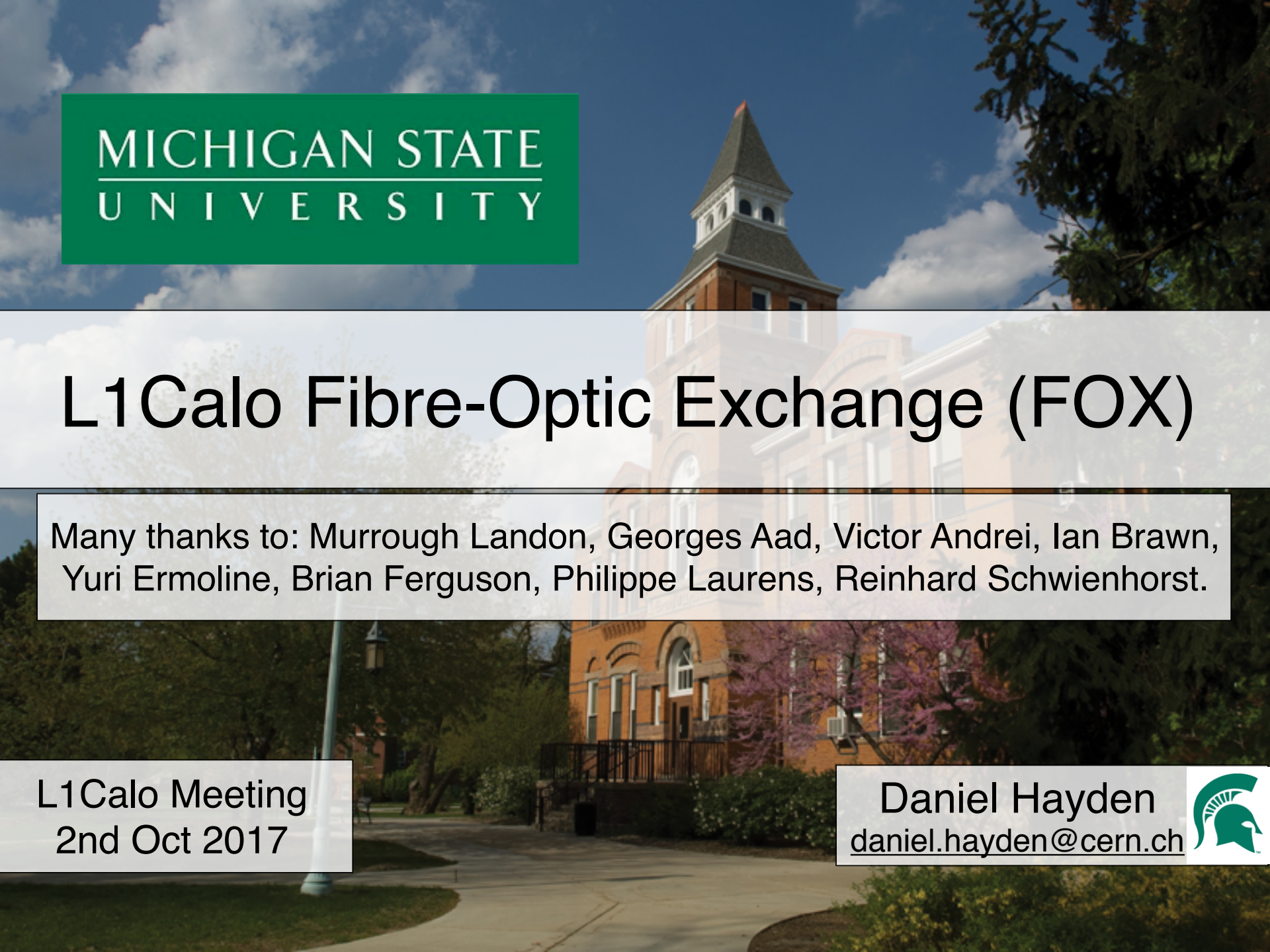


MICHIGAN STATE UNIVERSITY

L1Calo Fibre-Optic Exchange (FOX)

Many thanks to: Murrough Landon, Georges Aad, Victor Andrei, Ian Brawn, Yuri Ermoline, Brian Ferguson, Philippe Laurens, Reinhard Schwienhorst.

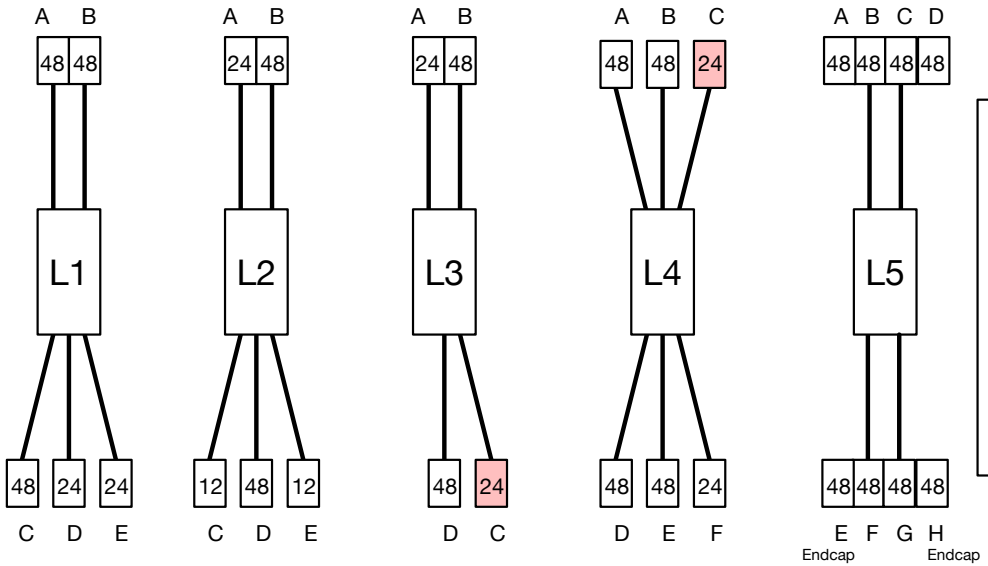
L1Calo Meeting
2nd Oct 2017

Daniel Hayden
daniel.hayden@cern.ch

Update

- Now have first complete mapping for the FOX system.
  - All ribbons/assemblies mapped.
  - All FOX boxes initially laid out.
- Discussion with manufacturers (Sylex) on-going.
  - Hope to have first complete cost overview in 2 weeks.
- FOX box design work on-going at MSU.
  - Will show the first mechanical schematics today.
- Preliminary documentation coming together.
  - CDS note will be made available today.
  - Timeline for production, assembly, and testing included.

