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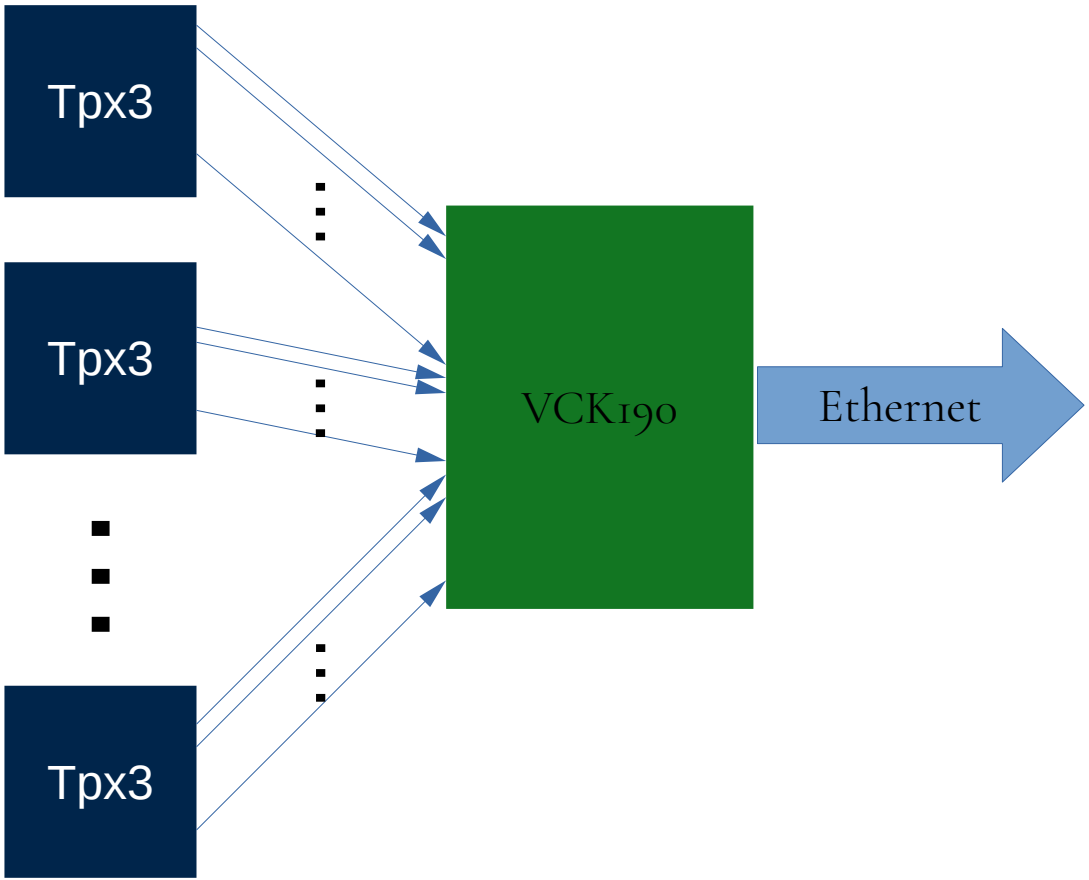
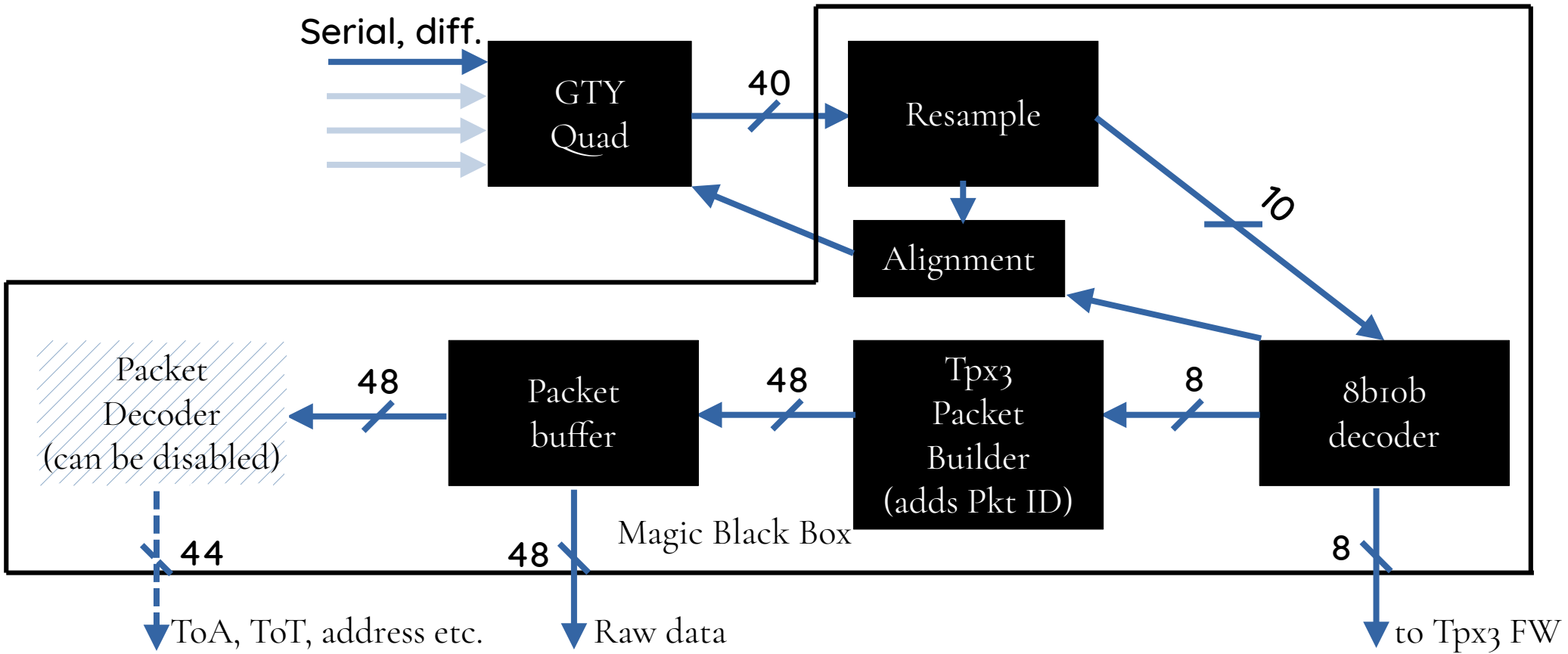
DIES UND DAS ZUM TESTBEAM

