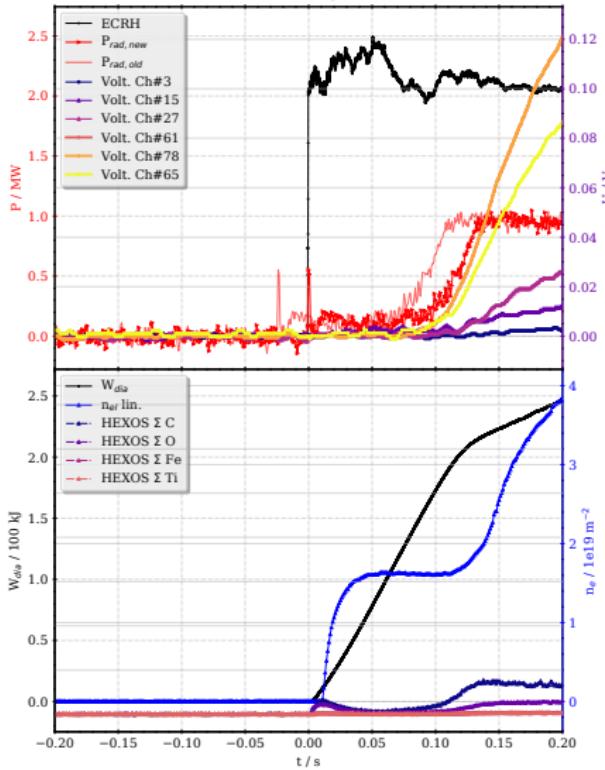
Overview of #20181011.015



Manual Results: 0.8 ms

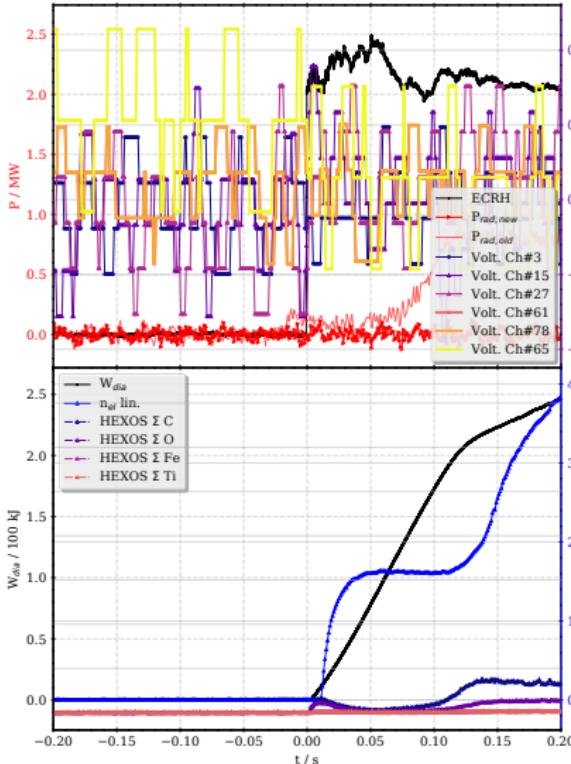
manual fit

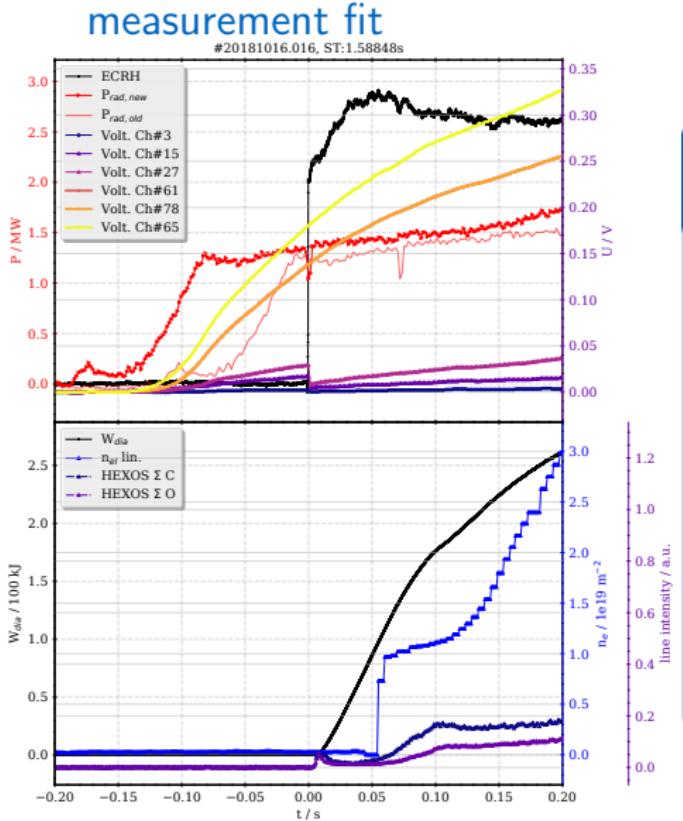
