

Splitter for EPD as FCS Preshower

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Reminder on the West EPD

tiles: 372, 24 (ϕ) \times 15 (η) + 12 more (ϕ) near the beamline
FEE: NW and SW boxes, 12 boards each, 16 ch/board

J. Adams, A. Ewigleben, S. Garrett et al. Nuclear Inst. and Methods in Physics Research, A 968 (2020) 163970

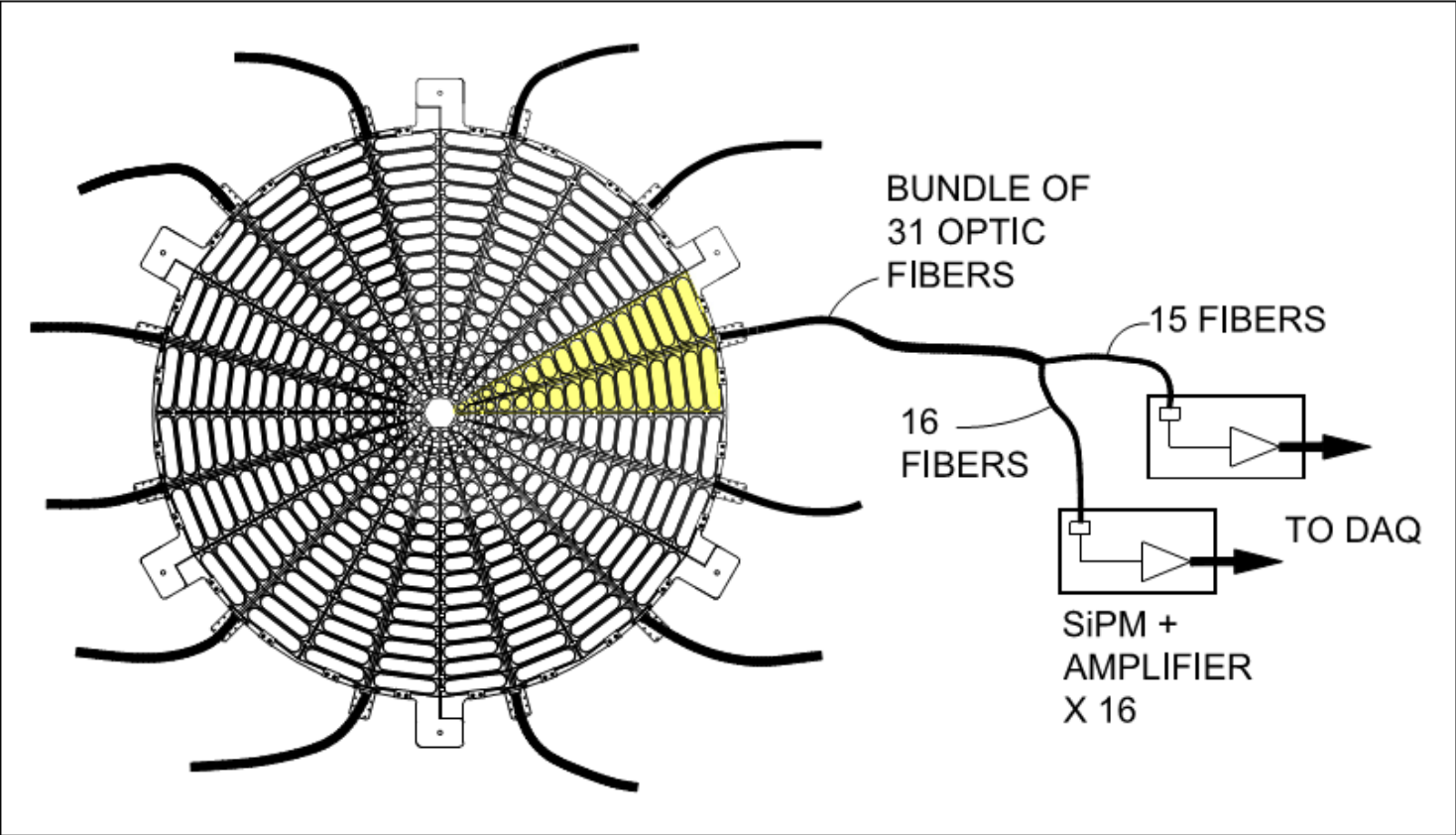
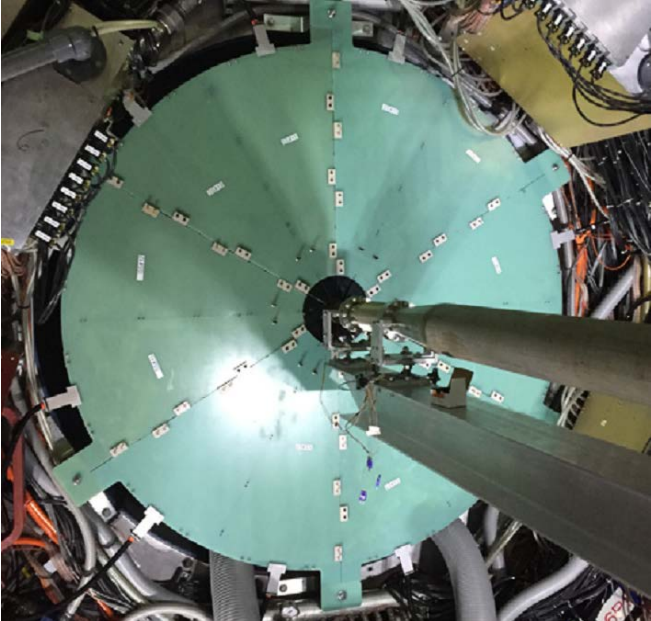
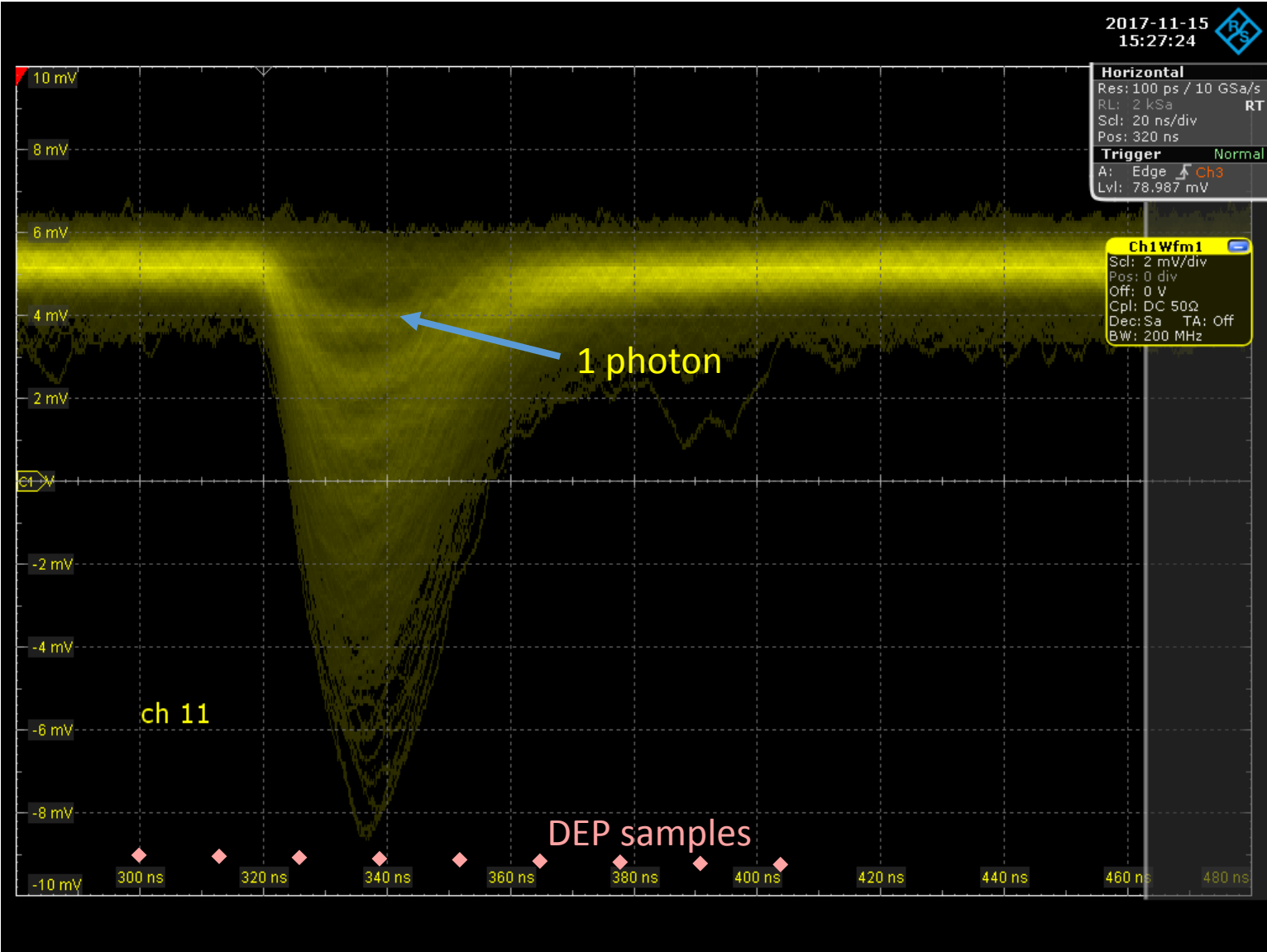


Fig. 1. A sketch of the EPD system. One of two EPD wheels is shown. The 31 tiles from each of 12 supersectors are connected via optical fiber bundles to silicon photomultipliers and amplification electronics. See text for details.