Lohengrin Meeting 24.7.2025

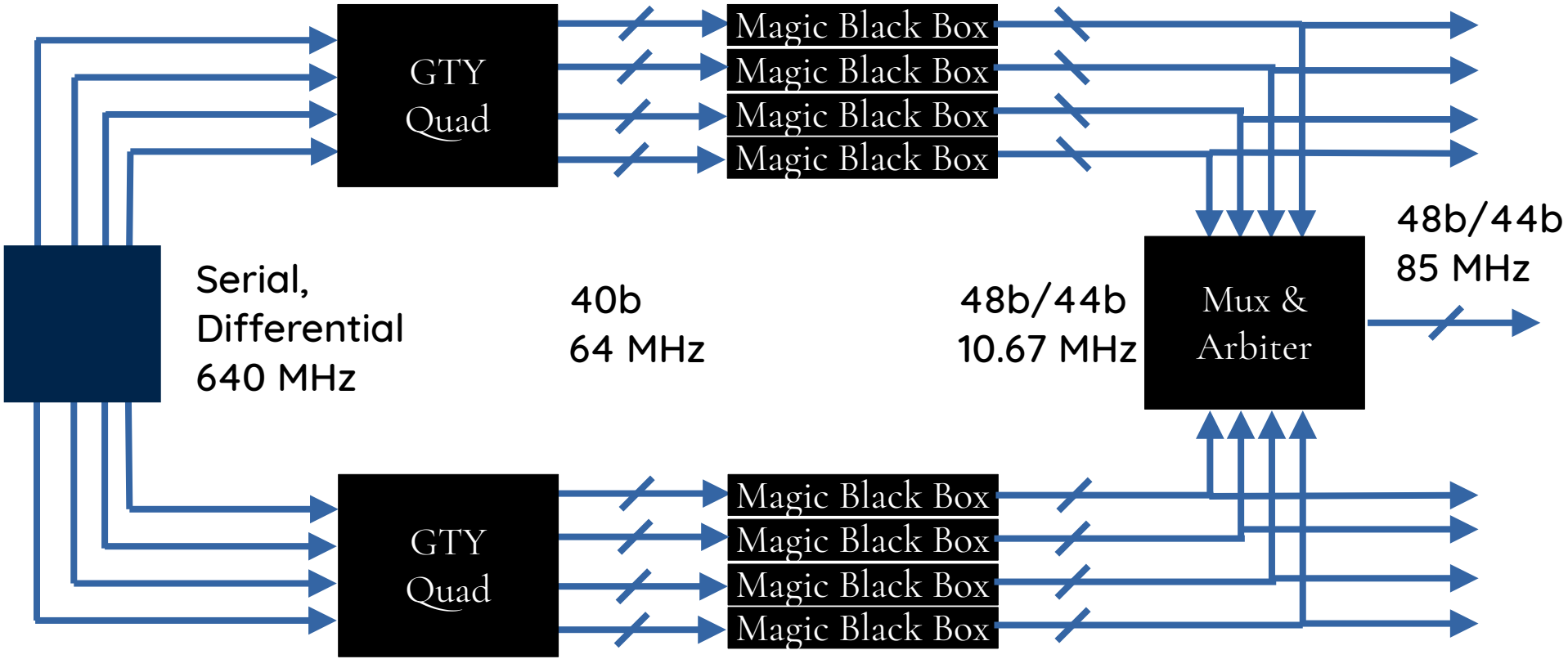
Flexible Readout scheme



Flexible Readout scheme



Flexible Readout scheme



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Requirements

Move data via network

Flexible and scalable

Push instead of poll

Multiple sources on FPGA

Flexible data sizes

Check data completeness

Generatable on FPGA

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The NAGUA protocol

- A layer on top of UDP
- Header per UDP packet
- 64 bit segment size
- Each segment can hold a subpacket
- Each subpacket can consist of multiple segments
- Each subpacket can be from a different source on the FPGA