Assembly Types



Key

Upper = Input
Lower = Output

Unused MTP

Naming

Everywhere:

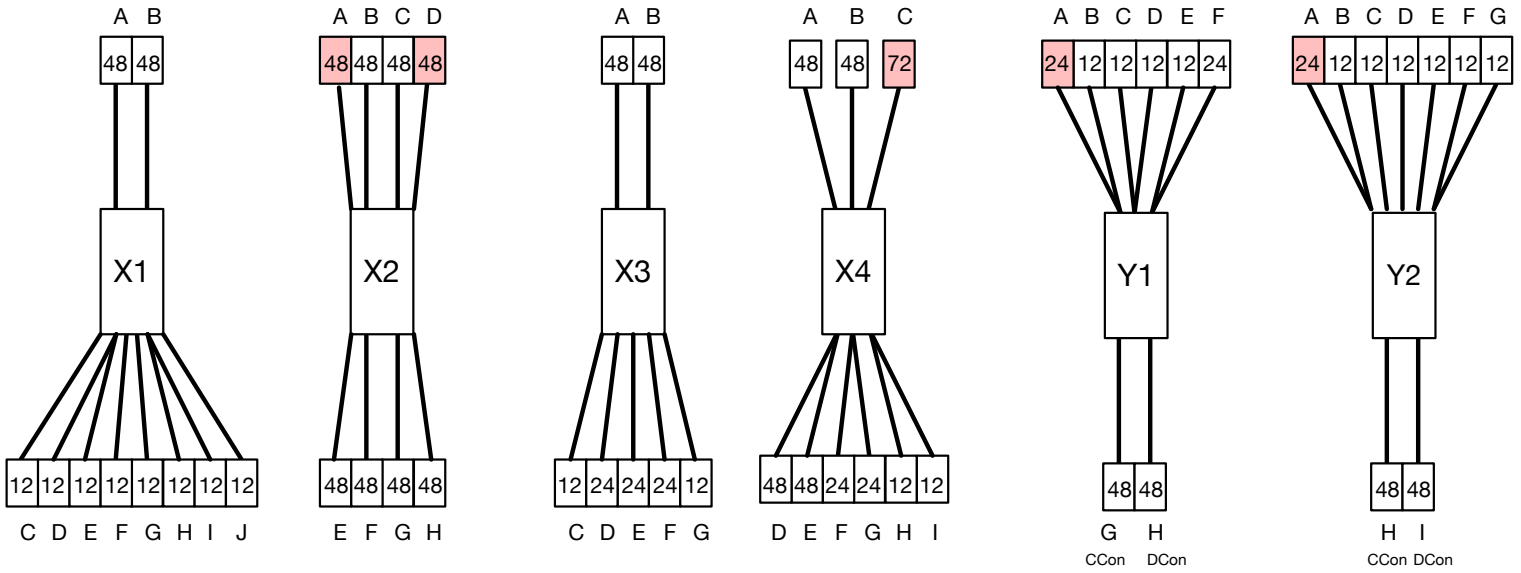
1 = (I)	= B
1 = (O)	= C

LArFOX Boxes:

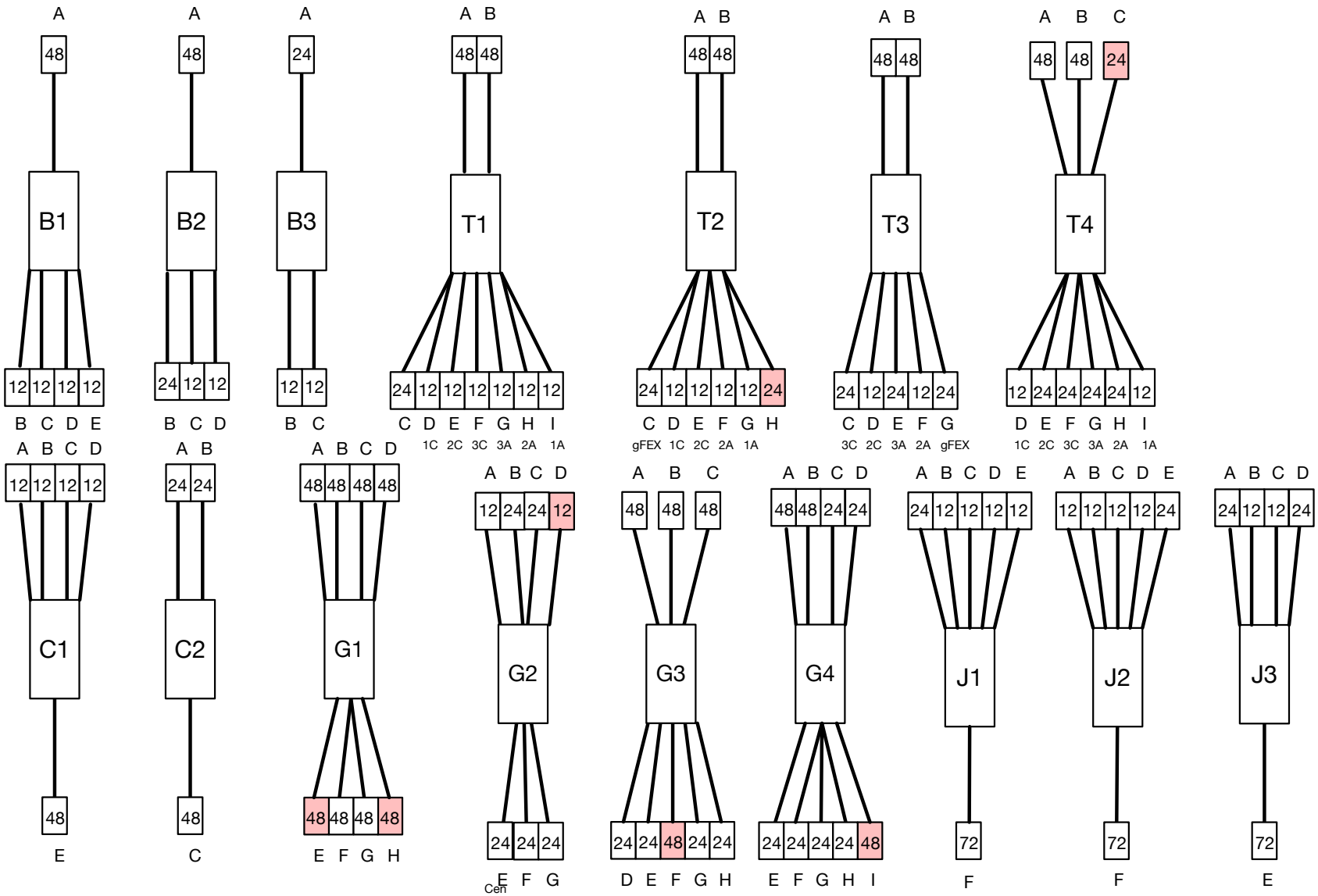
1 < (I/O) < 4	= L
>= 4 (O)	= X
>= 4 (I)	= Y

