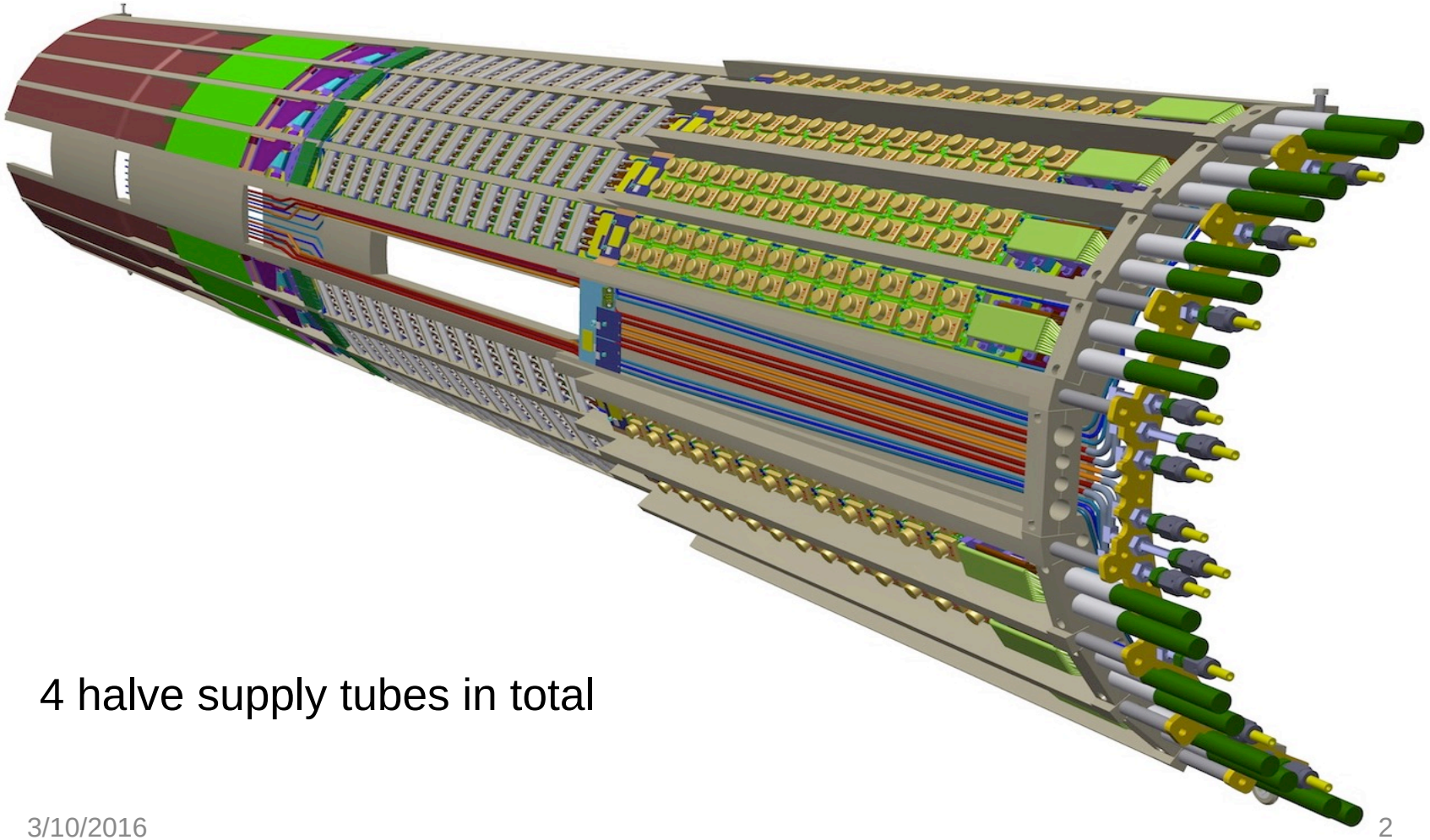
University of Zurich[UZH]