The NAGUA protocol (v.1): header

Octet	0	1	2	3
0	"N"	"A"	"G"	Protocol version: 0x01
4	Packet ID			

The NAGUA protocol (v.1): payload

subpacket structure:

Octet: Bit:	0 6:0	7	1	2	3
0	Source ID	is multiseg.	Num. add. segments or ID	Payload (upper 16 bits)	
4	Payload (lower 32 bits)				

→ 48b of payload (looking at you, Tpx3 packets)

The NAGUA protocol (v.1): payload (multisegment packet)

subpacket structure:

Octet: Bit:	0 6:0	7	1	2	3
0	Source ID	1	No. additional segments	Payload (upper 16 bits)	
4	Payload (lower 32 bits)				

Following subpacket(s):

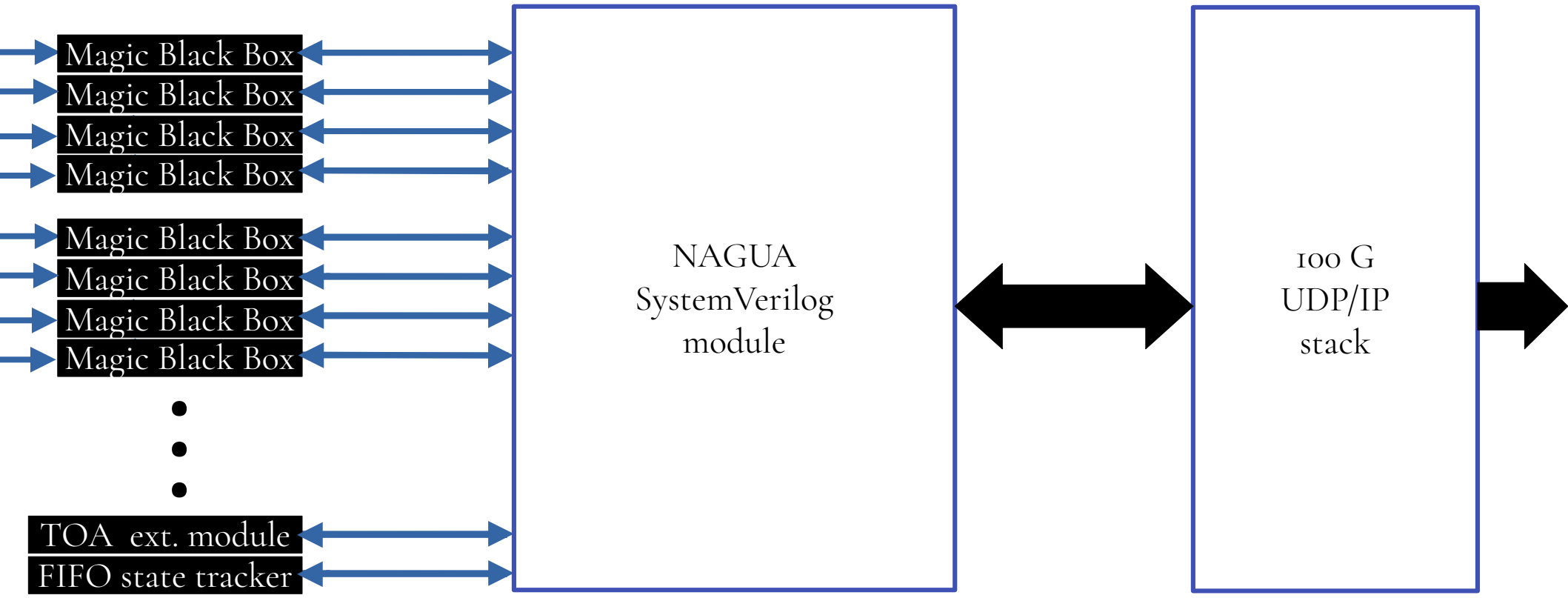
Octet	0	1	2	3
0	64 bit payload (including, ideally, an ID)			
4				

The NAGUA protocol (v.1): payload (single segment packet)

