



# *mTower readout trigger distance limits*

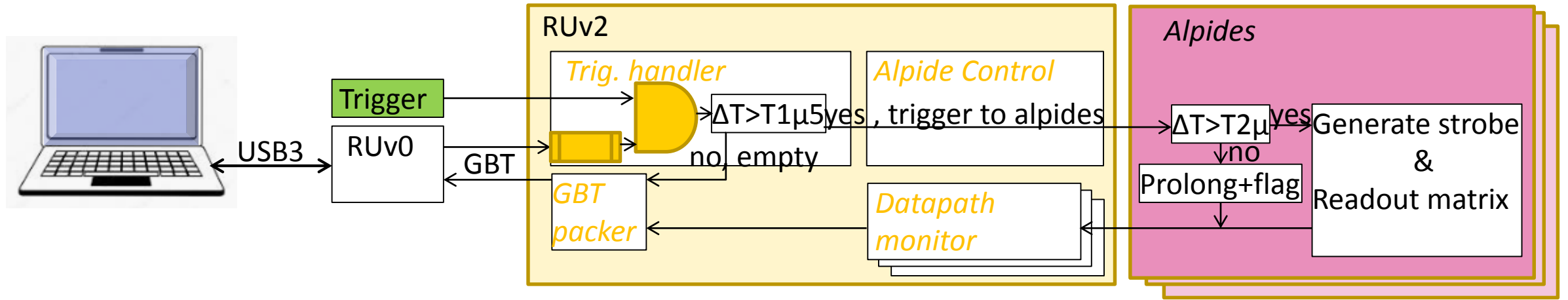
# Outline

Trigger propagation through mTower readout

mTower trigger speed tests

Conclusion

# mTower Readout system trigger propagation



With Alpidet in triggered mode, there are 3 situations depending on time between triggers:

**<  $T1 \mu s$  (=RUv2 TRIG\_MIN\_DISTANCE register )**

RUv2 will not send trig to Alpidet and sends empty packet over GBT

**$T1 \mu s \dots T2 \mu s$**

RUv2 sends trigger/pulse to Alpidet. Alpidet prolongs strobe period and activates strobe flag.

**>  $T2 \mu s$  (=strobe period)**

All triggers handled "normally"

# Full mTower Readout system

Trigger generator (Agilent 81110A) setting:

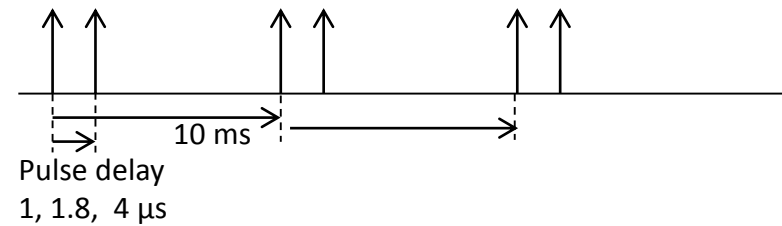
- Double pulse frequency = 100 Hz (10ms)
- Double pulse delay 1  $\mu$ s, 1.8  $\mu$ s or 4  $\mu$ s
- Number of double pulses 125, 250 (in total 250, 500)

RUv2 TIG\_MIN\_DISTANCE = 1,5  $\mu$ s

Alpide strobe = 2  $\mu$ s

PC asks/sends 500 triggers

#double pulses = 3



Trigger generator		RUv2			Alpide		RUv2				PC	
Agilent 81110A		Trigger handler			Alpide Control	FROMU trigger counter	Strobe extend flag	Datapath monitor	GBT packer			#full events decoded
pulse Delay	#double pulses	echod	Send	proces	#Trigs			Event cnt	Empty	Timeout	Done	
1 $\mu$ s	125	*	*	*	125	126	0	N*125	126	0	251	125
	250	*	*	*	250	250		N*250	252		502	250
1.8 $\mu$ s	125	*	*	*	250	126	1	N*125	1	125	251	125
	250	*	*	*	500	250		N*250	2	250	502	250
4 $\mu$ s	125	*	*	*	250	251	0	N*250	1	0	251	250
	250	*	*	*	500	500		N*500	2		502	500

# Conclusions

Alpide Strobe extend flag gets activated

Alpide FROMU trigger counter not increased when strobe extended

Following counters are fully in line with expectations:

- RUv2 Alpide Control #triggers/Pulses send
- Alpide Strobe extend flag
- RUv2 Datapath monitor event count
- RUv2 GBT packer Timeout
- PC #full events received after decoding

Following counters are 1 or 2 counts higher, probably due to SOD, EOD packets:

- RUv2 GBT packer Empty & Done

Following counter is sometimes 1 higher then expected:

- Alpide FROMU trigger counter

RUv2 trigger handles counters (\*) not consistent at all

=> During testbeam, trigger-pulse duration was  $16\mu\text{s}$  (60kHz sustained) >> TIG\_MIN\_DISTANCE & strobe period?

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	250				250	250		N*250	252		502	250
	500				250	250		N*250	252		502	250
1.8 $\mu$ s	125				250	126	1	N*125	1	125	251	125
	250				500	250		N*250	2	250	502	250
	500				500	250		N*250	2	250	502	250
4 $\mu$ s	125				250	251	0	N*250	1	0	251	250
	250				500	500		N*500	2		502	500
	500				500	500		N*500	2		502	500