



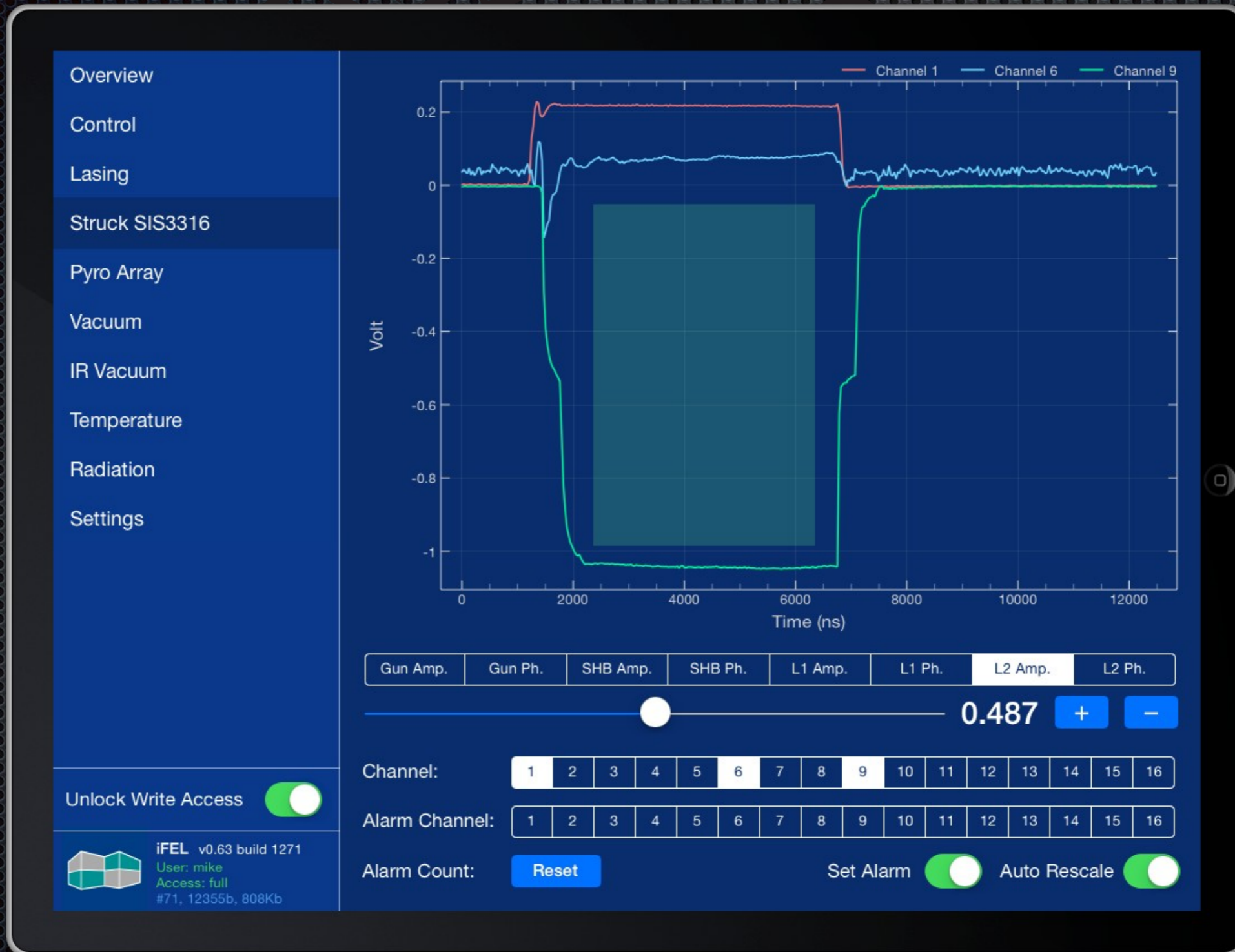
Timestamp issues and other trouble

EPICS collaboration meeting, May, 2015
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The FHI FEL

- Mid-infrared oscillator FEL
- Accelerator consists of a thermionic gridded gun, a subharmonic buncher, and two S-band standing-wave copper structures
- Electron energy adjustable from 15 to 50 MeV
- More than 200 pC bunch charge
- Moderate “shot” rates (1Hz, 5Hz, 10Hz, max 20Hz)
- Planar hybrid-magnet undulator within a 5.4 m long IR cavity
- Wavelength range from 4 to 48 μm
- 17547 PVs on 29 IOC's

iFEL - iPad-App



Why I am here?