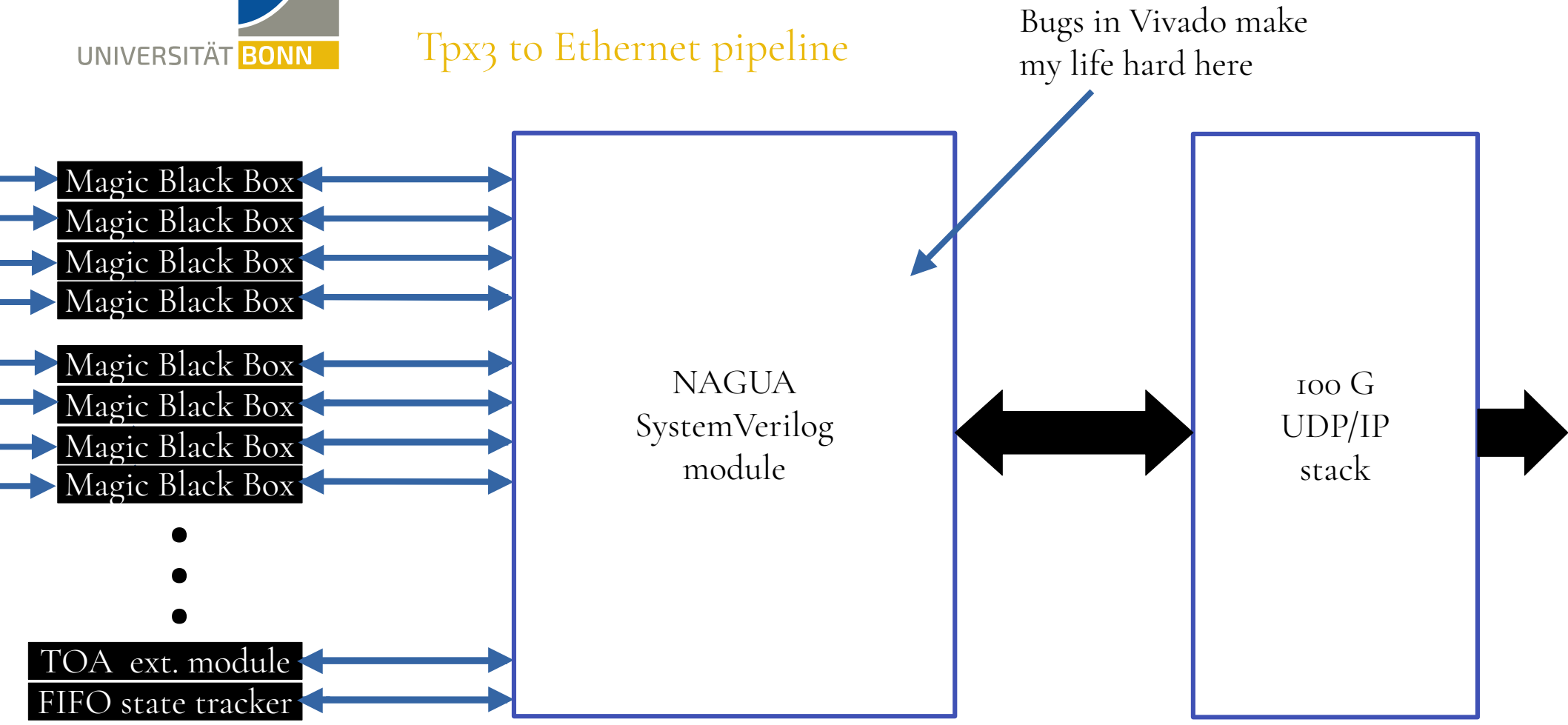
subpacket structure:

Octet: Bit:	0 6:0	7	1	2	3
0	Source ID	0	Subpacket ID	Payload (upper 16 bits)	
4	Payload (lower 32 bits)				