Reminder on the West EPD

signals (as seen by QT – signals on MDR cable are slightly faster...)



It was made about as fast as possible due to limitations of QT readout (gate width and imperfections).

It is probably too fast for DEP readout.

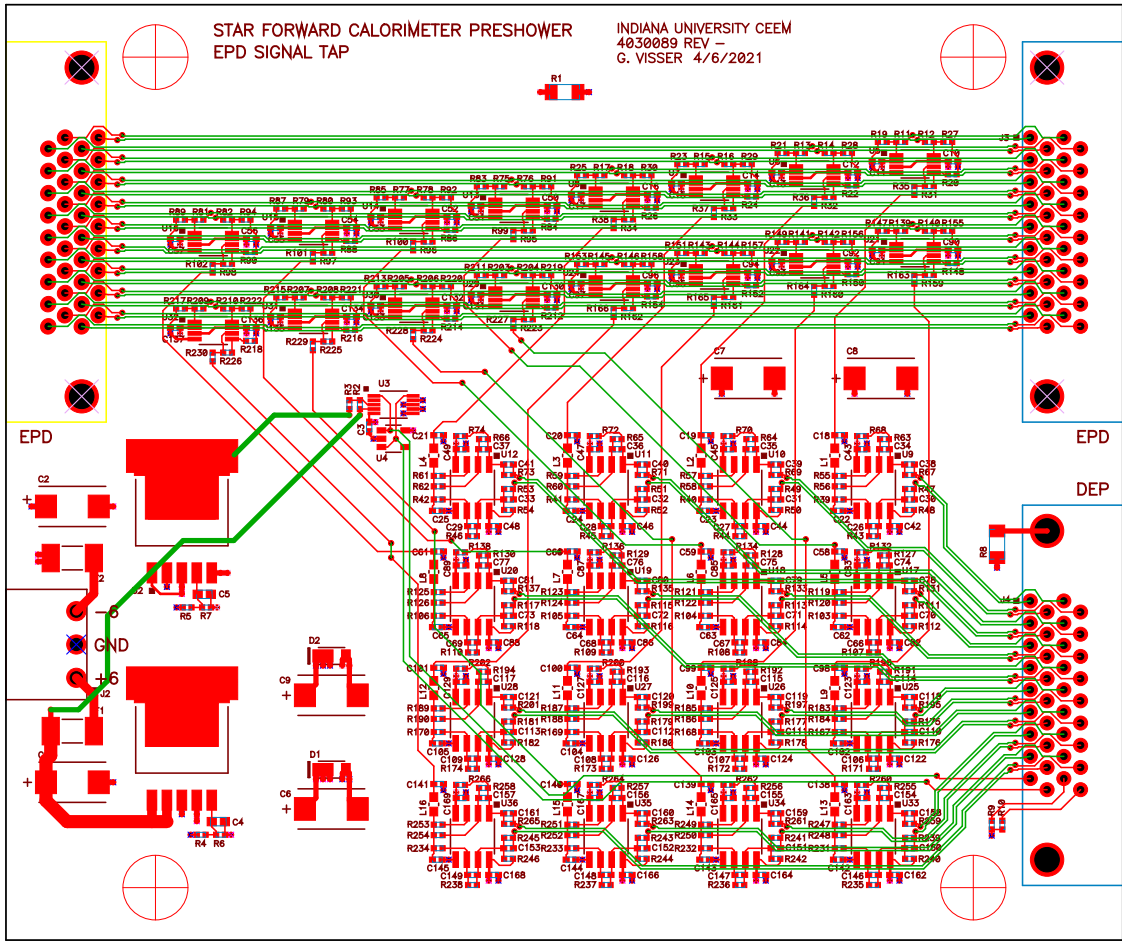
Splitter Requirements

- **Not to impair or significantly alter** the signals from EPD FEE to EPD readout
 - especially not to be sensitive to FCS running or not, DEP connections / power
 - inevitably, **splitter power does matter** though, so we have to be careful with that
- Copy the signals from all 384 west EPD channels to inputs to DEP for FCS trigger and readout
- Probably have to shape the signals little slower suitable for DEP sampling
 - otherwise no crisp hit threshold is possible, and efficiency may suffer
- 16 (or $N \times 16$) channels per board, same MDR connectors and pinout
 - note that FCS pinout is the same as EPD pinout which was based on FMS-POST pinout, so this is all sane actually by default
- and the usual: low cost, super reliable, easily serviceable, safety requirements, etc.