TileFOX Boxes:

jFEX first half	= T
jFEX output	= J
gFEX output	= G



Assembly Types



Assemblies and Connection Planes

Table 7: Numeration of the various assembly types throughout each FOX box and for the overall FOX system. There are a total of 27 assembly types, and 212 assemblies overall.

Type	LArFOX B	LArFOX D	LArFOX A+C	TileFOX E+F	Total
L1	16	16	16	-	48
L2	16	-	-	-	16
L3	-	16	16	-	32
L4	-	-	8	-	8
L5	-	-	2	-	2
X1	-	-	2	-	2
X2	-	2	-	-	2
X3	-	-	4	-	4
X4	-	-	2	-	2
Y1	-	-	12	-	12
Y2	-	-	4	-	4
B1	-	-	4	-	4
B2	-	-	-	8	8
B3	-	-	-	4	4
C1	8	-	-	-	8
C2	-	-	-	6	6
T1	-	-	-	4	4
T2	-	-	-	4	4
T3	-	-	-	4	4
T4	-	-	-	4	4
G1	-	-	-	2	2
G2	-	-	-	4	4
G3	-	-	-	2	2
G4	-	-	-	2	2
J1	-	-	-	8	8
J2	-	-	-	8	8
J3	-	-	-	8	8

Table 6: Number of MTP connections for each connection plane of the various FOX boxes.

Type	LArFOX B	LArFOX D	LArFOX A/C	TileFOX E/F	Total
Front	48	48	38	32	236
First	32	32	24	56	224
Second	32	-	26	13	142
Back	24	28	38	18	164
Total	136	108	126	119	766

eFEX Layout, Connectors, and Naming.

eFEX_C_1	eFEX_B_1	eFEX_A_1
eFEX_C_2	eFEX_B_2	eFEX_A_2
eFEX_C_3	eFEX_B_3	eFEX_A_3
eFEX_C_4	eFEX_B_4	eFEX_A_4
eFEX_C_5	eFEX_B_5	eFEX_A_5
eFEX_C_6	eFEX_B_6	eFEX_A_6
eFEX_C_7	eFEX_B_7	eFEX_A_7
eFEX_C_8	eFEX_B_8	eFEX_A_8

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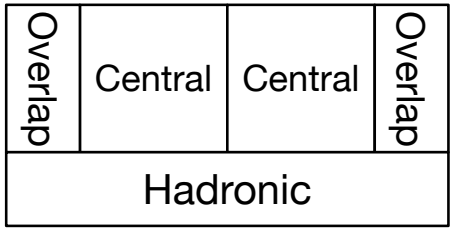
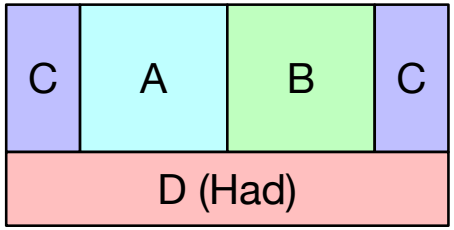
Connector Coverage

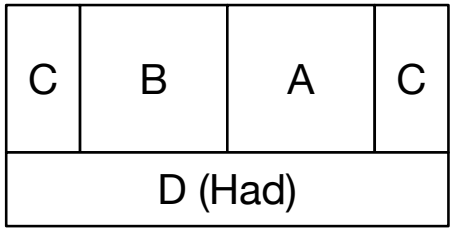


Connector Naming

eFEX_C and eFEX_B



eFEX_A



eFEX C Output Ordering

EM

1	3,7
	4,8
2	5
	6

1	13	25	37
2,4	14,16	26,28	38,40
3,5	15,17	27,29	39,41
6	18	30	42
7	19	31	43
8	20	32	44
9	21	33	45
10	22	34	46

1	13	25	37
2,4	14,16	26,28	38,40
3,5	15,17	27,29	39,41
6	18	30	42
7	19	31	43
8	20	32	44
9	21	33	45
10	22	34	46

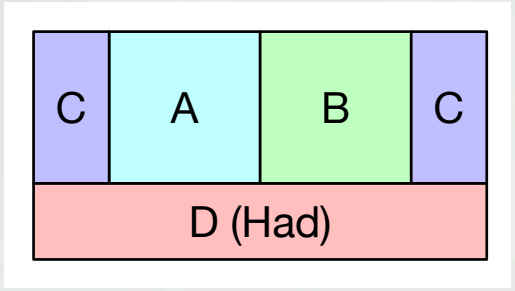
9
10,12
11,13
14
15
16
17
18

Had

1	3,9	5,10	6,11	3,9	12,14	15,17	18,20
2	4	7	8	4	13	16	19

19-48: Spare

21-48: Spare



N.B. After discussion with Murrough - Connector C will be slightly reshuffled.

eFEX B Output Ordering

EM

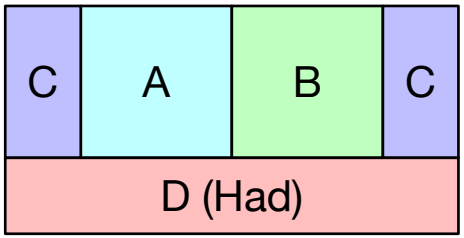
1	1	13	25	37	1	13	25	37	37
2,4	2,4	14,16	26,28	38,40	2,4	14,16	26,28	38,40	38,40
3,5	3,5	15,17	27,29	39,41	3,5	15,17	27,29	39,41	39,41
6	6	18	30	42	6	18	30	42	42
7	7	19	31	43	7	19	31	43	43
8	8	20	32	44	8	20	32	44	44
9	9	21	33	45	9	21	33	45	45
10	10	22	34	46	10	22	34	46	46