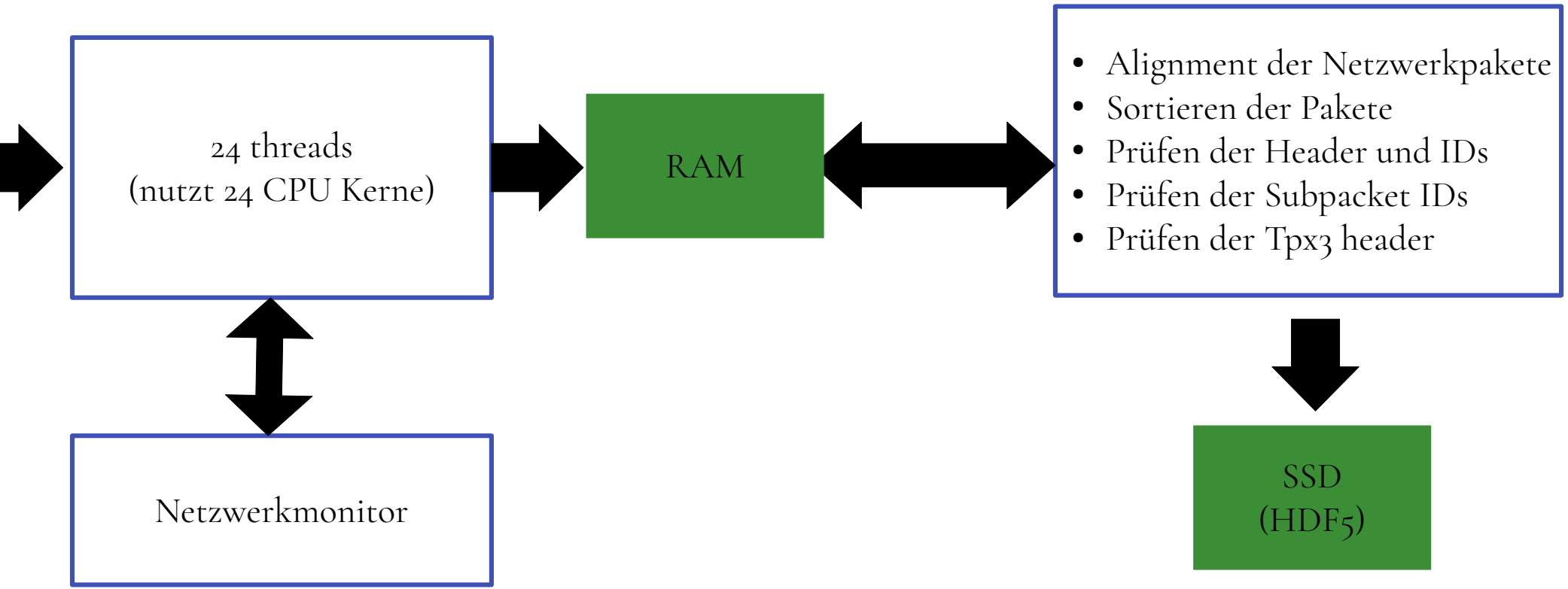
Tpx3 to Ethernet pipeline



Tpx3 to Ethernet pipeline



Server software



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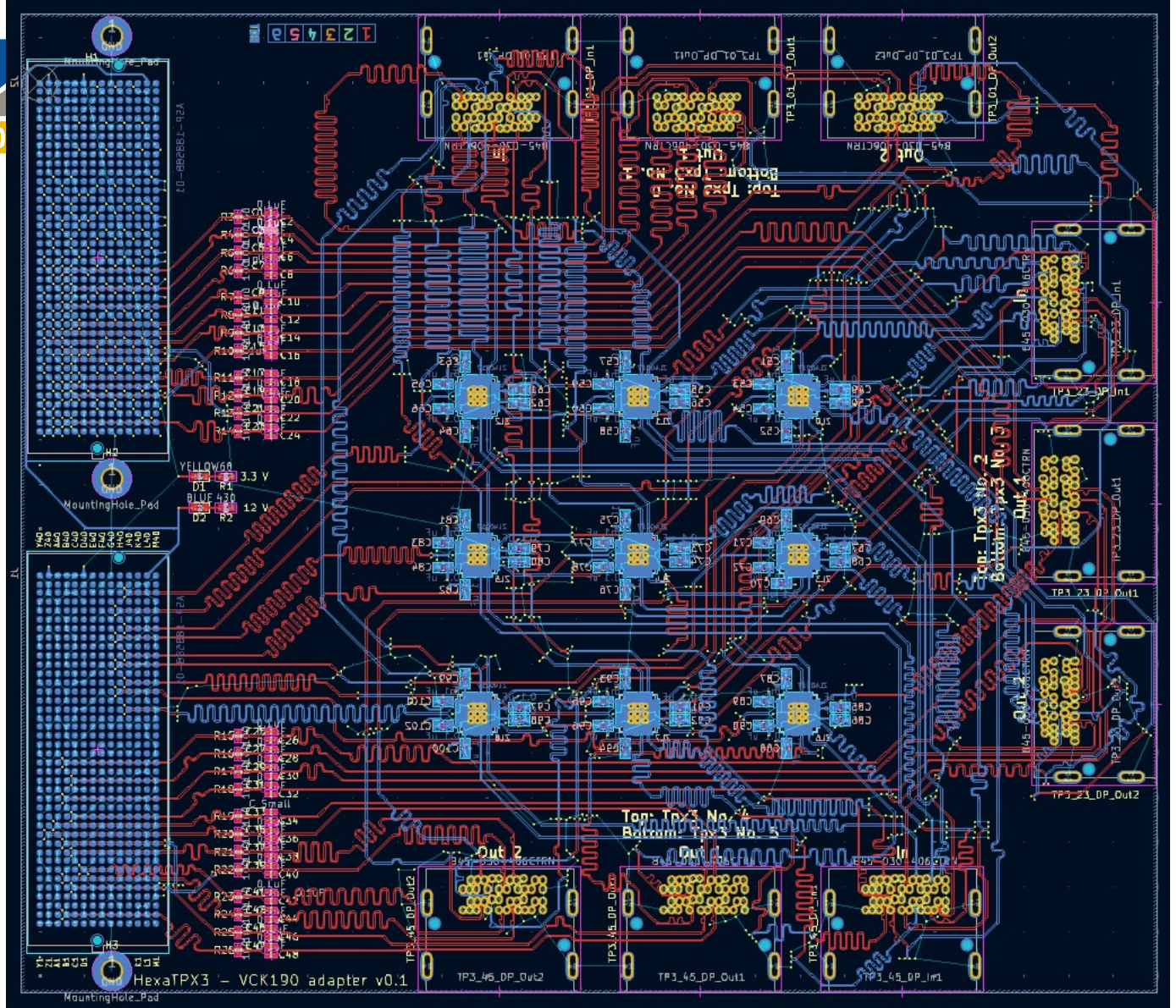