BPIX Supply Tube Load Board and POH status

- Daniel Hernandez
- B pix Phase 1 Supply Tube
- 9 March 2016

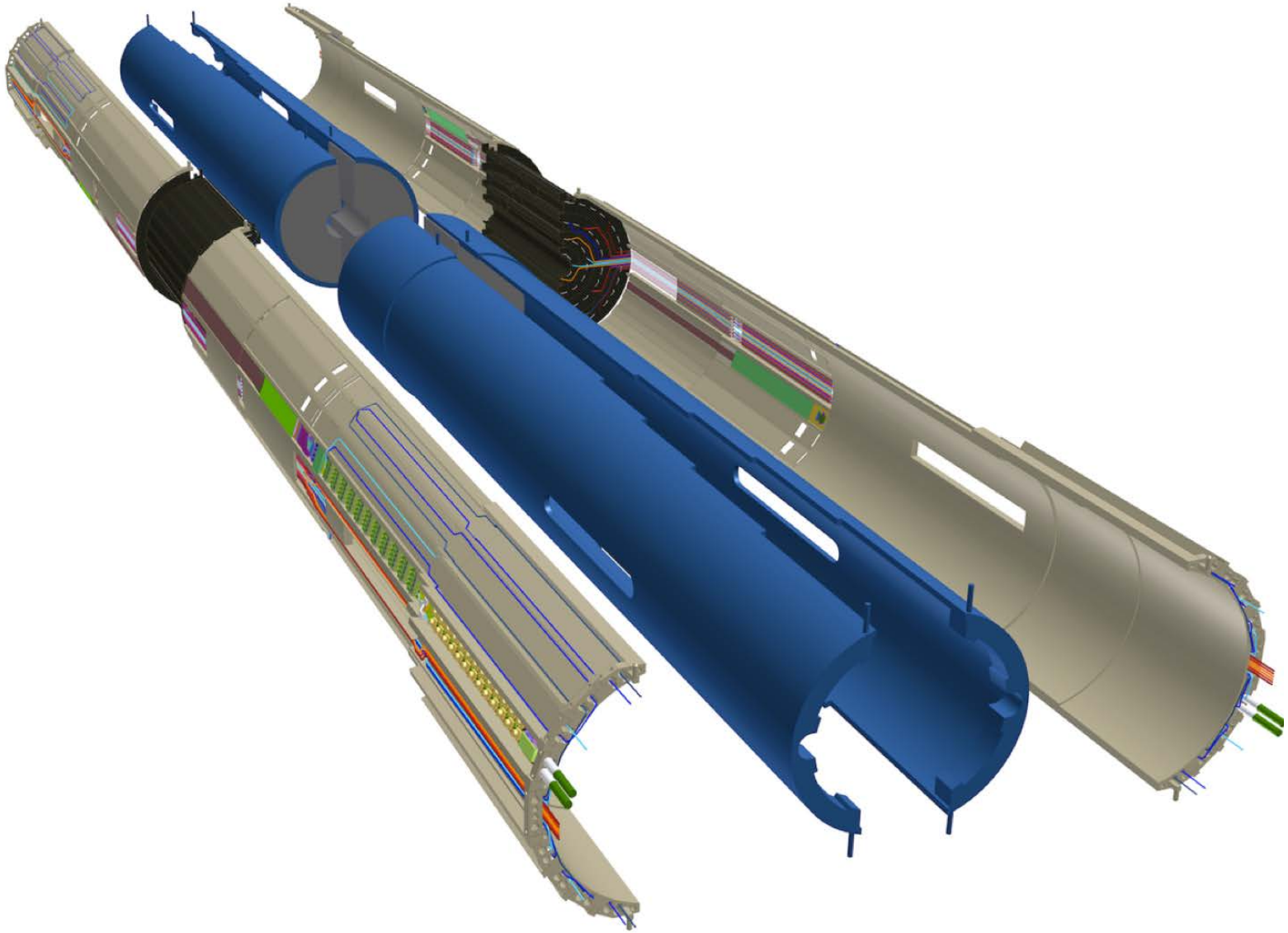
Supply Tube

Half cylinder Supply Tube Diagram



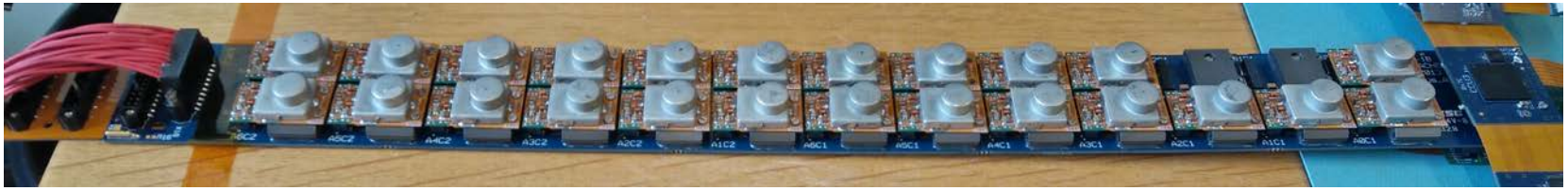
- 4 halve supply tubes in total

Supply Tube



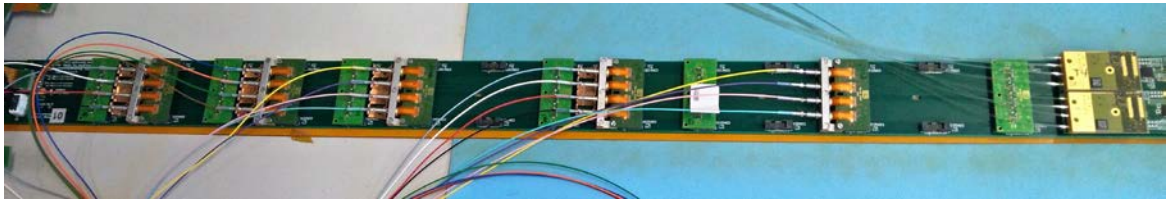
Supply Tube Component Diagram

A.-

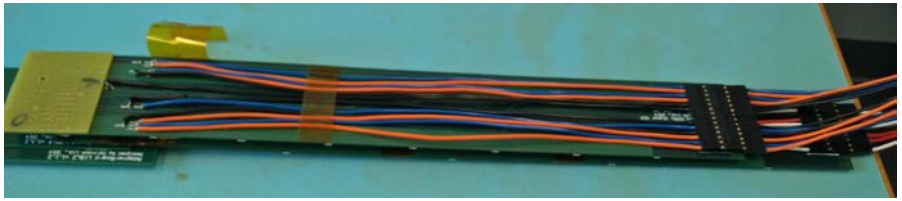


B.-

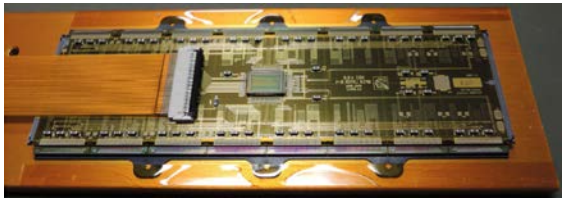
B'.-



C.-



D.-



A. DCDC convertor board

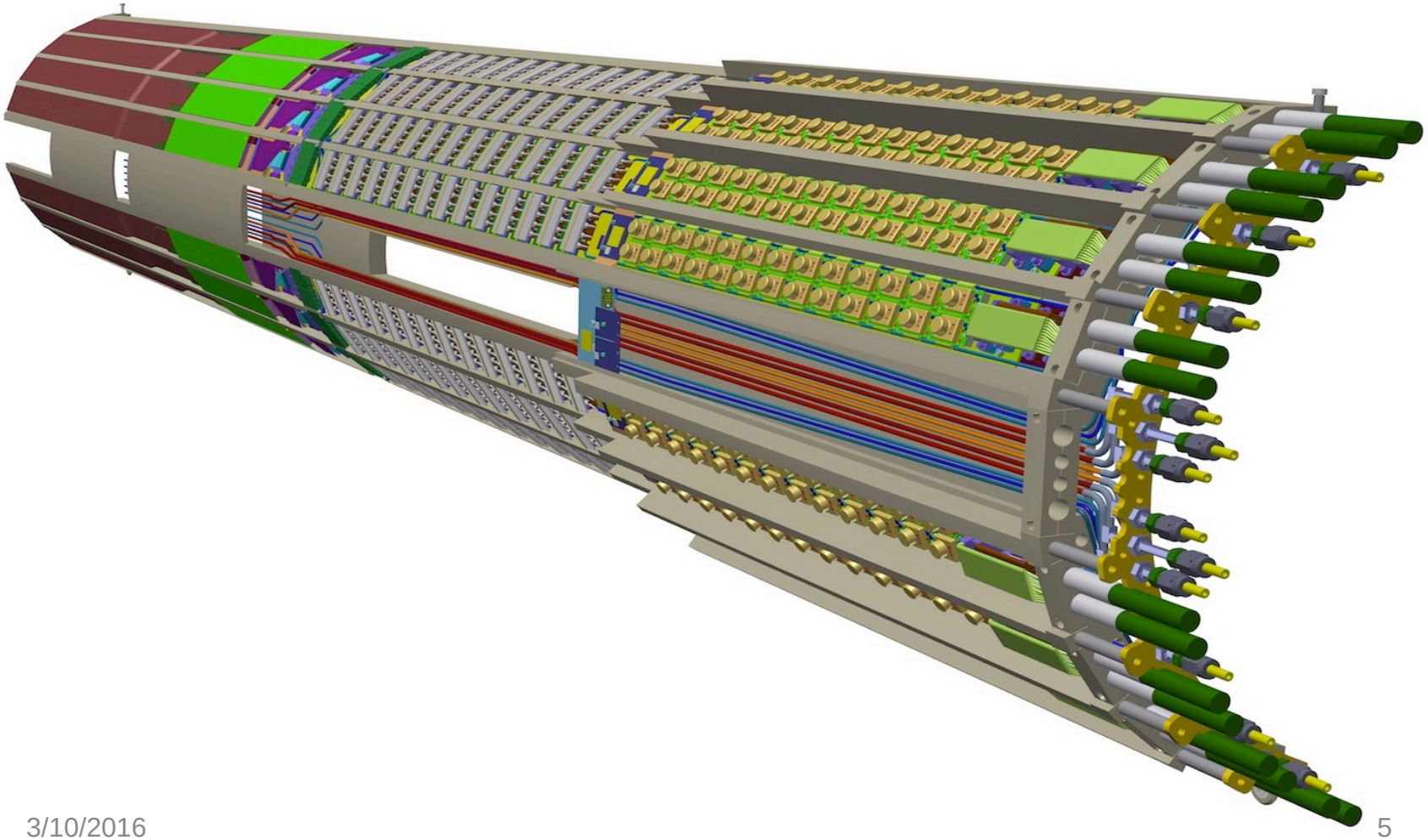
B. Extension board B'. POH Mother Board

C. Adapter board/Connector board

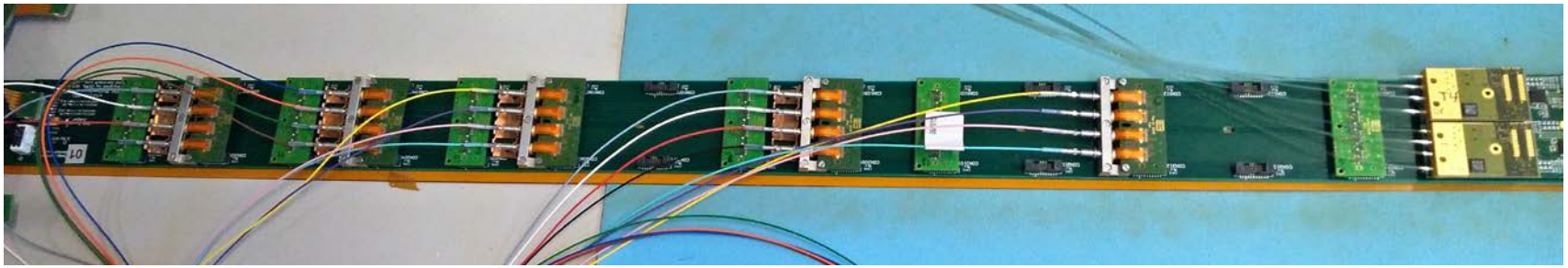
D. Modules

Supply Tube

Half cylinder Supply Tube Diagram



POH MB



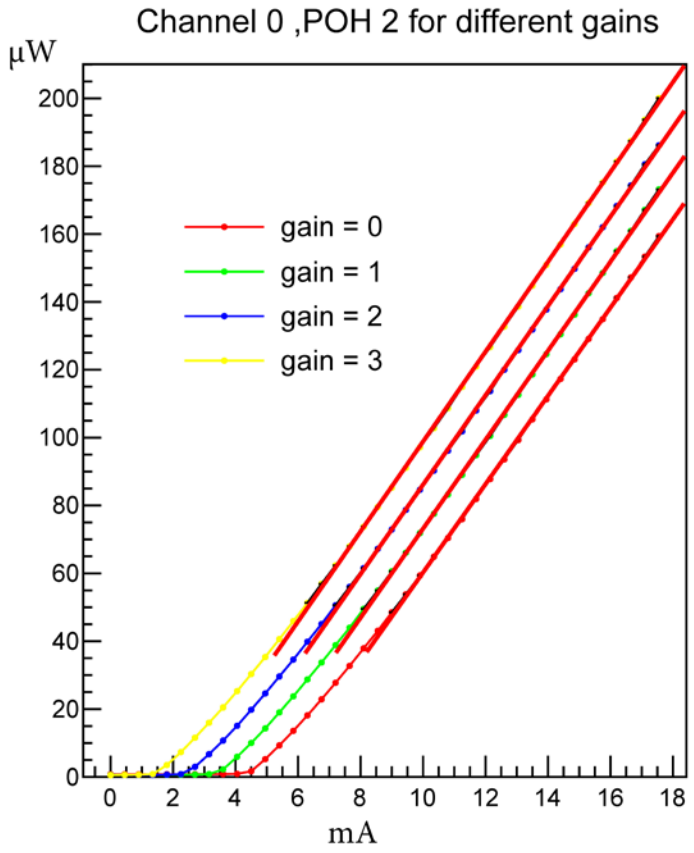
- 14 POH on POH MB (14 positions)
- Each POH has 4 channels(fibers)
- 3 POHs go on 1 bundle (12 fibers)
- Fibers are plugged to FED

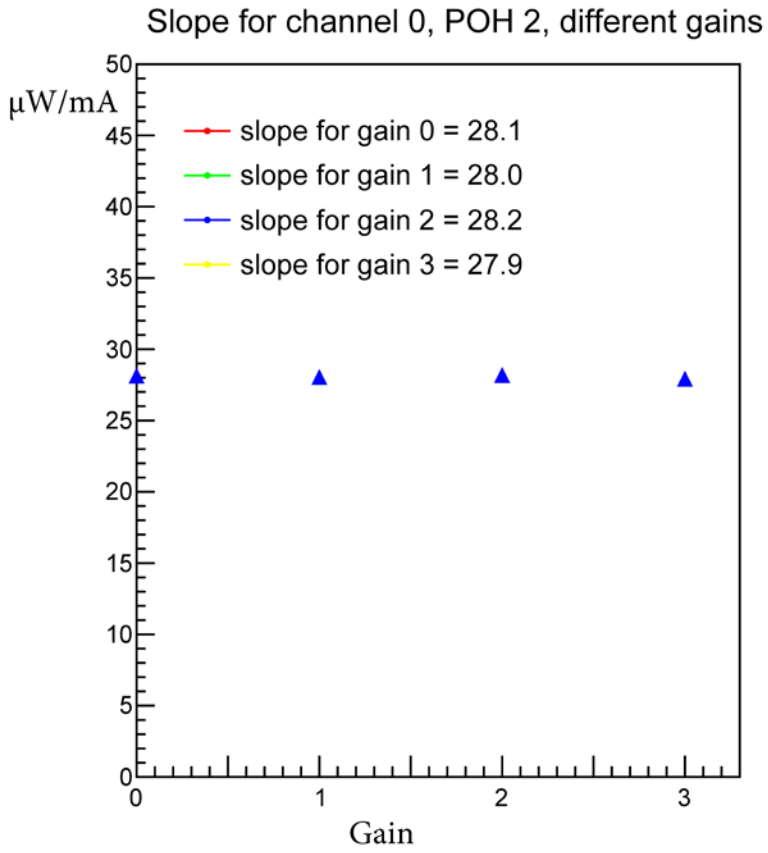
POH Tests

- Scan laser bias → measure light yield at FED
- ADC count as a function of bias
- ADC/bias → μW/μA
- Optical connections status
- Slope is the figure of merit