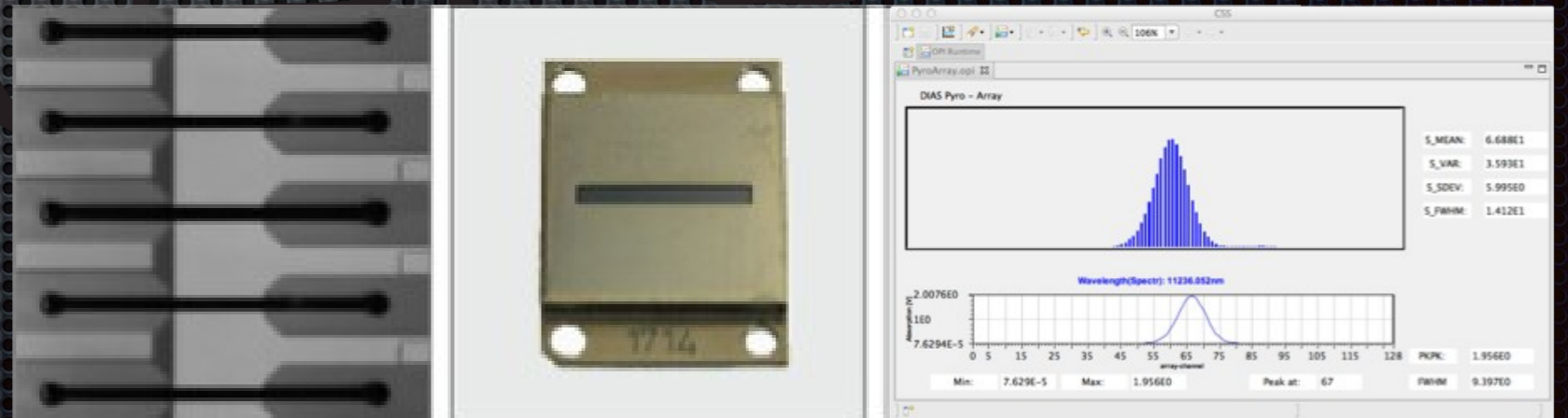
- I just have questions!
- I do not have right answers :- (
- I would like to thank Michael for his contributions
E.g. “epics-ioc.pdf” and “epics-devsup.pdf” at
<https://pubweb.bnl.gov/~mdavidsaver/epics-doc>
- We were always running into the problem of the temporal assignment of the record data
- It gets worse. For new pulse-probe experiments, we need to evaluate the micro-pulses too. (1GHz)

The 1st 5', SIS3316

- 16 channel, 14bit ADC, 250 MSPS, VMEbus
+++ SFP cage for Gigabit Ethernet +++
- Use of the provided CPP-lib to communicate with the board (UDP)
- The device support for this board is based on the device support for the SIS3302 (Michael)
- No VMEbus, but Ethernet communication
- No ISR, therefore no timestamp at all
- Card internal 48bit timestamp can not be used, no relation to any time

The 2nd 5', shot number

- For monitoring the wavelength we are running an Acton vacuum monochromator (VM-504) in conjunction with a pyroelectric linear array
- This is a “homemade” device using a PC104 SBC with a DM6430 module from RTD with 16bit A/D, S&H, versatile triggering, pacer clock,...



The 2nd 5', shot number

- PyroArray device support, derived from the waveform record
- At machine trigger take the actual time and adds "shotnumber" to the nsec part of the "triggerTime":

```
epicsEventWait(priv->syncEvent);
epicsMutexMustLock(priv->lock);
epicsTimeGetCurrent(&(priv->triggerTime));
if (priv->extTriggerCounter < (1000 - 2)) {
    priv->extTriggerCounter += 1;
} else {
    priv->extTriggerCounter = 0;
}
msec = priv->triggerTime.nsec / 1000000;
priv->triggerTime.nsec = msec * 1000000
    + priv->extTriggerCounter * 1000;
```

The 2nd 5', shot number

- Set the TIME-field of the record on read access (adds the shot number to the waveform data too):

```
prec->time = priv->triggerTime;
((double*)(prec->bptr))[PYRO_SAMPLES/2] = 0.0; // reserved
((double*)(prec->bptr))[PYRO_SAMPLES/2 + 1] =
    (double)priv->extTriggerCounter;
prec->nord = n;
if (prec->tssel.type == CONSTANT
    && prec->tse == epicsTimeEventDeviceTime) {
    prec->time = priv->triggerTime;
}
```


The 2nd 5', shot number

- My last (two) question(s)
 - Does it makes sense that the TSEL field of other records points to the TIME field of the PyroArray record?
 - Does it works on distributed IOCs?

```
record(waveform, "${IOC}pyroArray")
{
  field(DTYP, "diasPyro")
  ...
  field(SCAN, "I/O Intr")
  field(TSEL, "42")
  field(TSE, "-2")
}
```