#20181011.015, ST:0.8s



laboratory fit

#20181011.015, ST:0.820992s

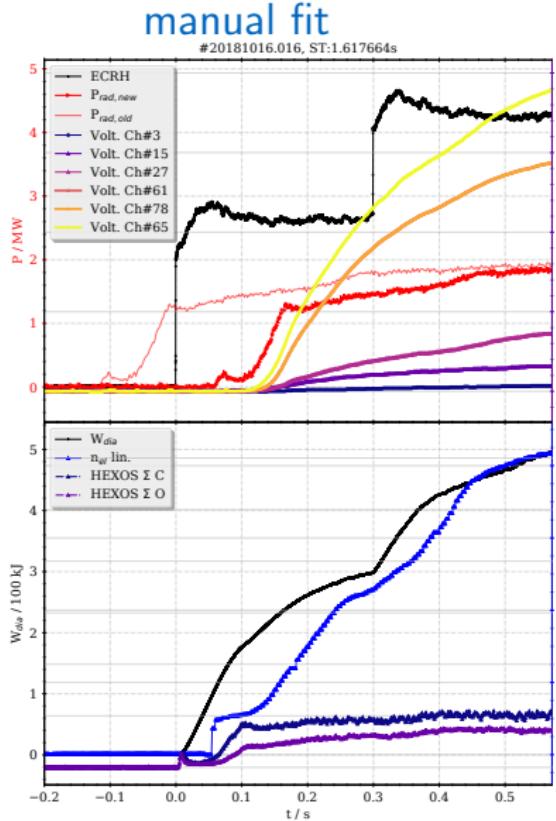
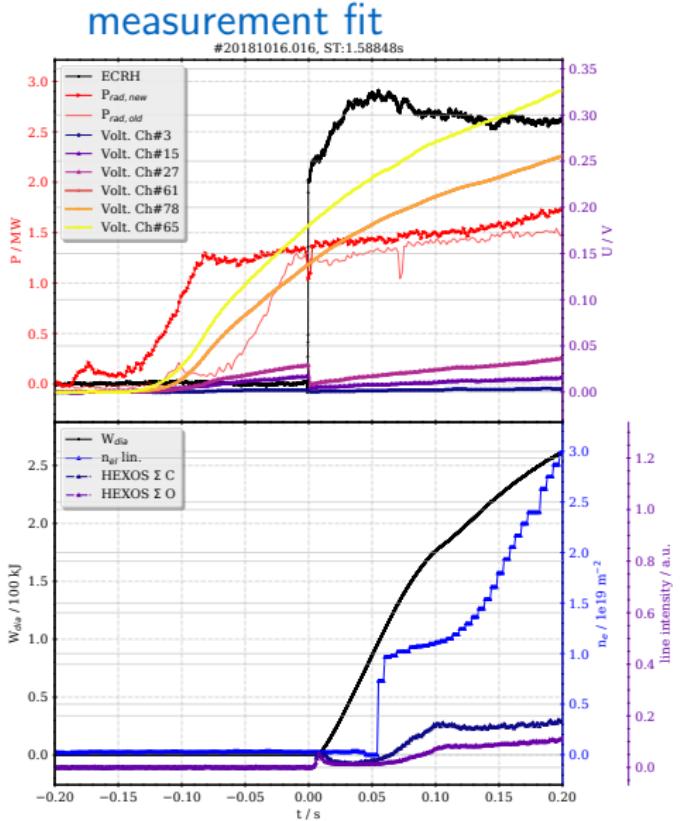