POH Tests

Bias scan for a single POH channel for different gain settings

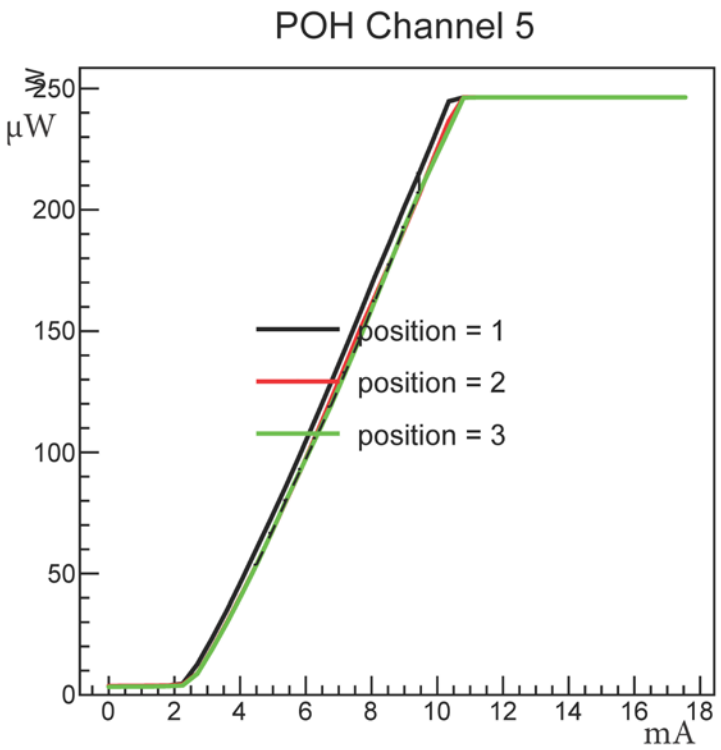


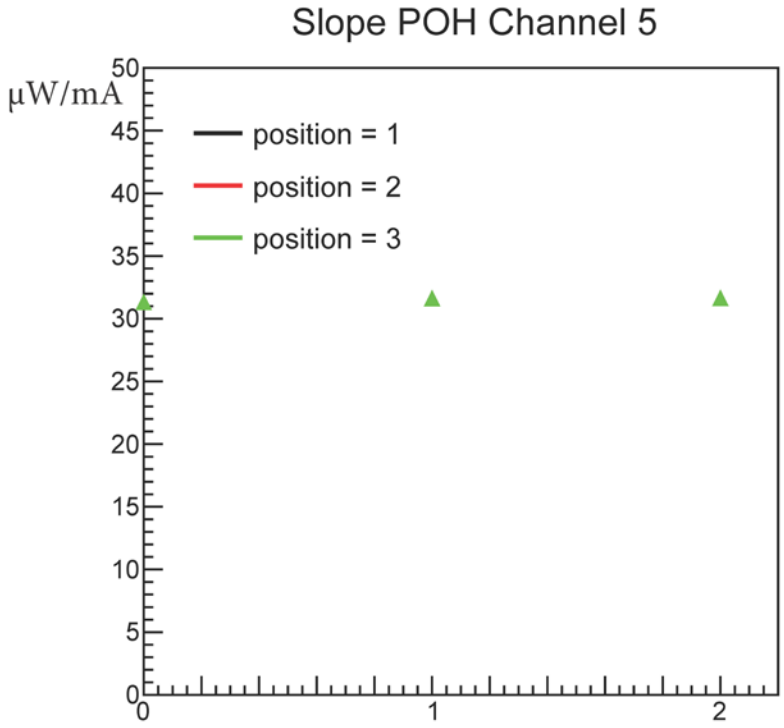


- Previous data acquisition: Riccardo Del Burgo

POH Tests

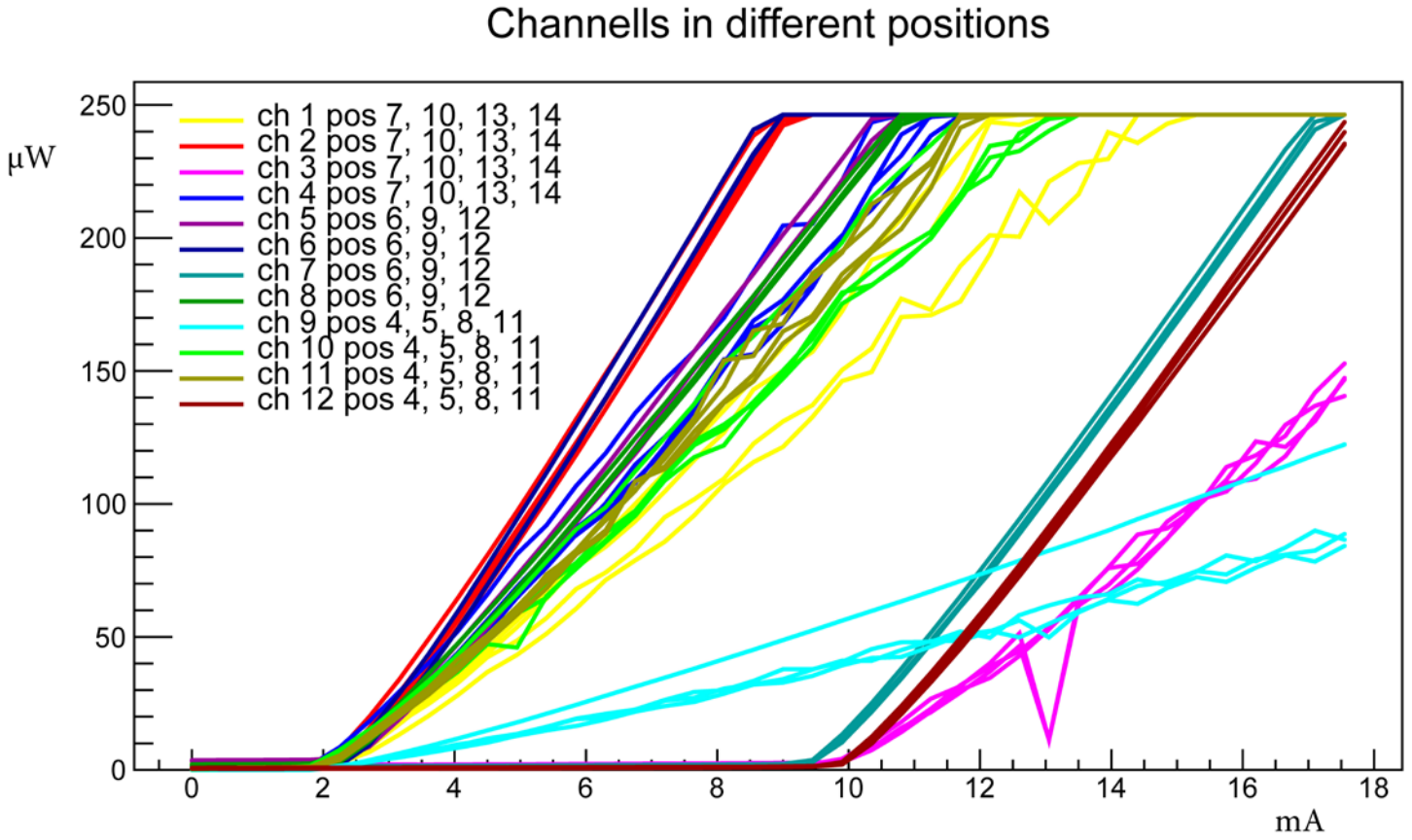
Bias scan for a single POH channel for different positions, fixed gain





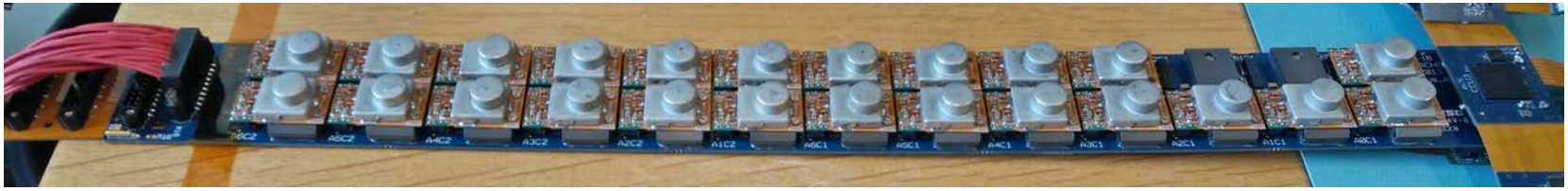
POH Tests

Bias scan for a all POH channels for certain different positions, fixed gain



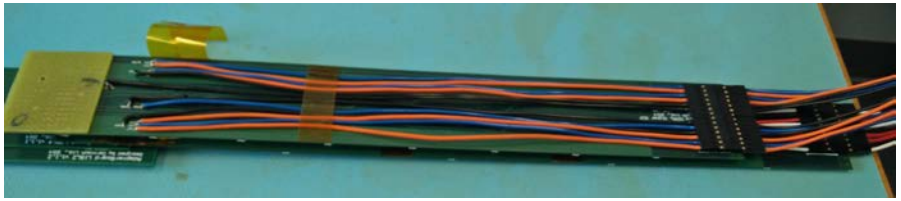
Supply Tube Power System Components

A.-



B.-

C.-



D.-

- A.- DCDC convertor board
- B.- Extension board
- C.- Adapter board
- D.- Modules

Introduction

Load Board

- Purpose → Test DCDC convertor boards before and after installation
- Simulate conditions of pixel modules connected on connector board → Voltage drop and current intensity
- Design & Calculate → Construction → Test

Calculate & Design

Diagram for a fully functional sector

3 L1 modules

8 L2 modules

12 L3 modules

16 L4 modules

32 sectors in total

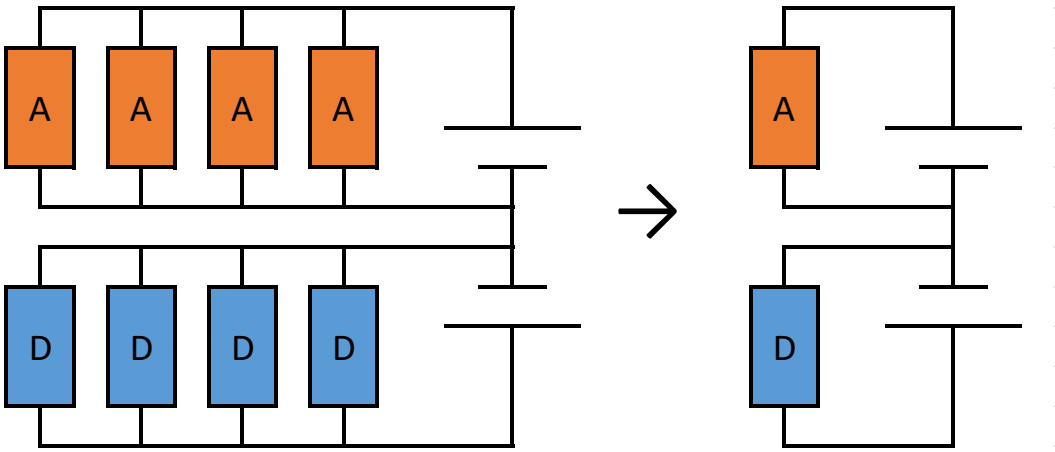
Group 1

Group 2

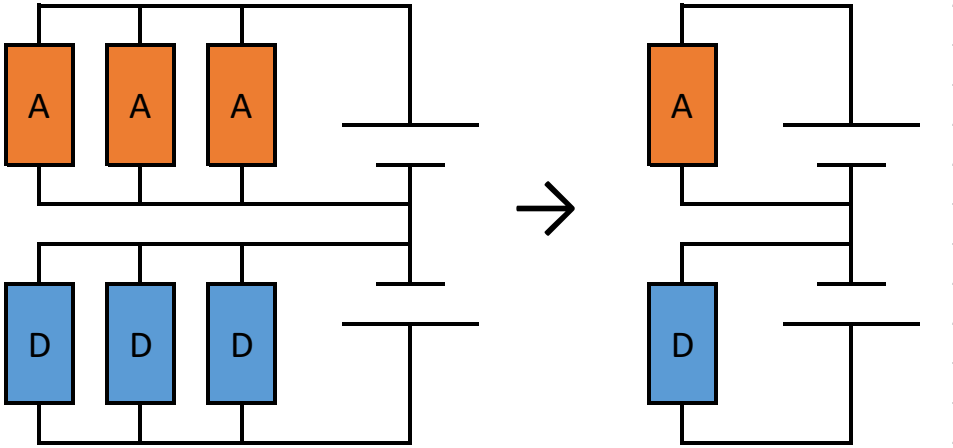
Group 3

Calculate & Design

In Layer 4 (4)

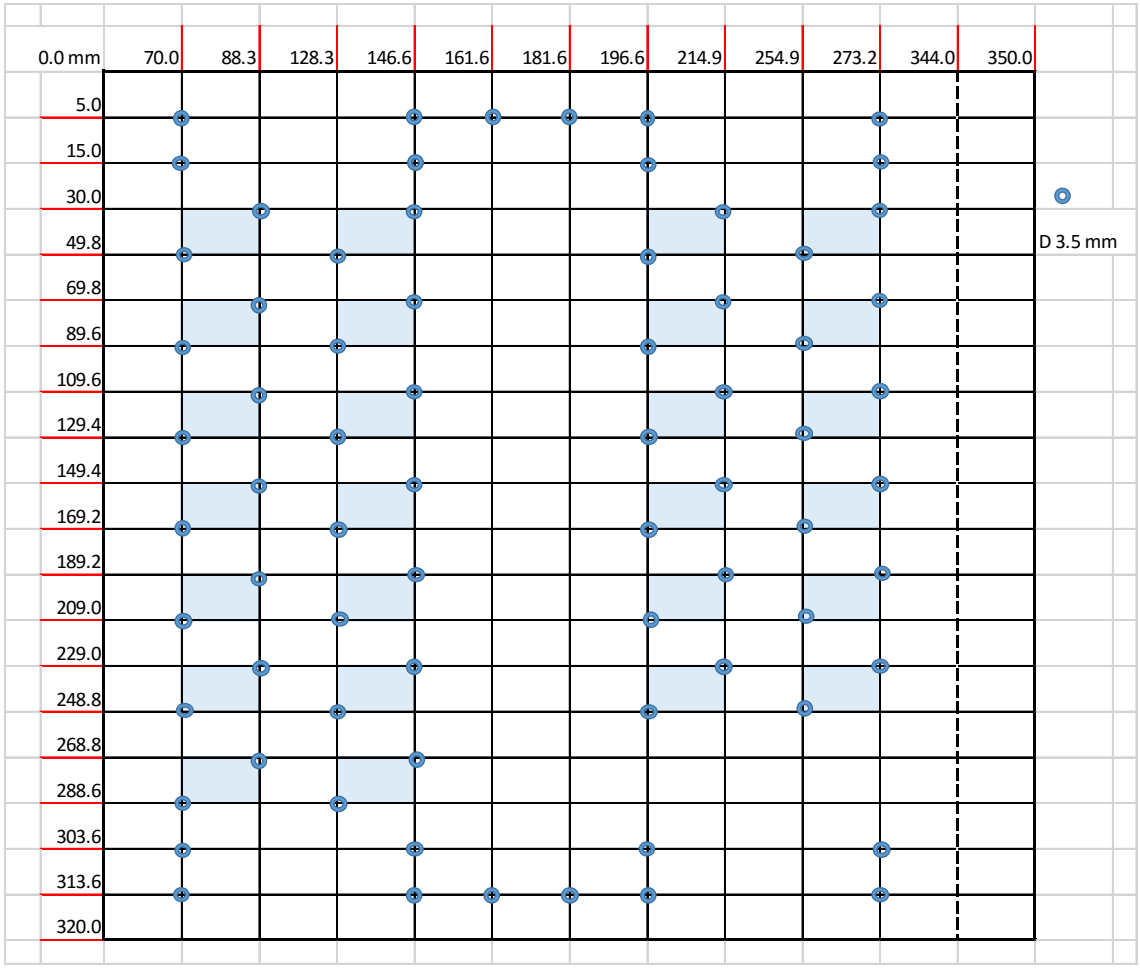


In Layer 2 (3)