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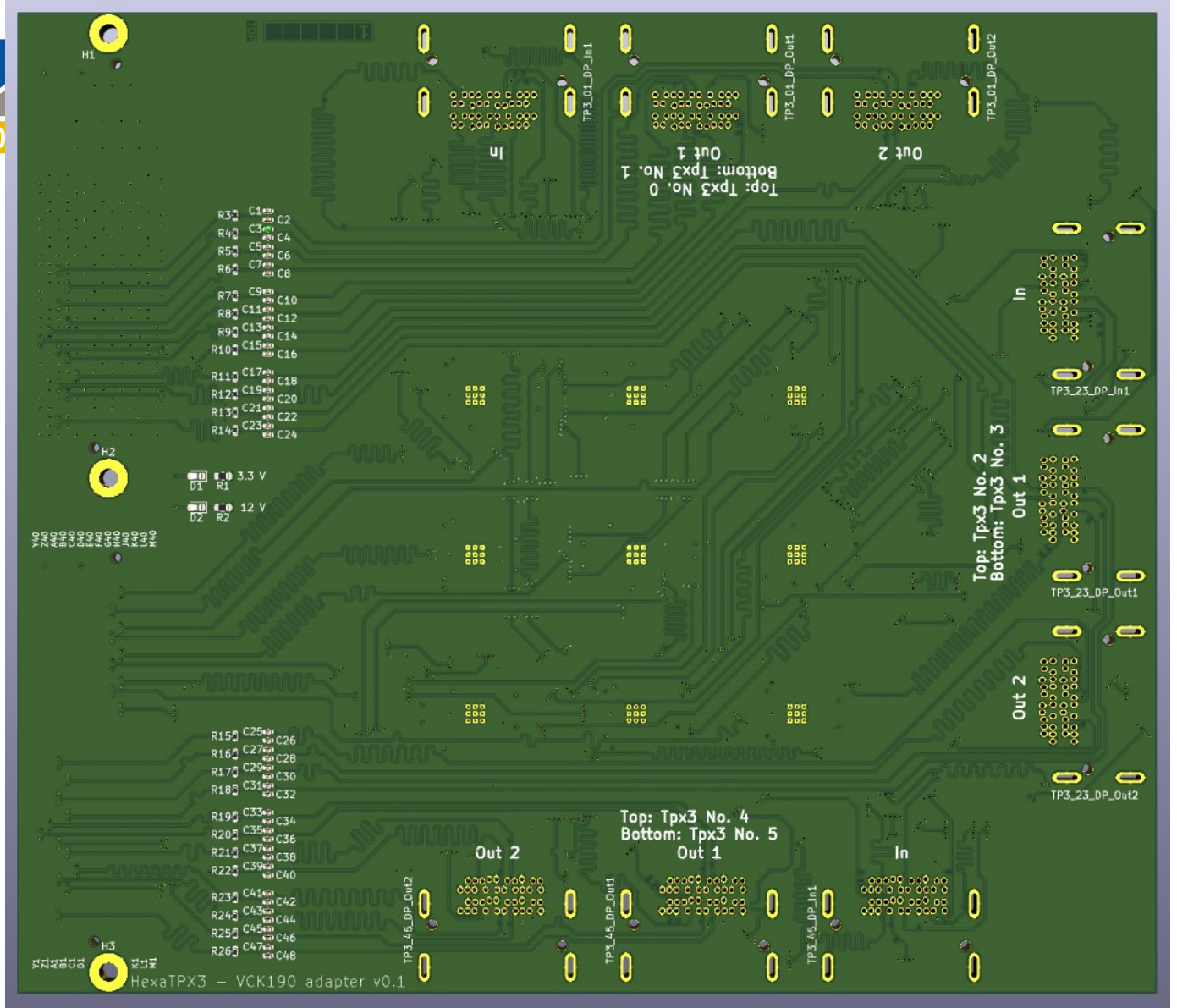

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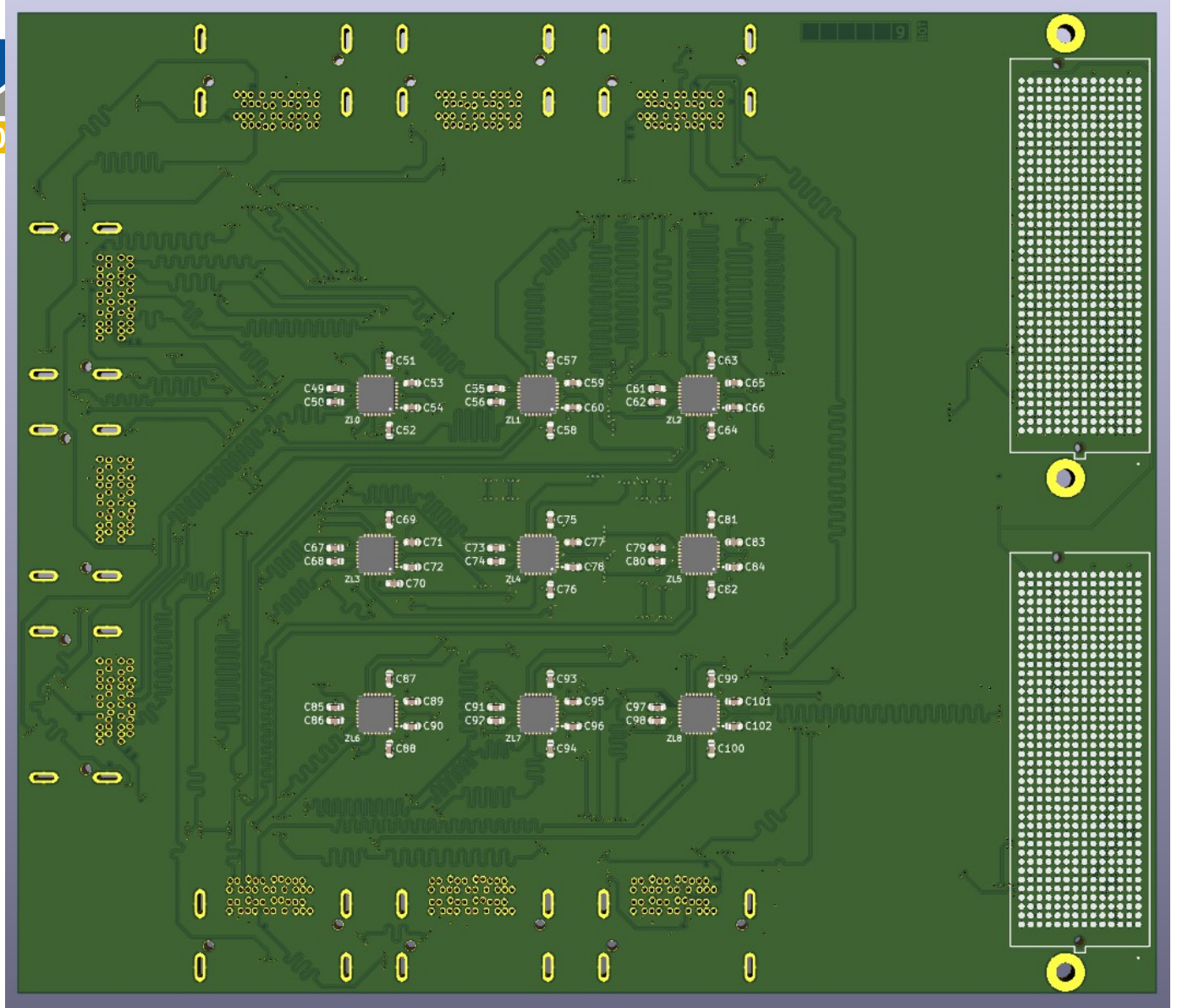