Had

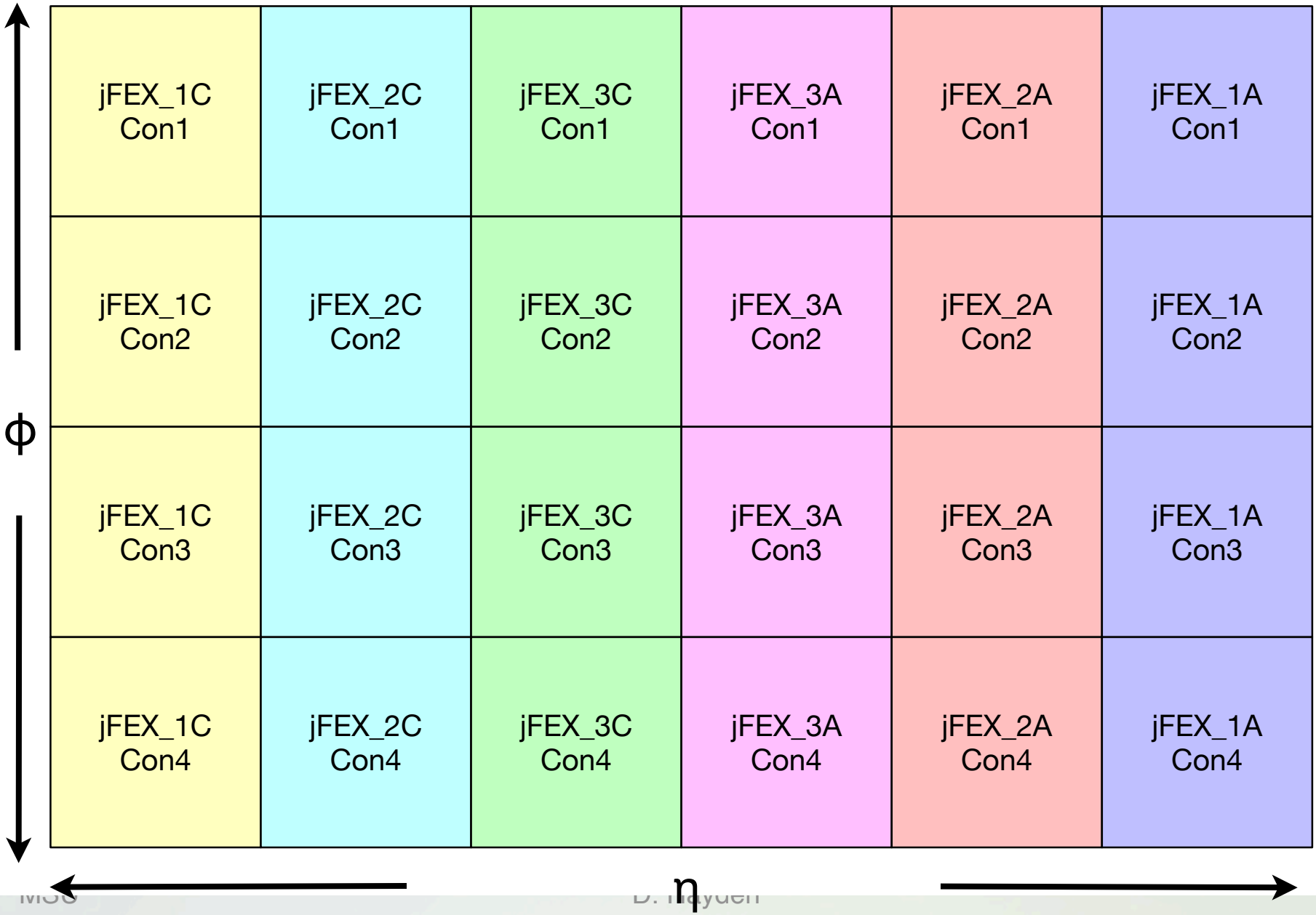
1	4	7	10	13	16
2	5	8	11	14	17
3	6	9	12	15	18

11-36: Spare

19-48: Spare



jFEX Layout, Connectors, and Naming.



EM

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24

J1 (1C/1A) Output Ordering

Had

25	27	29	31	49	33	35
26	28	30	32		34	36
37	39	41	43	50	45	47
38	40	42	44		46	48

51-72 Spare

EM

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24

J2 (2C/2A)