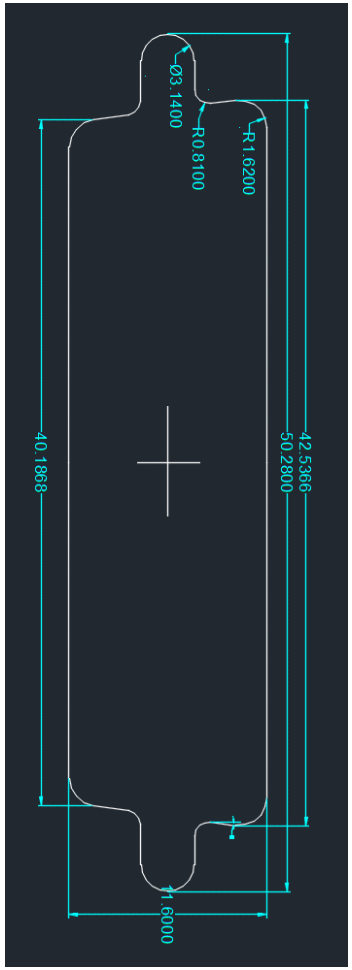


Calculate & Design

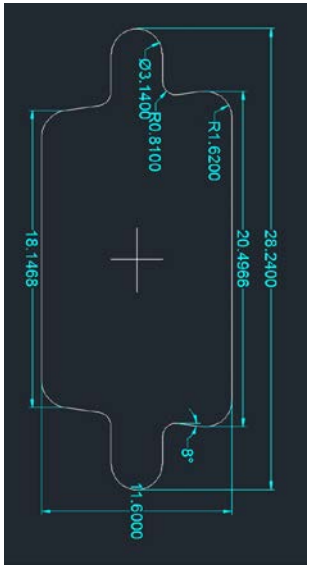
Load Board Plate



D Sub Conn.



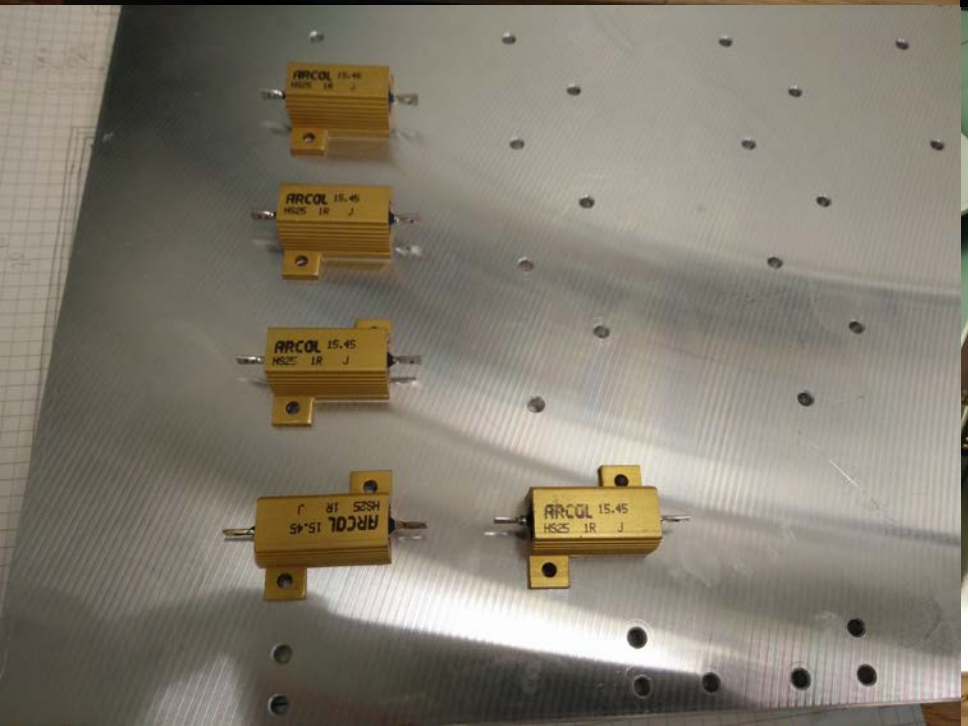
D Sub Conn.

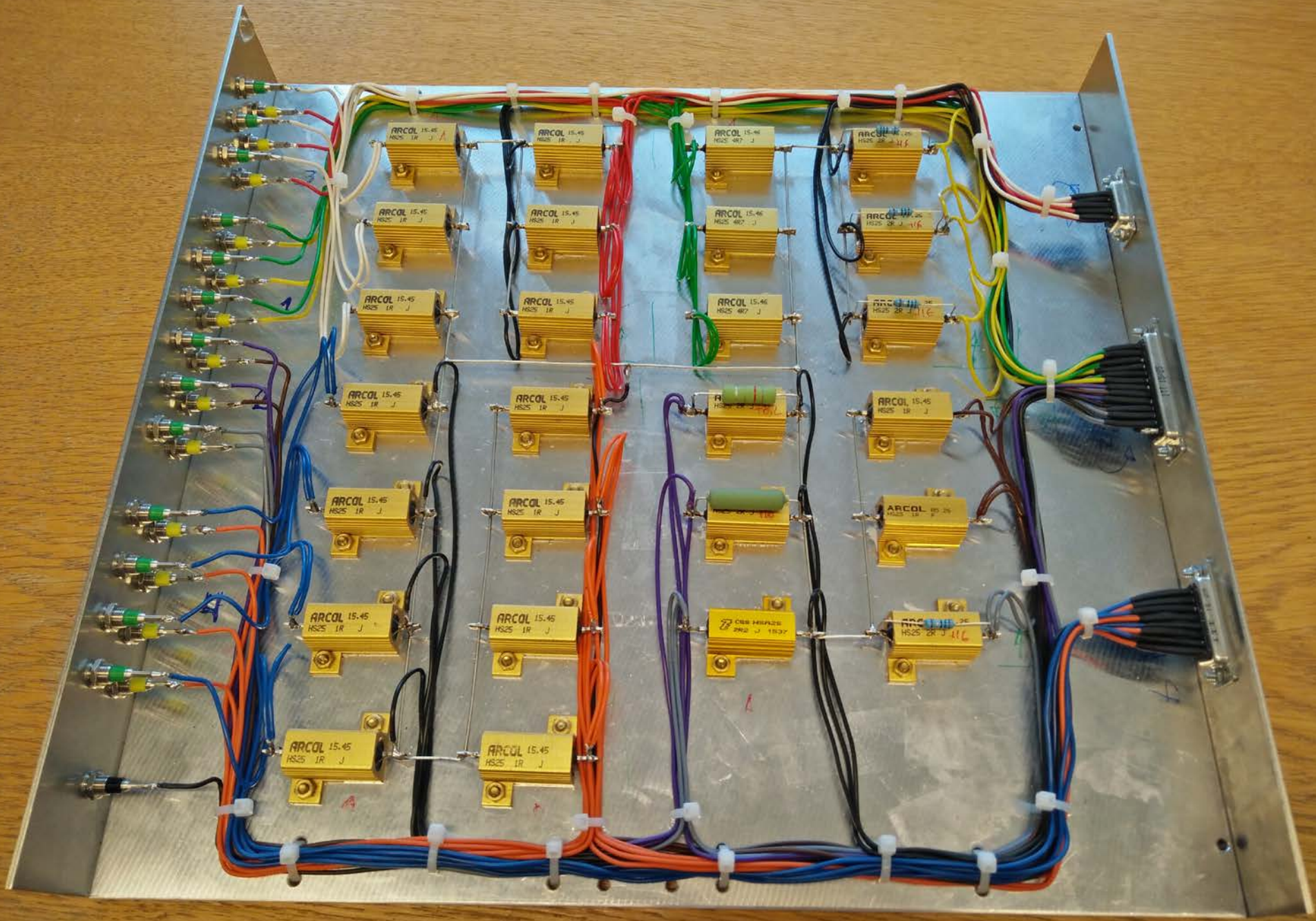


Load Board Module Resistance Values

Analog Signal										
Pixel Modules								Load Board		
Layer	# of modules per group	# of groups	module current (A)	Cable resistance (Ω)		module voltage	Module + cable resistance (Ω)	cable resistance (Ω)		module resistance (Ω)
				active	ground			active	return	
1	1	3	0.38	0.30	0.08	1.60	4.59	0.035	0.035	4.52
2	3	2	0.38	0.34	0.12	1.59	2.32	0.028	0.028	2.27
2	2	1	0.38	0.34	0.12	1.59	1.55	0.032	0.032	1.49
3	4	3	0.38	0.34	0.12	1.60	1.17	0.042	0.042	1.08
4	4	4	0.38	0.34	0.12	1.61	1.17	0.042	0.042	1.09


8418
DISTRELEC
4328418/001/PCS
10 00 24
16 Stk
11000245
1/3
LB-I2R YELLOW
Laborbuchse ø2mm gelb
02 B 01 23


ARCOL 15.45
HS25 1R J


ARCOL 15.45 HS25 1R J
ARCOL 15.46 HS25 4R7 J
ARCOL HS25 2R J
CSS HS25 2R2 J 1537

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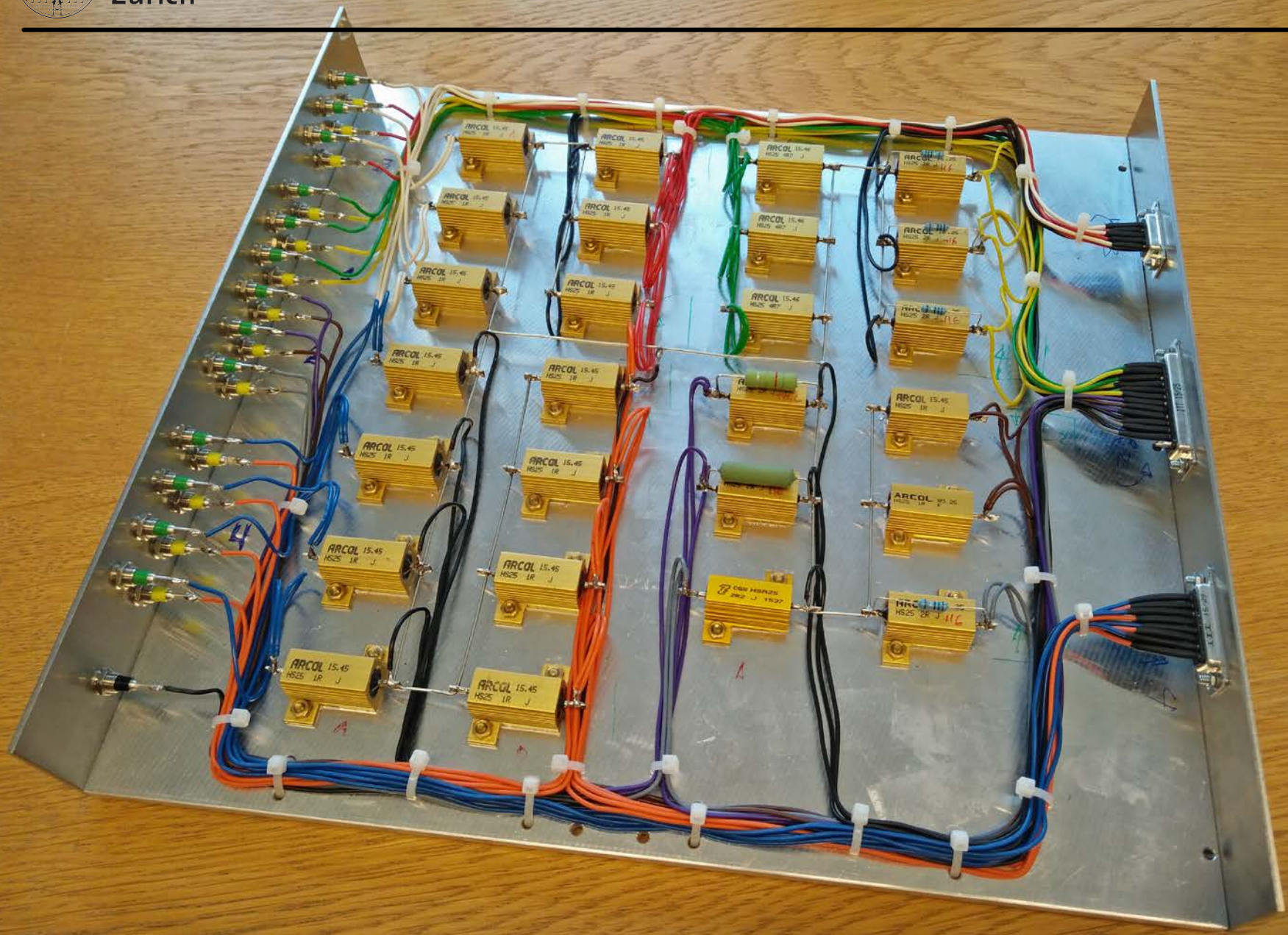
Construction