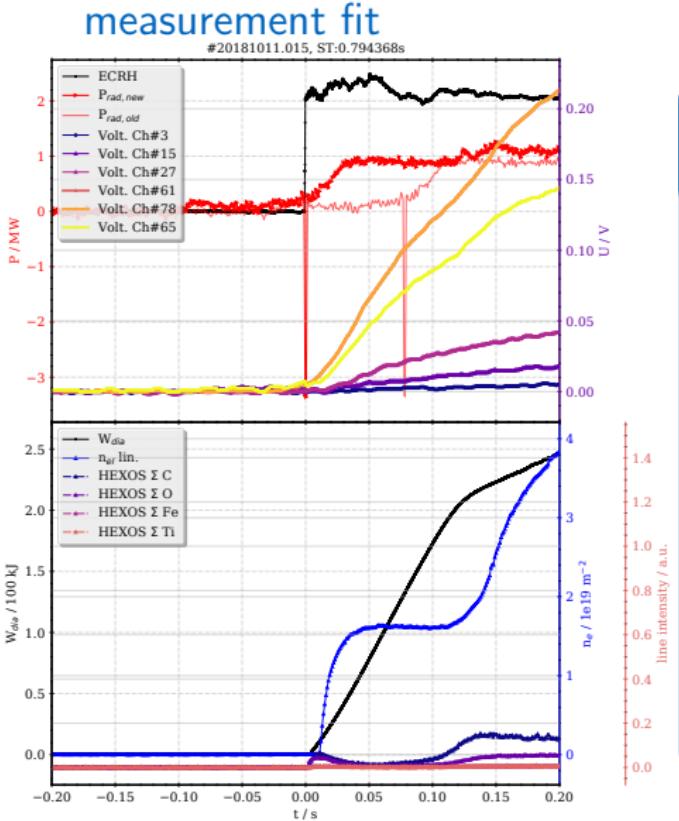


Info: measurement method

- + from LabVIEW,
 $N_{\text{skip}} = 1000$, $\omega = 0$
- + -0.72% error,
 $S_{\text{new}} = 1.589 \text{ ms}$
- + shift around T1/T4:
 $-71.667 / -294.556 \text{ ms}$
- + samples and time
before T1: 5295,
8.411 s