Output Ordering

Had

25	27	49	29	31	33	35
26	28		30	32	34	36
37	39	50	41	43	45	47
38	40		42	44	46	48

51-72 Spare

EM

1	3	5	7	9	11
2	4	6	8	10	12
13	15	17	19	21	23
14	16	18	20	22	24

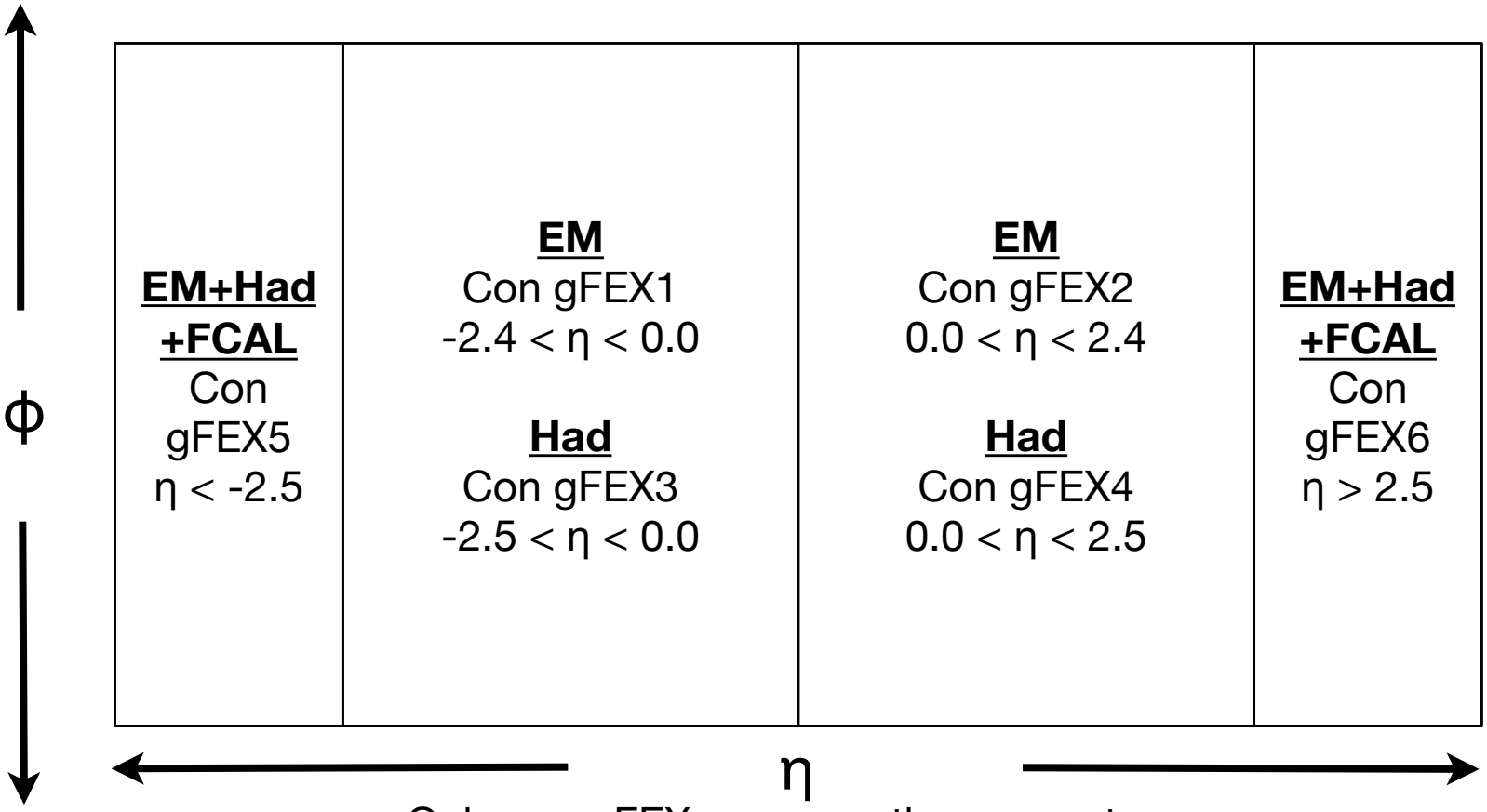
J3 (3C/3A) Output Ordering

Had

49	25	27	29	31	33	35
	26	28	30	32	34	36
50	37	39	41	43	45	47
	38	40	42	44	46	48

51-72 Spare

gFEX Layout, Connectors, and Naming.



Only one gFEX, so name the connectors.

EM

1	9	17
2	10	18
3	11	19
4	12	20
5	13	21
6	14	22
7	15	23
8	16	24
25	33	41
26	34	42
27	35	43
28	36	44
29	37	45
30	38	46
31	39	47
32	40	48

Had

9	1	2	3	4
10				
11				
12				
13	5	6	7	8
14				
15				
16				
33	25	26	27	28
34				
35				
36				
37	29	30	31	32
38				
39				
40				

gFEX_1/2 (EM) G3-Type

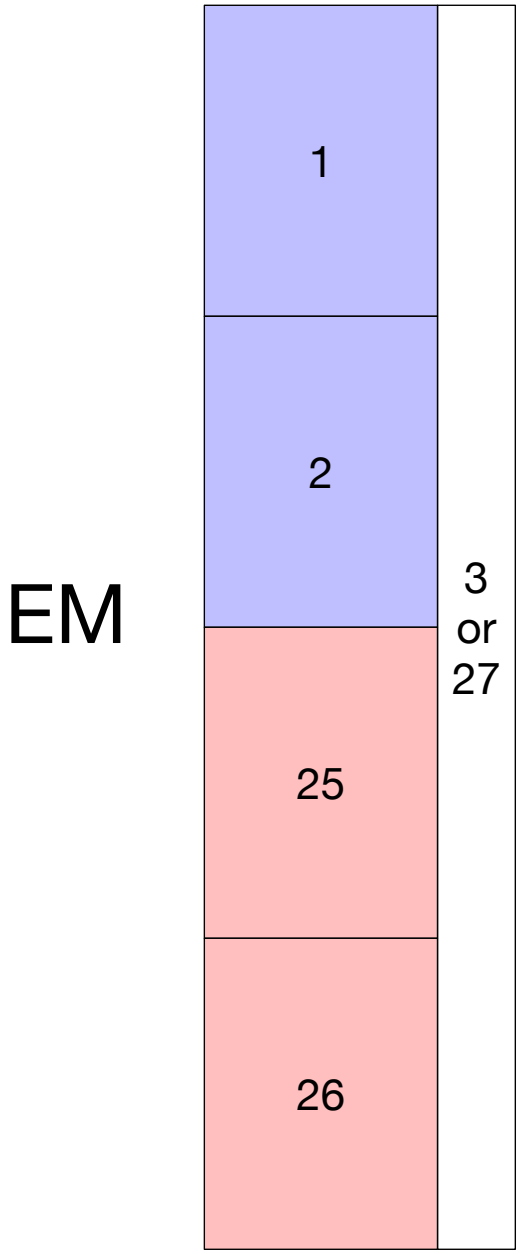
- Part 1 (24w)
- Part 2 (24w)