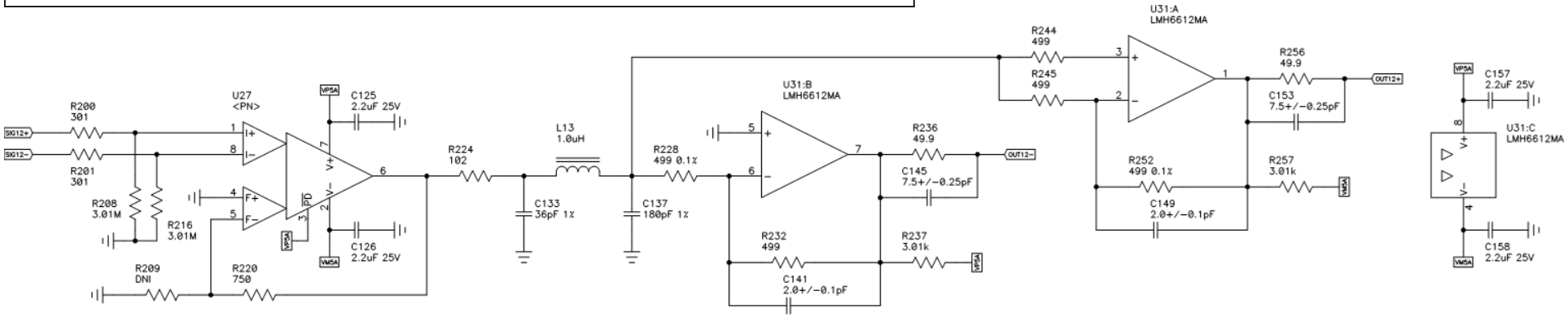
and

- **For run 21 test installation only: Delay should be as small as possible! Since it adds skew between signals in same QT**
 - Rosi informs us “We discussed this a bit in the EPD meeting today – we think that probably the 5 ns will be fine and that any changes that might result can be taken care of in the calibration of the data.”

Current status



- Schematic and layout 100% complete
 - 31 PCB's fabricated (3 for prototype, 24+3 spare, may differ from prototype assembly)
 - Board size 12.7 × 10.7 cm, mounted in 4 stacks of 6 boards w/ some cover TBD (probably not used in run 21)
 - 6 layer PCB (2 signal, 4 power/ground)
 - Component values for gain & shaping are placeholders w/ some prototyping needed
 - e-serial & V & T monitoring is included
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- We'll assemble 3 boards to install 2 in run 21 test
 - Three 1m L-COM non-tray cables ordered & received 2/23, one is at IU for prototyping
 - Two long cables (from existing spares) to be installed – done ?



Timeline

- 4/8 PCB design finished + RFQ
- 4/9 ordered by Tim (from E-Teknet)
- 4/19 shipped from fab (on schedule)
- ... delays (I would say, compared to past experience); not sure what shipping time Tim requested though
- 4/26 today finally received (at BNL) (?? TBC)
- 4/28 at IU
- 5/3 (monday) labwork done, prepare assembly documentation, RFQ
- 5/5 receive quote
- 5/6 order 3 boards assembled; if need be order certain parts – plan for turnkey as much as possible
- 5/17 (optimistic – or 5/21) assembled boards ship
- 5/19 (optimistic – or 6/8) assembled boards received at BNL
- installation: immediate with first just a quick smoke test by Tim
 - or of course it would be better to test a bit first (Tim, or send to IU if time permits)

To be discussed whether it is important for Gerard to come out for this installation. Of course in normal times I would, as I would have done for FCS installation. Prashanth can hopefully help if I am not there, anyway someone w/ EPD experience should be involved.

Summary

Design is basically done, except only a small amount of labwork to finalize component values especially in regards to gain and shaping.

A few weeks ago, I expected to have had the PCB's in hand last week, test results to show here, and to report that we are about to order assembled boards. Instead that will be early next week now.

Risk of technical issues should be pretty low. I expect either the prototype will be the production version, or we make some small gain or shaping change.

I am not sure of status of EPD group's readiness to have a small timing and a miniscule gain change on two FEE's worth of channels. The issue has been raised with them of course, and Rosi replied it should be OK. But maybe needs some more discussion as installation gets closer.

BTW do we know which two FEE we are doing this to? I don't know.