Construction

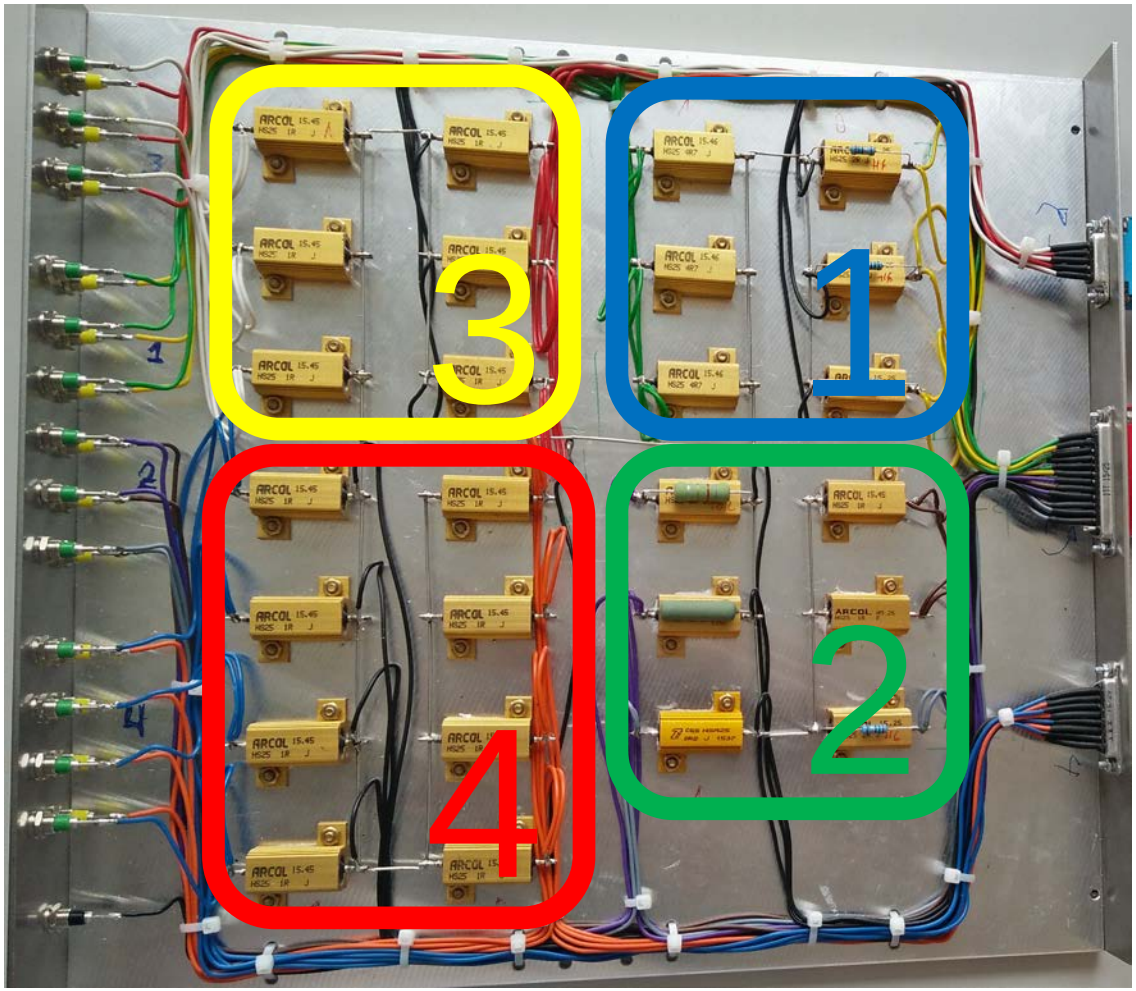
Layers in Load Board

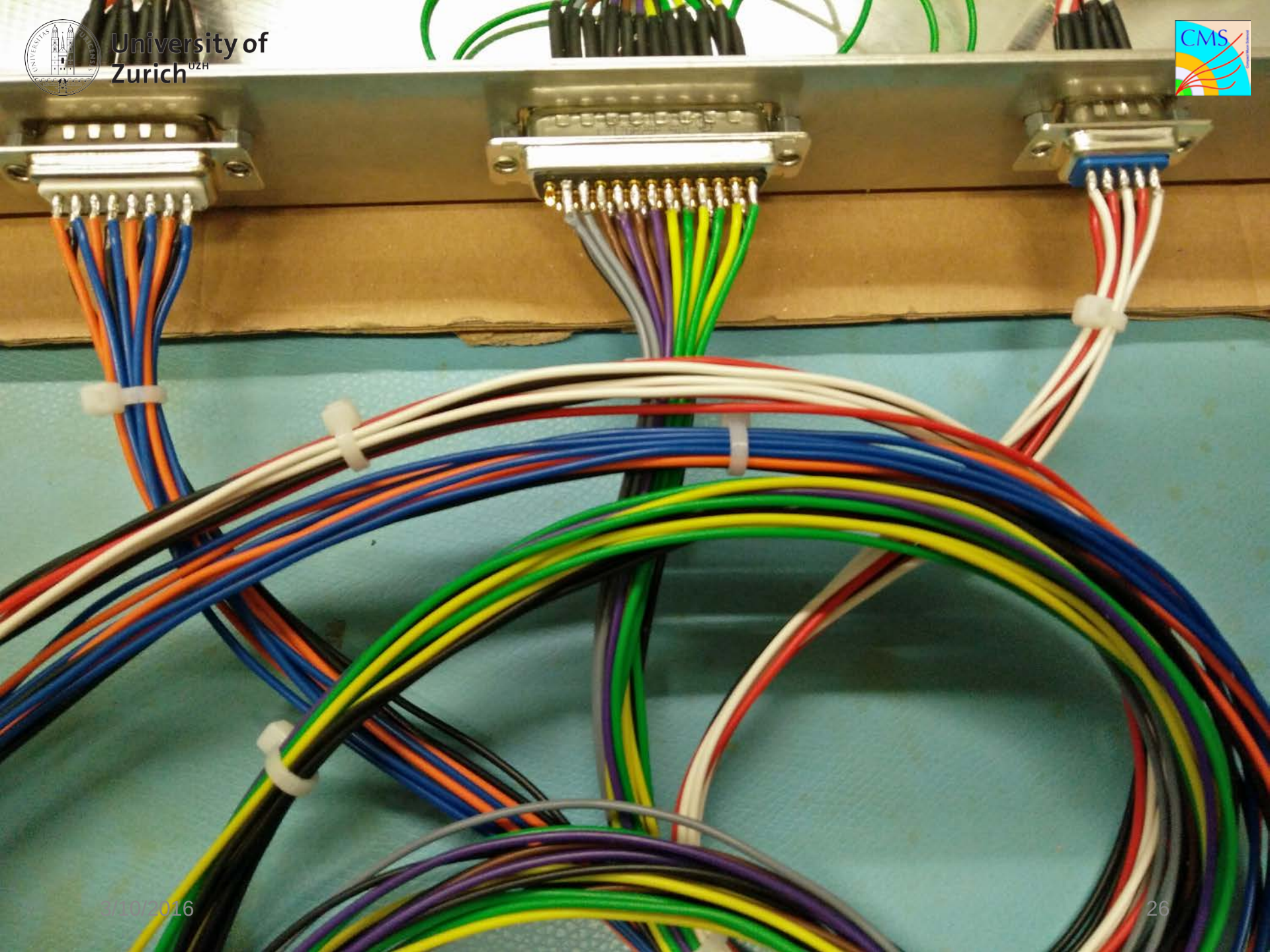
Layer 1:
modules ≡ 1 pixel module

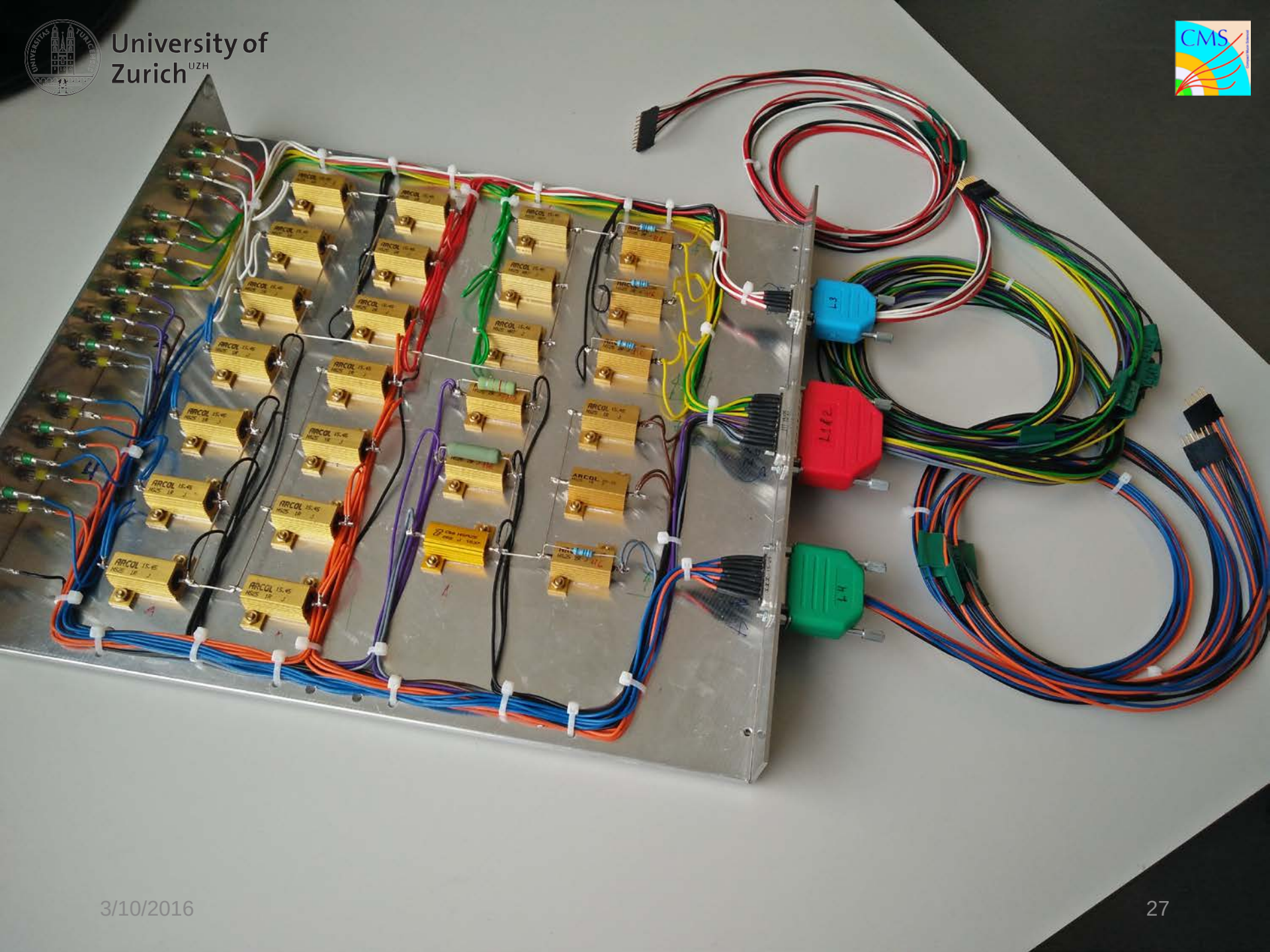
Layer 2:
modules ≡ 2 & 3 pixel module

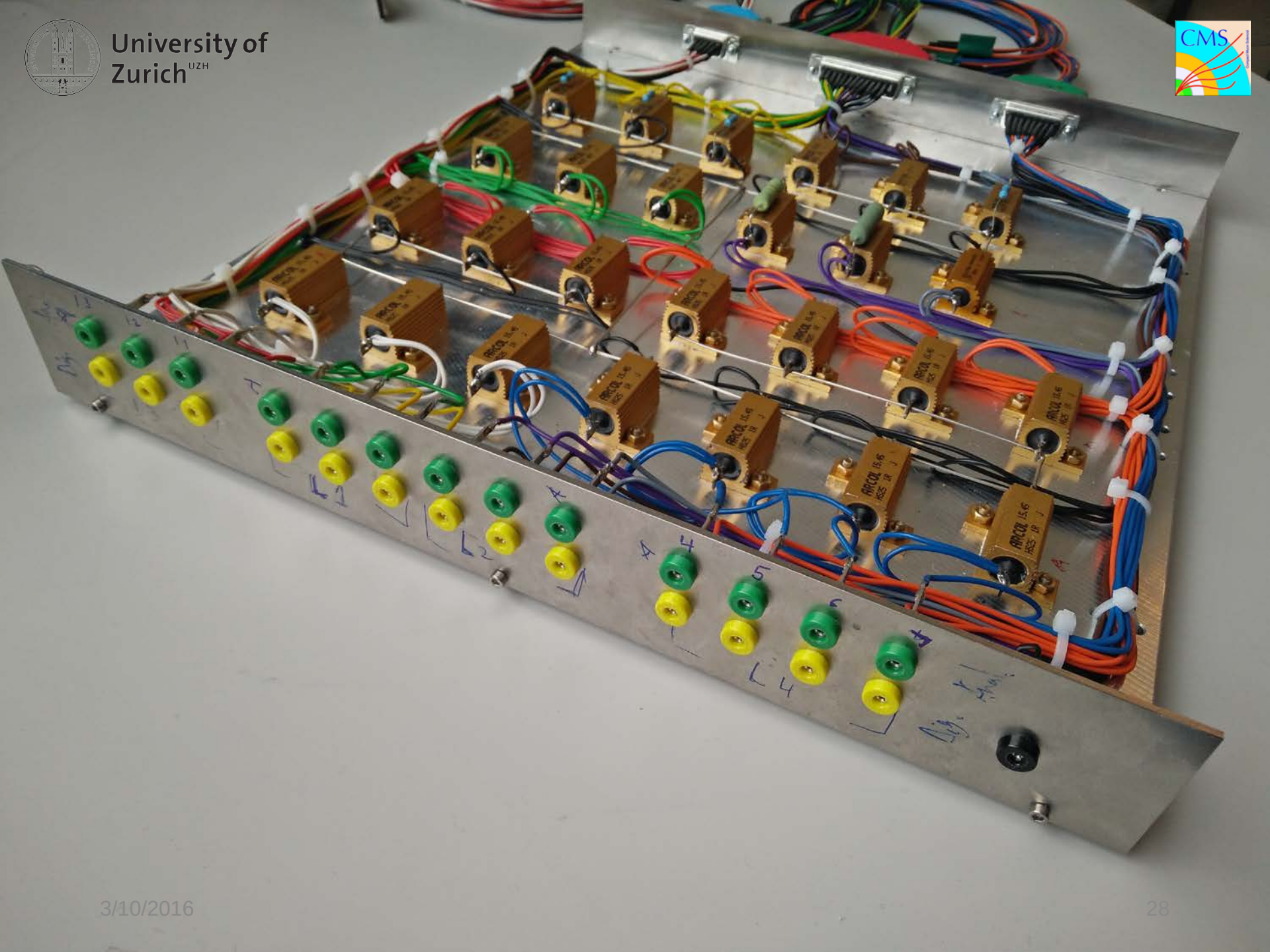
Layer 3:
modules ≡ 4 pixel module

Layer 4:
modules = 4 pixel module





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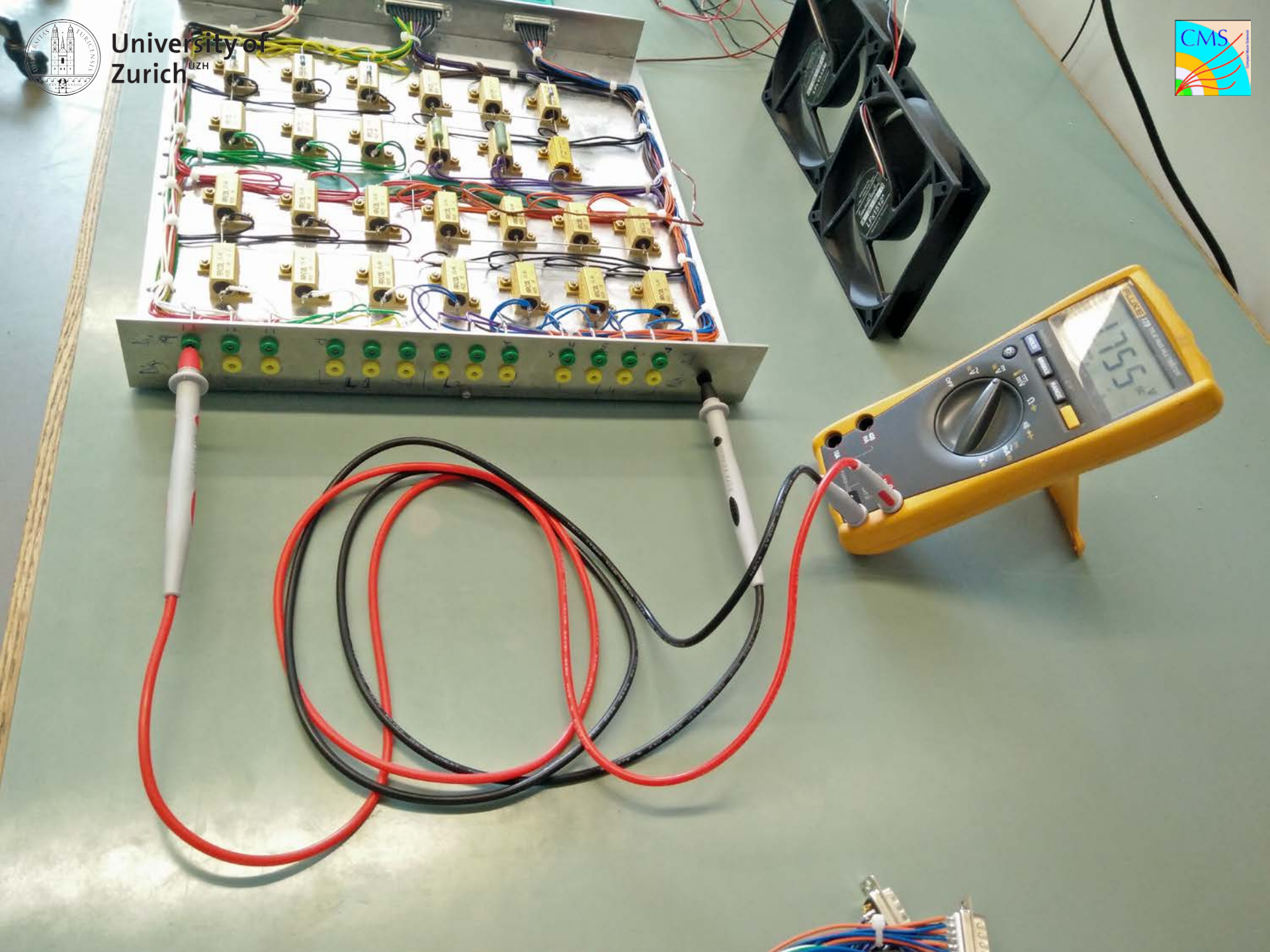
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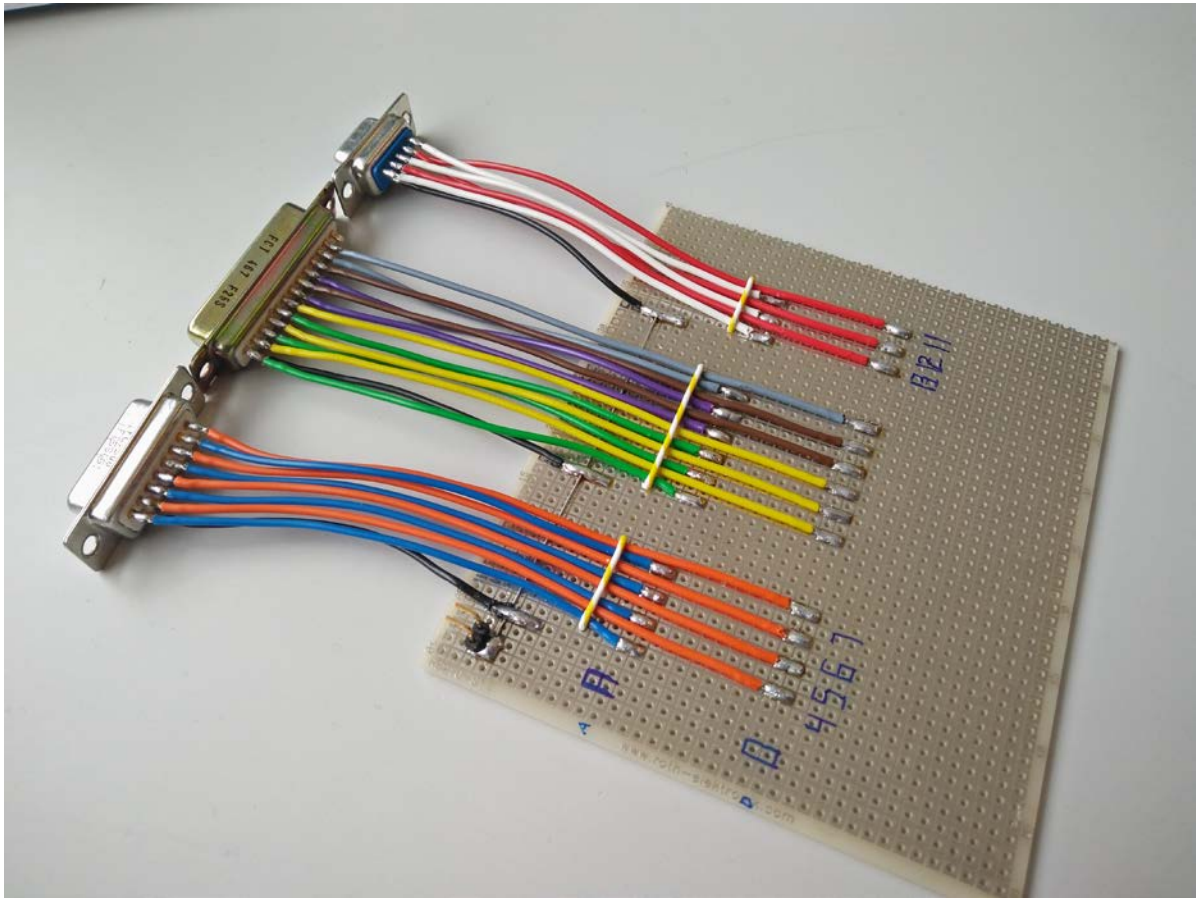
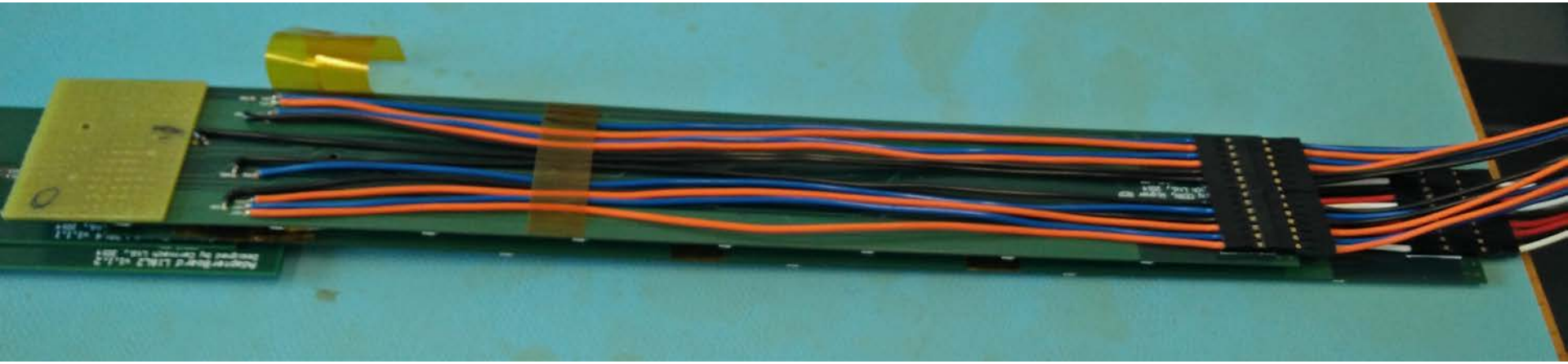
CMS