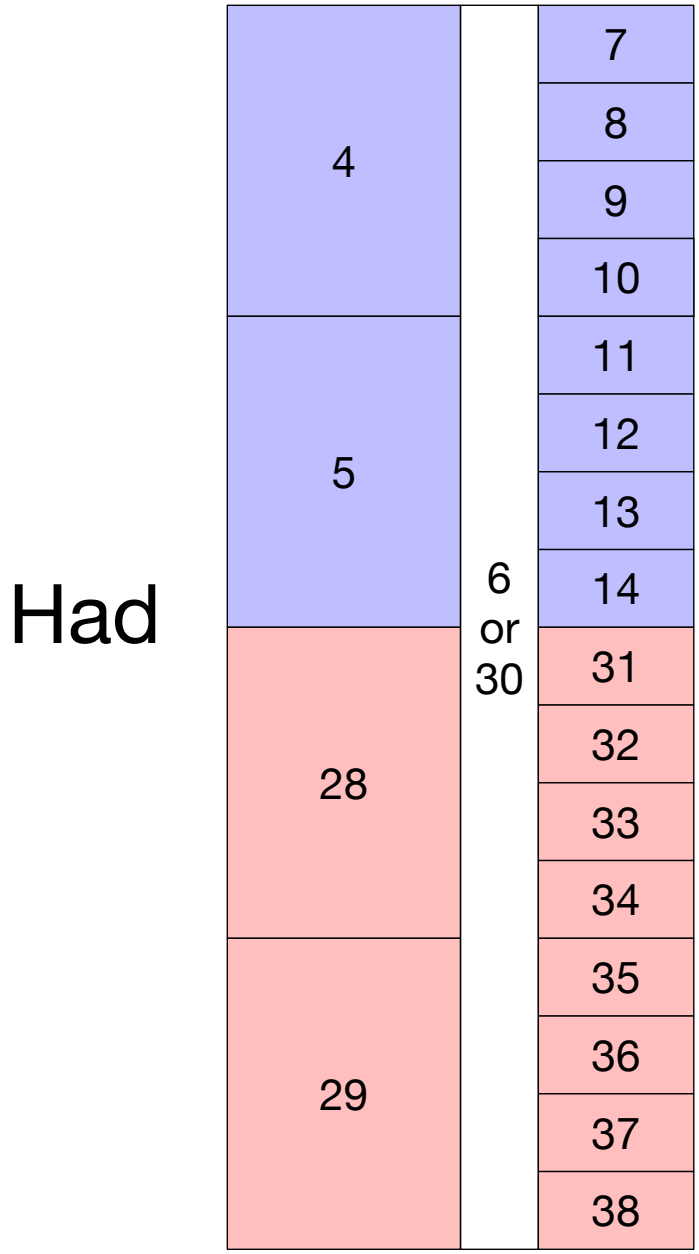
gFEX_3/4 (Had) G4-Type

- Part 1 (24w)
  - 17-24: Spare
- Part 2 (24w)
  - 41-48: Spare

Output Ordering

gFEX_5/6 G2-Type Output Ordering

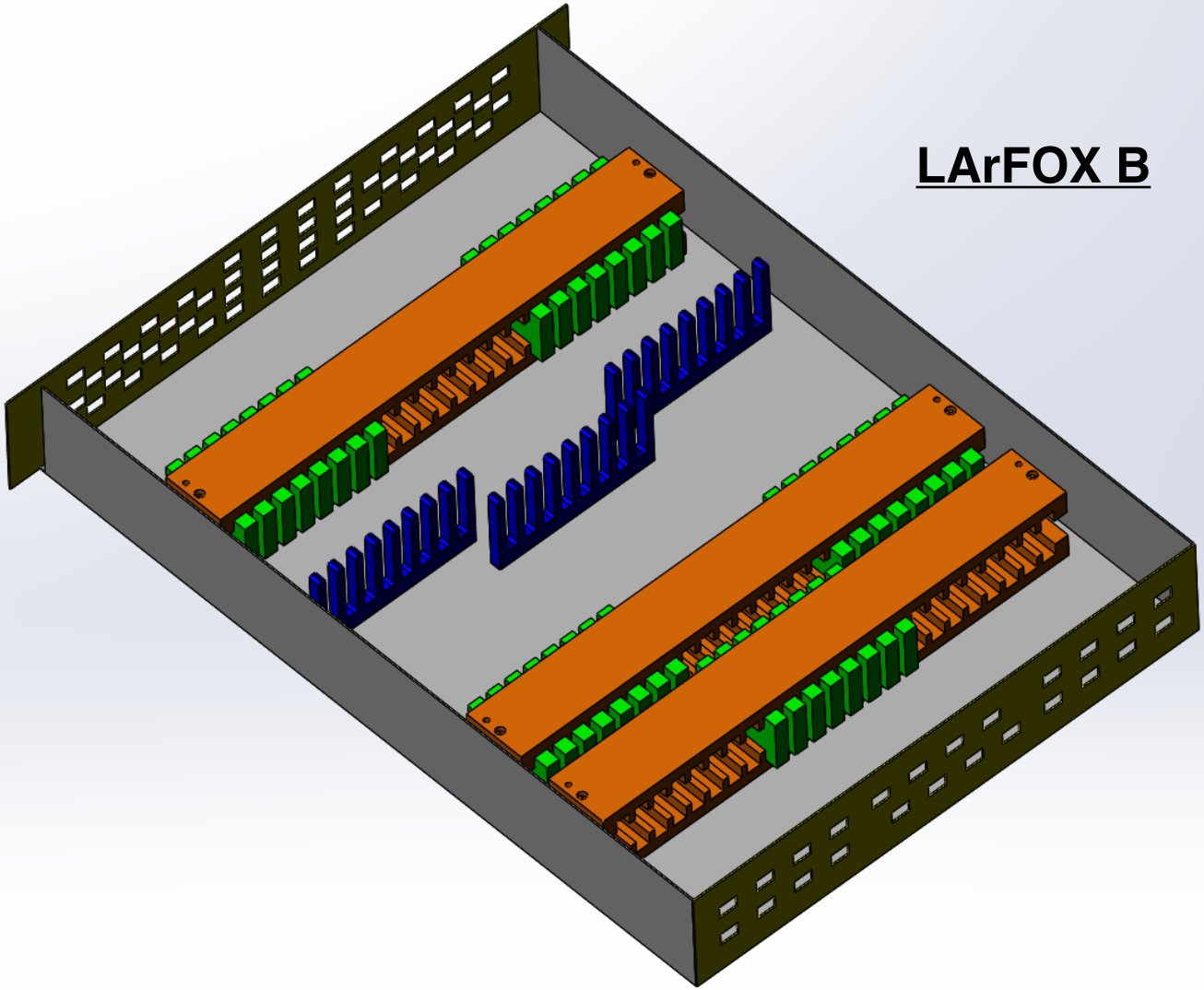




Part 1 (24w)
15-24: Spare

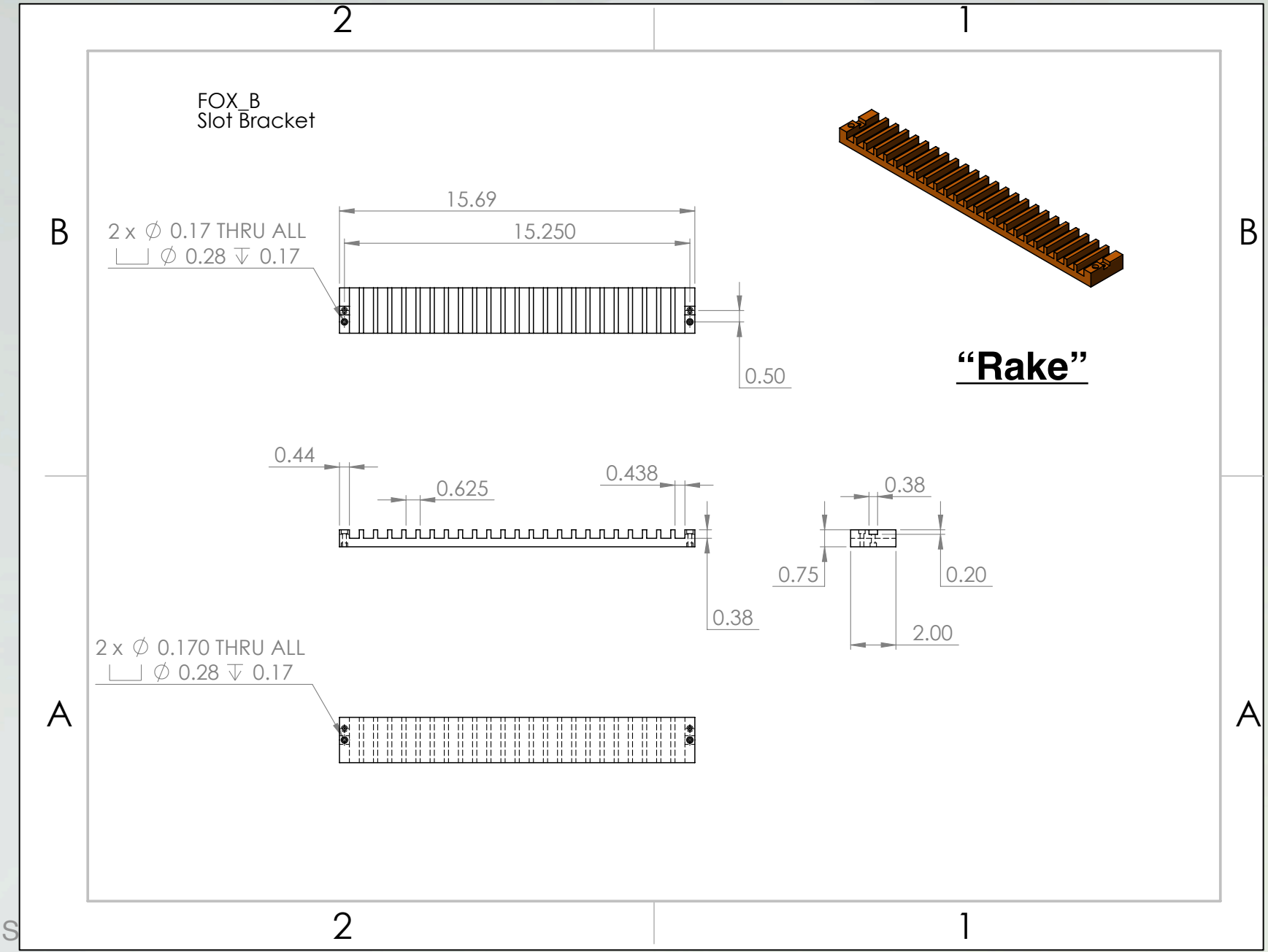
Part 2 (24w)
39-48: Spare

FOX Box Design



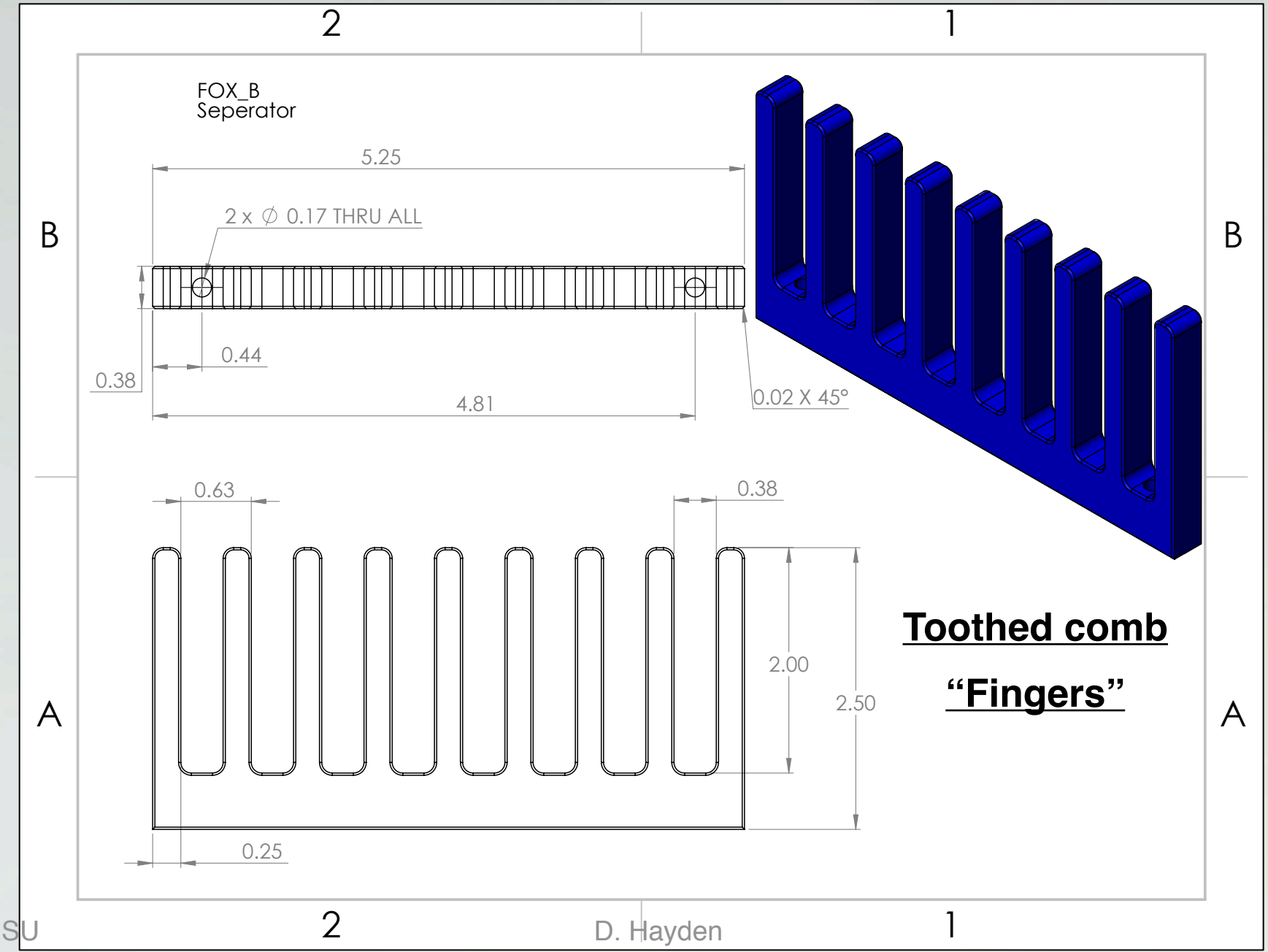
LArFOX B

FOX Box Design



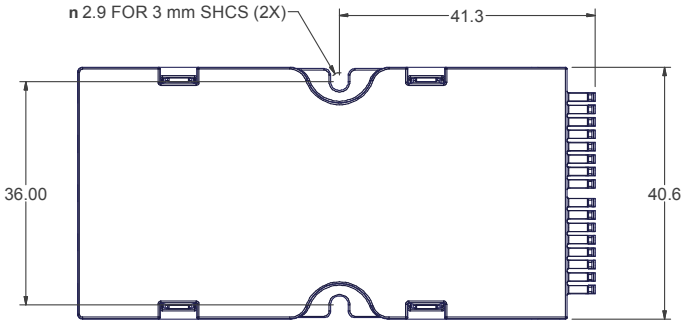
“Rake”

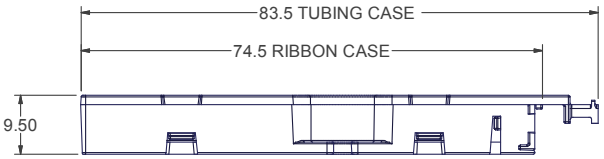
FOX Box Design



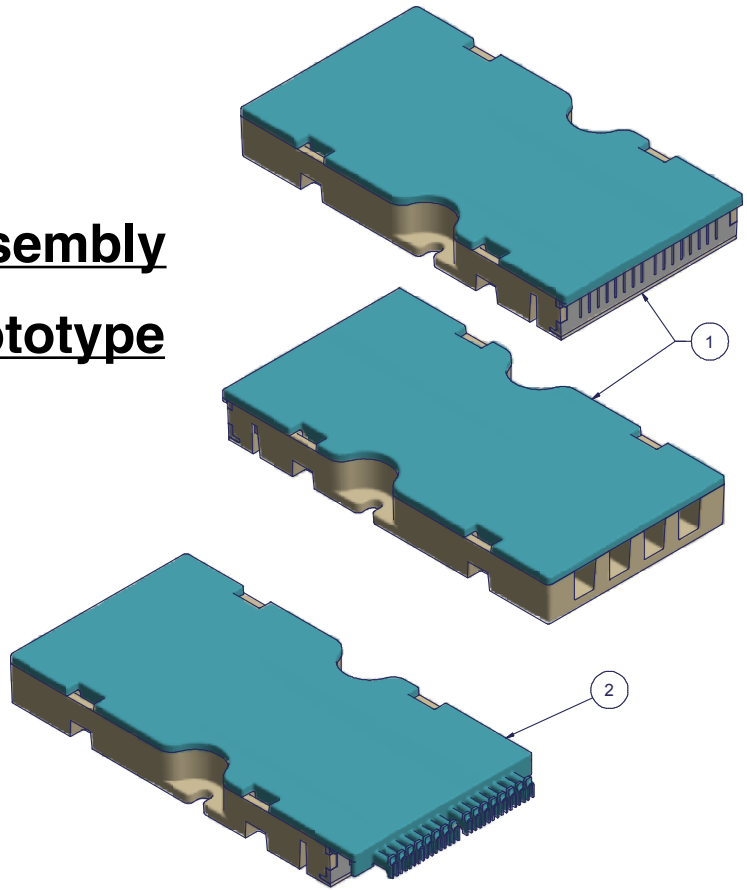
FOX Box Design

P/N	DESCRIPTION
18872	CASE FOR RIBBON
18913	CASE FOR ROUND TUBING





Assembly Prototype



PRELIMINARY

▲ DENOTES CRITICAL DIMENSION

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REV	DATE	DESCRIPTION	ECN