Adapter PCB

Was funktioniert:
Multichip FW/SW: ✓
ZL40217 (Input-Fanout): ✓
Layout: ✓ (Fehler für Kanal 6 im Layout? PCB? Problem beim Löten?)

To do:
Weitere PCBs bestellen und bestücken lassen bis eins funktioniert ;-)

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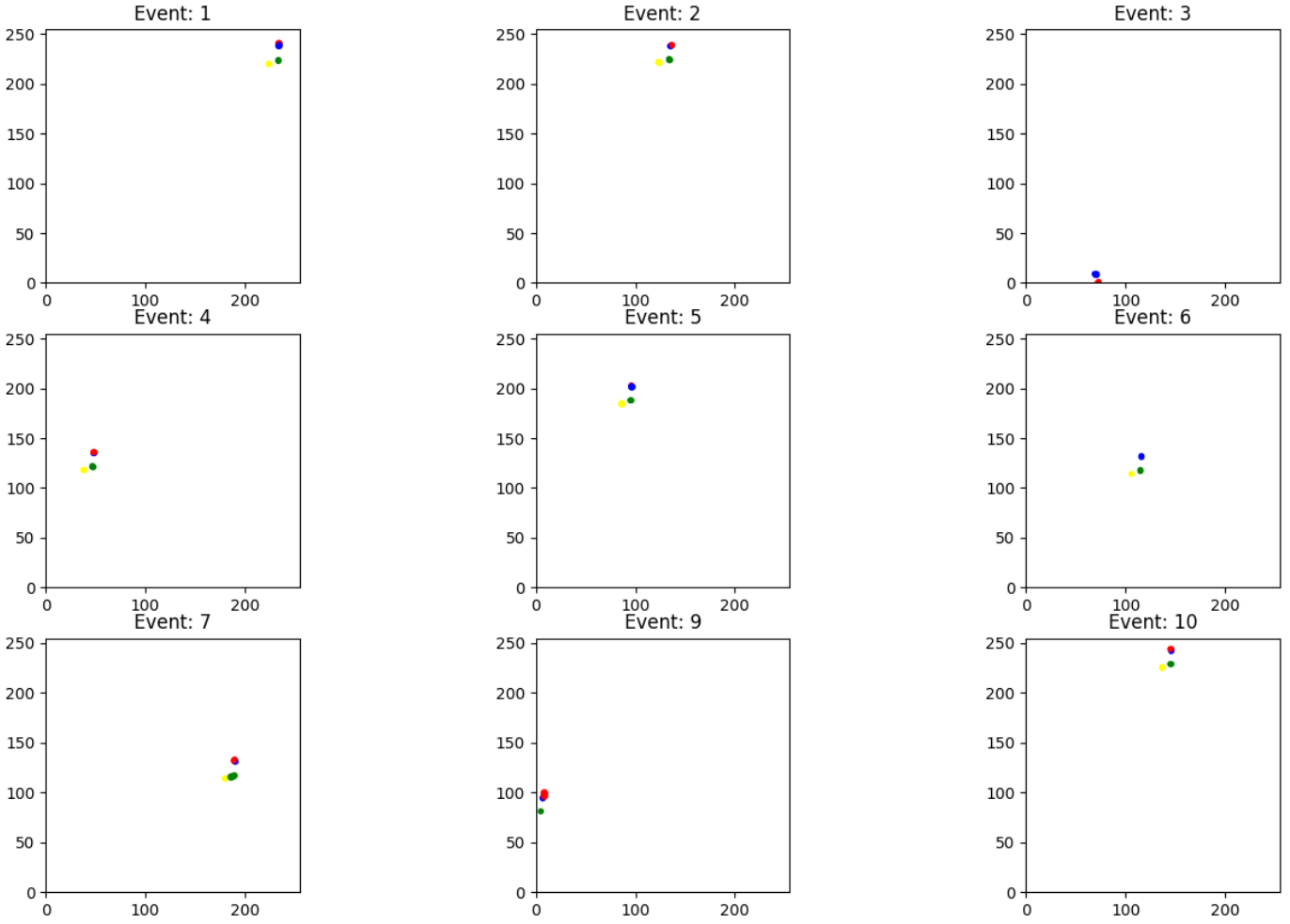
Data processing