Construction

Mini Board

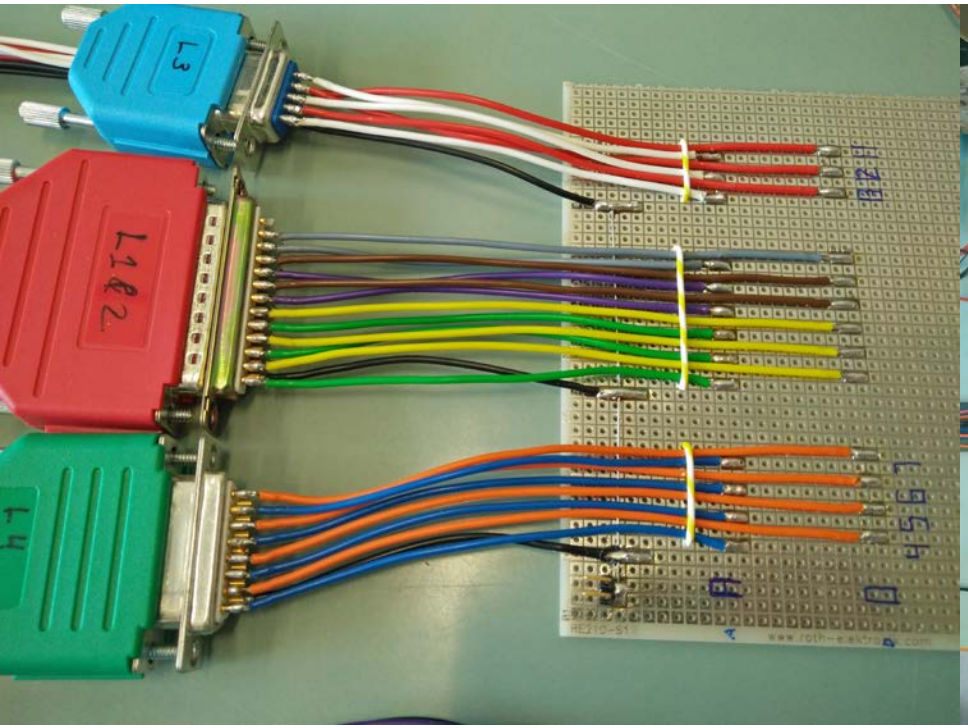


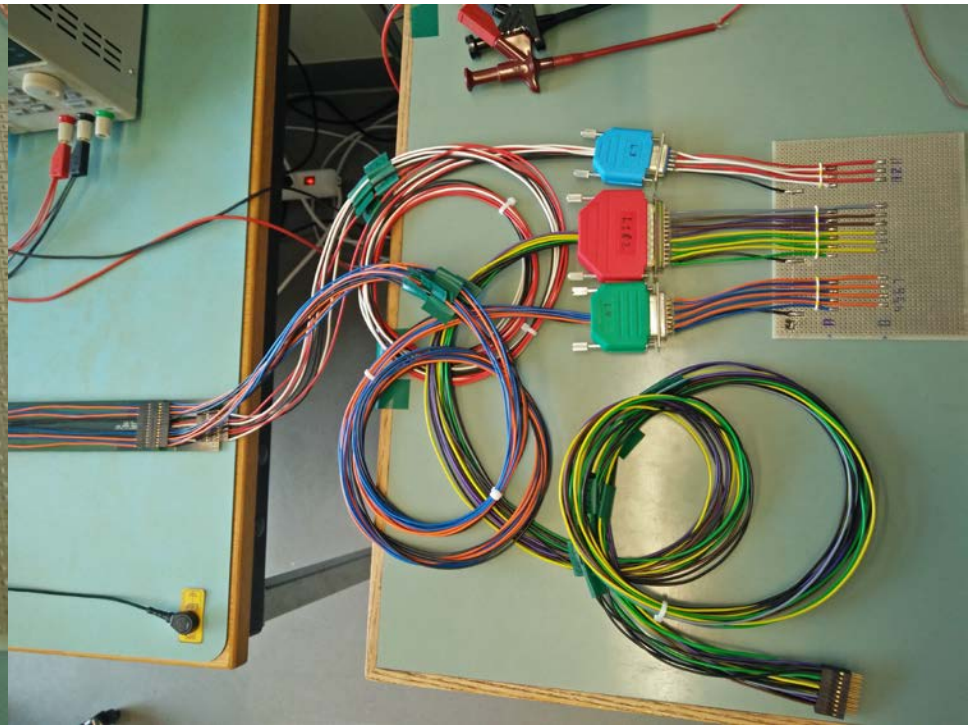
Construction



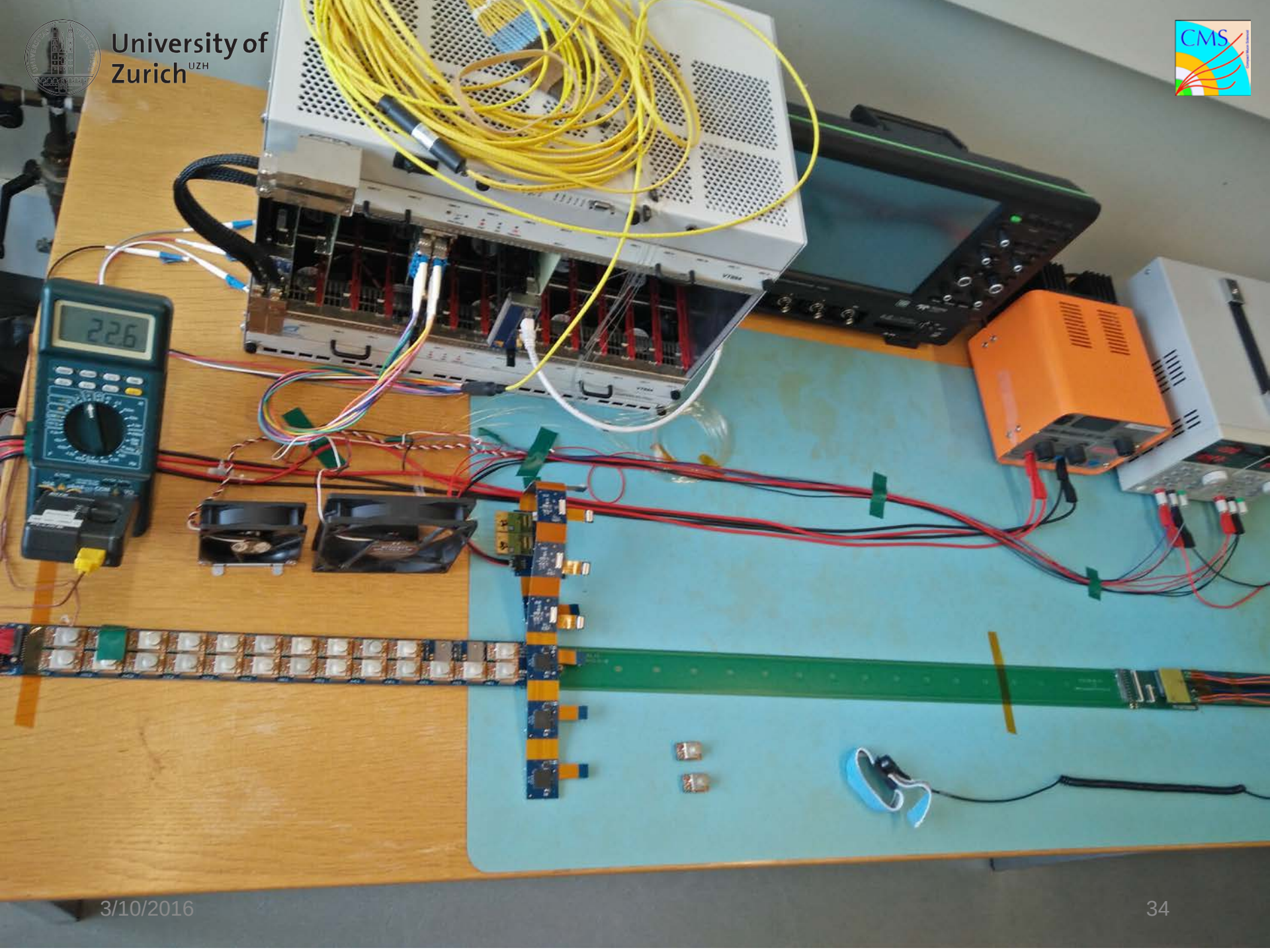
Construction

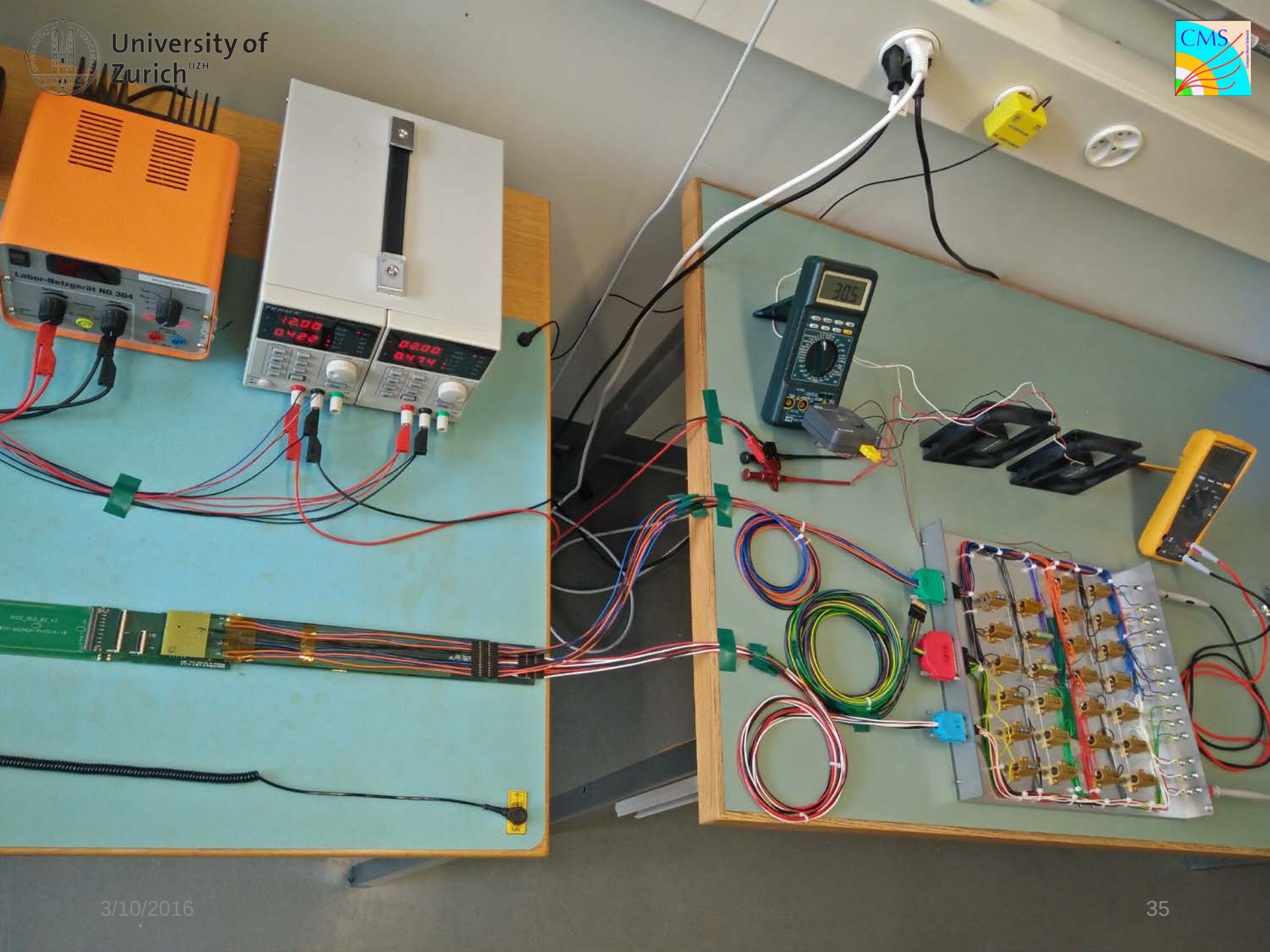
Mini Board





Power Testing Cables


226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Labor-Netzgerät ND 304
3.05

Test

Measurements with load board connected							
Layer 4	Voltage at Sector A (V)	Voltage at Sector D (V)	Voltage at Module - Load Board (V)	Voltage Drop Sectors at A+B+C (mV)	Resistance of load board module + cables (Ω)	Current at load board modules (A)	Cables resistance (Ω)
VA4	2.43	2.12	1.50	312	1.29	1.64	0.15
VA5	2.40	2.09	1.48	315	1.29	1.62	0.15
VA6	2.42	2.11	1.49	306	1.30	1.62	0.15
VA7	2.49	2.18	1.56	311	1.29	1.69	0.15
VD4	3.02	2.69	2.02	333	1.28	2.10	0.14
VD5	3.10	2.75	2.08	355	1.27	2.16	0.14
VD6	3.10	2.75	2.07	351	1.27	2.16	0.14
VD7	3.10	2.75	2.07	345	1.27	2.17	0.14

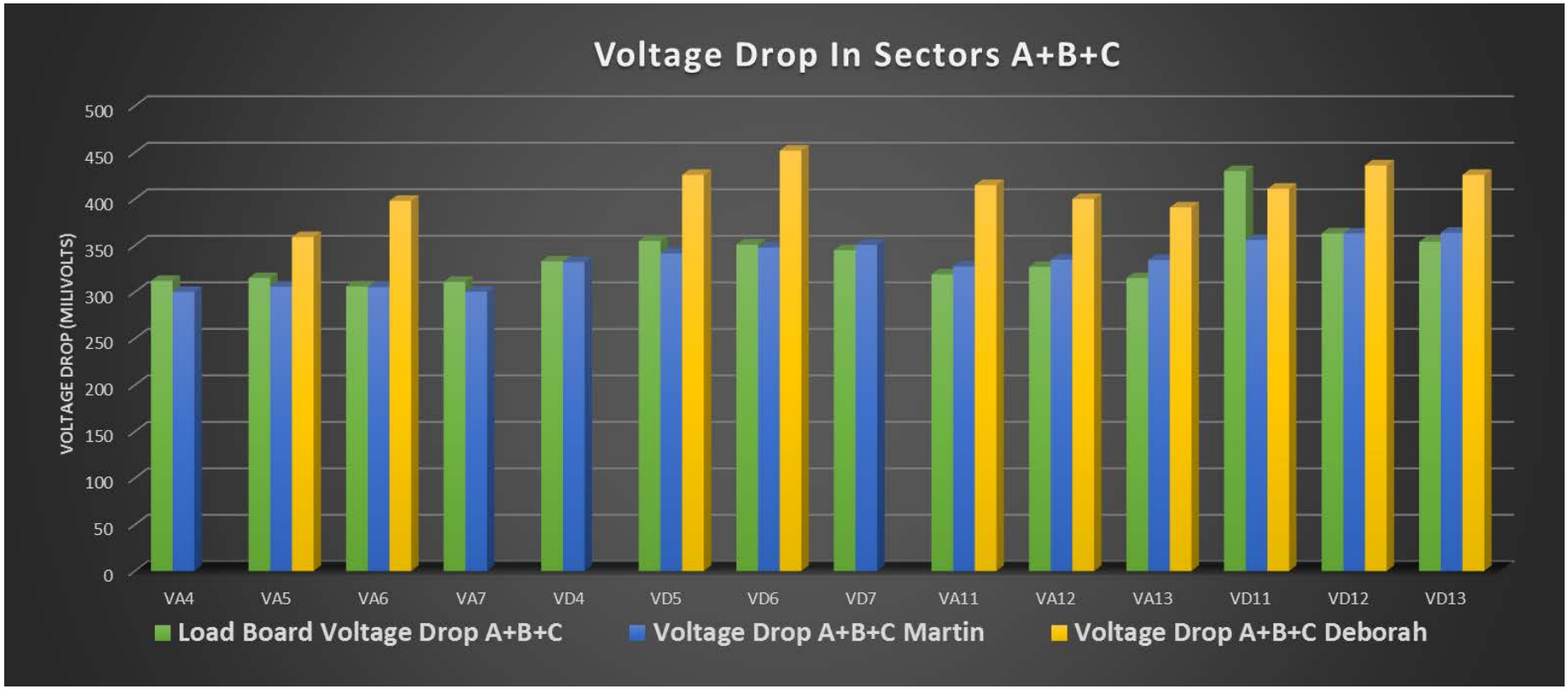
Test

Curent comparison			
Layer 4	measured Current (A)	Nominal Current (A)	Percentual difference (%)
VA4	1.64	1.52	-8.17
VA5	1.62	1.52	-6.54
VA6	1.62	1.52	-6.73