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METRIC/mm

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TITLE: CASE, SHUFFLE

SIZE	S&M Part No.:	DWG NO	REV
A3	SEE TABLE	C18872	X1

SCALE	Drafter	Date:	SHEET	OF
N.T.S.	craigconrad	4/19/2017	1	1

Documentation and Timeline

- Documentation will be made available for comment later today.
  - Preliminary version already on [CDS].
- Project Timeline:

- Mid-October: Initial Cost Estimate for Full system from Sylex.
- Early November: First metal box (LArFOX B) produced at MSU. L1Calo Review, to get approval to order subset of assemblies for physical tests.
- December: All metal boxes produced at MSU (LArFOX A/C, LArFOX D, TileFOX E/F). Narrow pass through for all boxes arrives at MSU, i.e. an adequate subset (and spares) of assemblies to test mapping and light loss tests.
- End of January: Assembly and Tests done at MSU (as described above).
- February: Show results in L1Calo Meeting / PRR, and seek approval to order all remaining components from Sylex.
- March-April: Components arrive at CERN.
- April-May: Assembly and testing at CERN, iėöctopus cables connected to test all mapping paths, some light loss tests of the whole system, possibly even connection to some real latome and FEXs on the surface for full test. At this point, official task completed.
- Afterwards: Provide "7th" box for Surface Test Facility to use, containing a simple set of ribbons that go from a Latome to a variety of FEXs.
- Fall-Back time allowed in the schedule: 3 months.