- ToA/FToA Korrekturen (analog zu Markus' Analyse Skript)
- ToA extension und zugehörige Hits matchen (ermöglicht sortieren)
- Events Plane-übergreifend suchen (DBSCAN clustering von ToA und X/Y)
- Plane offsets berechnen und korrigieren

File: 2025-07-08_14-49-40.h5



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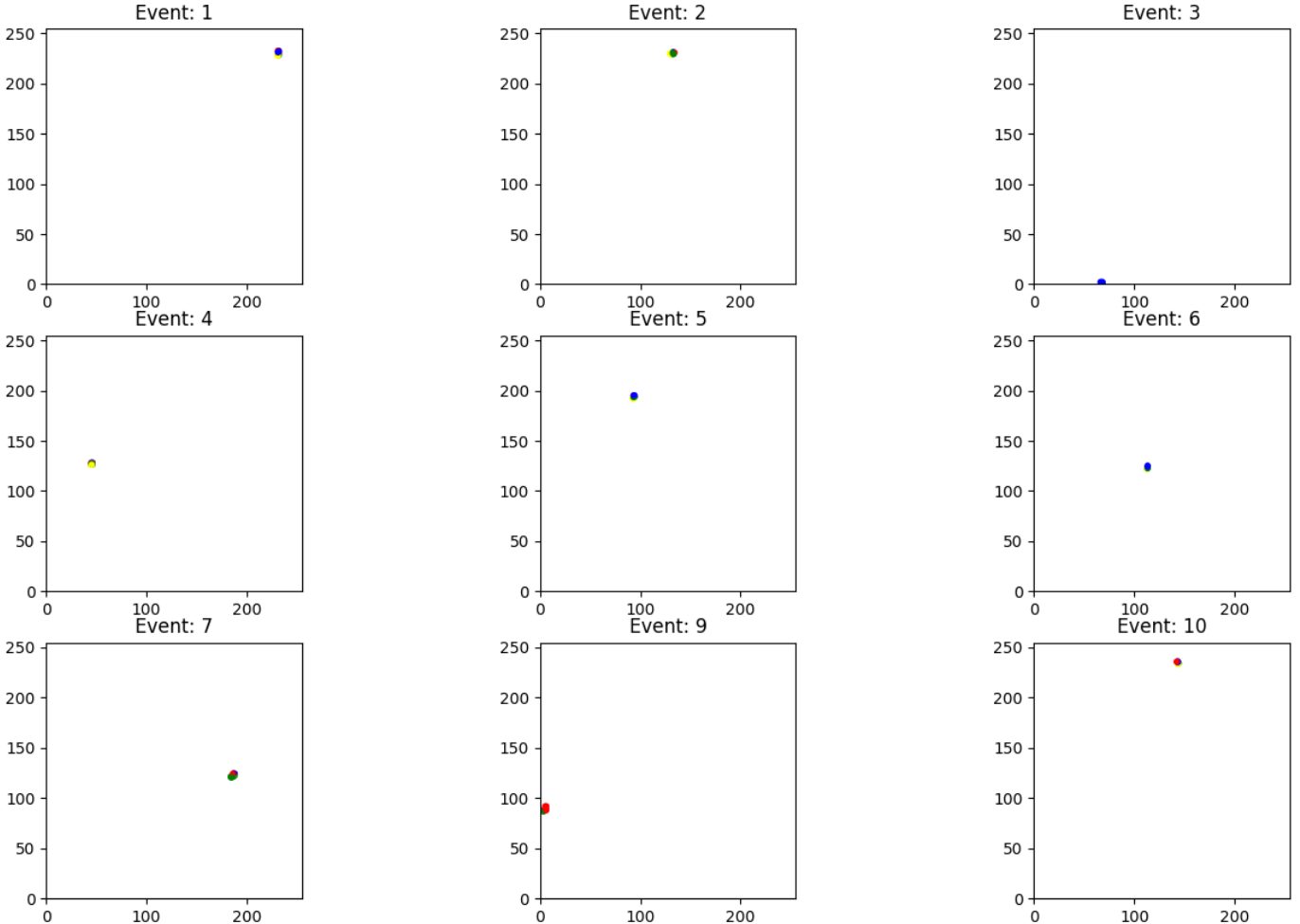

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Data processing

1) ToA bleiben wohl synchron
2) Plane 5 verhält sich merkwürdig (ToA und ToT scheinen falsch, X/Y wohl korrekt)