VA7	1.69	1.52	-11.13
VD4	2.10	2.32	9.42
VD5	2.16	2.32	6.77
VD6	2.16	2.32	6.73
VD7	2.17	2.32	6.67

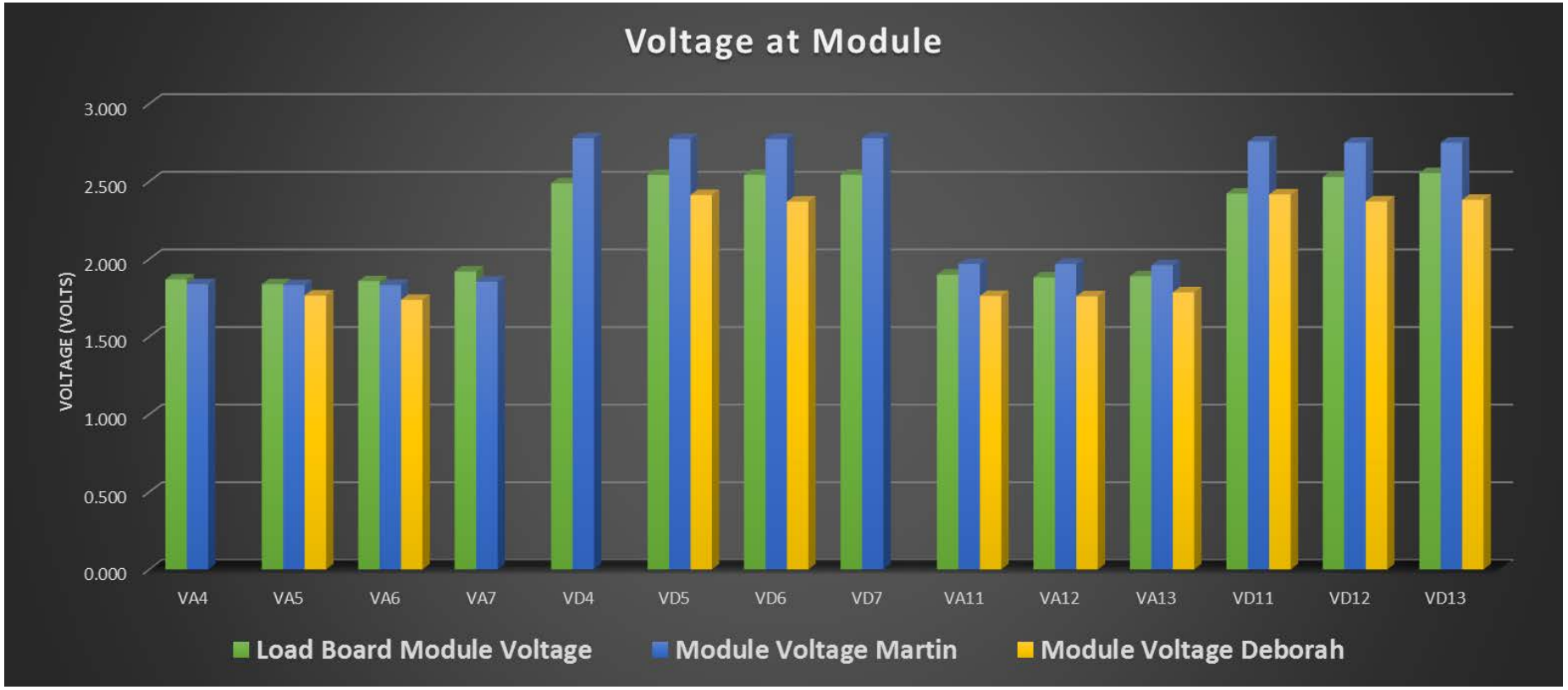
Test

Calculated values: load board modules →(back to) pixel modules				
Cable resistances (Ω)		Current at pixel modules (A)	Voltage drop sector D	Voltage at pixel modules
active	ground			
0.34	0.12	0.41	252	1.87
0.34	0.12	0.40	251	1.84
0.34	0.12	0.41	251	1.86
0.34	0.12	0.42	259	1.92
0.17	0.12	0.53	152	2.54
0.17	0.12	0.54	157	2.59
0.17	0.12	0.54	157	2.59
0.17	0.12	0.54	157	2.59

Test


Voltage Drop In Sectors A+B+C
VOLTAGE DROP (MILIVOLTS)
500
450
400
350
300
250
200
150
100
50
0
VA4
VA5
VA6
VA7
VD4
VD5
VD6
VD7
VA11
VA12
VA13
VD11
VD12
VD13
Load Board Voltage Drop A+B+C
Voltage Drop A+B+C Martin
Voltage Drop A+B+C Deborah

Test


Voltage at Module
VOLTAGE (VOLTS)
3.000
2.500
2.000
1.500
1.000
0.500
0.000
VA4
VA5
VA6
VA7
VD4
VD5
VD6
VD7
VA11
VA12
VA13
VD11
VD12
VD13
Load Board Module Voltage
Module Voltage Martin
Module Voltage Deborah

Acknowledgements:

- **Florencia Canelli**
- Lea Caminada
- Riccardo Del Burgo
- Daniel Florin
- Reto Meier

*Pictures taken in Physik Institut Zurich 8/3/2016