LabVIEW Results: 1.6 ms



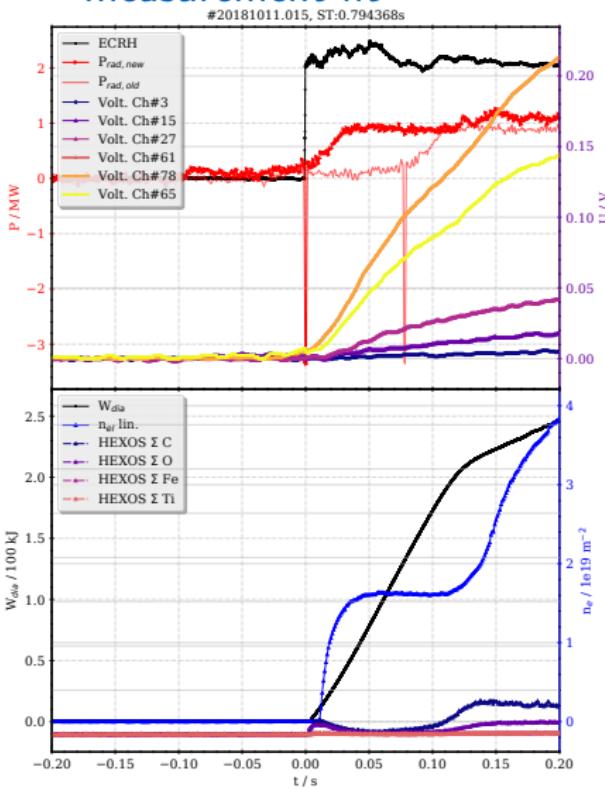


Info: measurement method

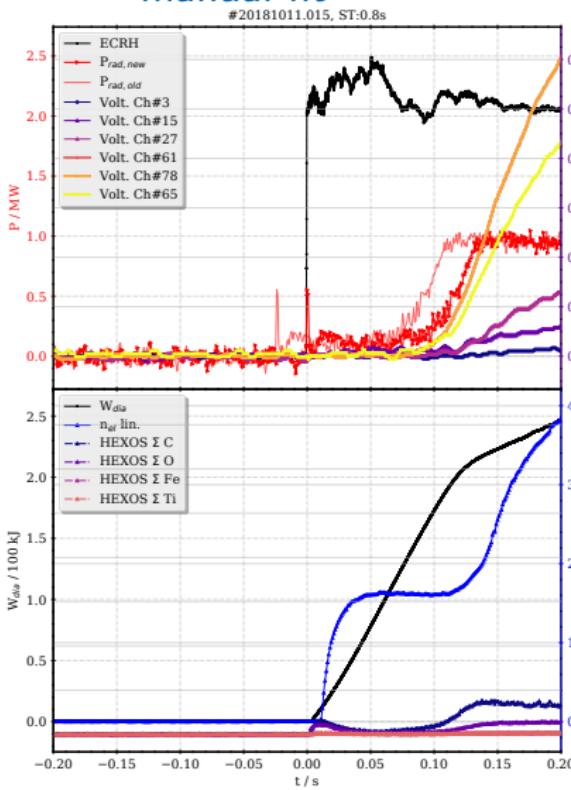
- + from LabVIEW,
 $N_{\text{skip}} = 1000$, $\omega = 0$
- + -0.72% error,
 $S_{\text{new}} = 0.794 \text{ ms}$
- + shift around T1/T4:
-77.4 / -135.45 ms
- + samples and time
before T1: 12597,
10.007 s
- + Fe/Ti LBO injections

LabVIEW Results: 0.8 ms

measurement fit



manual fit



- + laboratory results do not work flawlessly for 0.8 and 1.6 ms
- + linear function yields over-estimation towards end of discharge
- + potentially only offset in time base
- + highly likely that, since experimental campaign something in the setup changed that influences the timing

- + manual fit method from HEXOS works much more reliable, beginning and end of discharge
- + properly represents event timings in-between
- + possibly applicable for more experiments or entire campaign with some fine tuning
- + LabVIEW time measurements (old) not useable, however loop timings from DAQ routine looked similar

Protocoll

- + need to implement the skipped samples into the timebase correction, sadly not in PARLOGs (assumed to be 1000)
- + subtopical group archive to be established in //sv-di-fs-1/E5-IMP/Bolometer/Besprechungen/SubtopicalGroupMeeting/
- + overview plots to be shown along the respective trigger cross checks
- + HEXOS lines for LBO/intrinsic impurities to be displayed alongside/next to
- + time difference at specified sample/trigger to old timetraces
- + discussed cosmetics and phrasing on Dasen Fu's v3.0 presentation on the timing problem

Protocoll

- + compare the HEXOS distinguished timings to the peak locations of the Prad/channels
- + write the function used for correction down
- + joust down a quick summary
- + add more channels from both cameras (core, 2xedge) to display