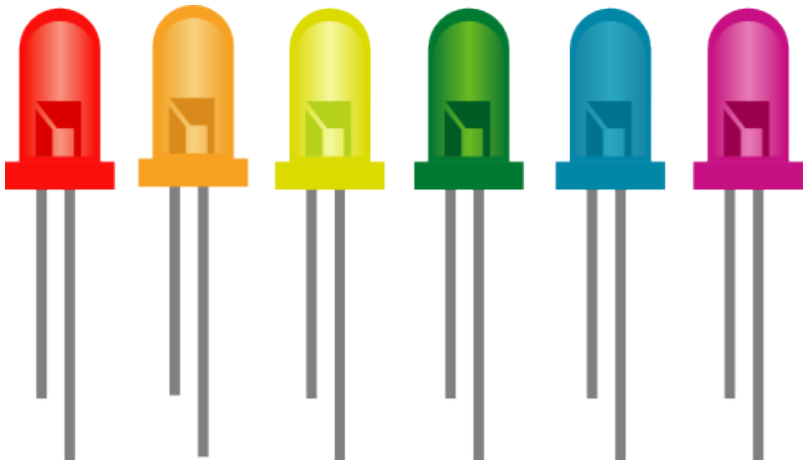
Some S406 DAQ highlights

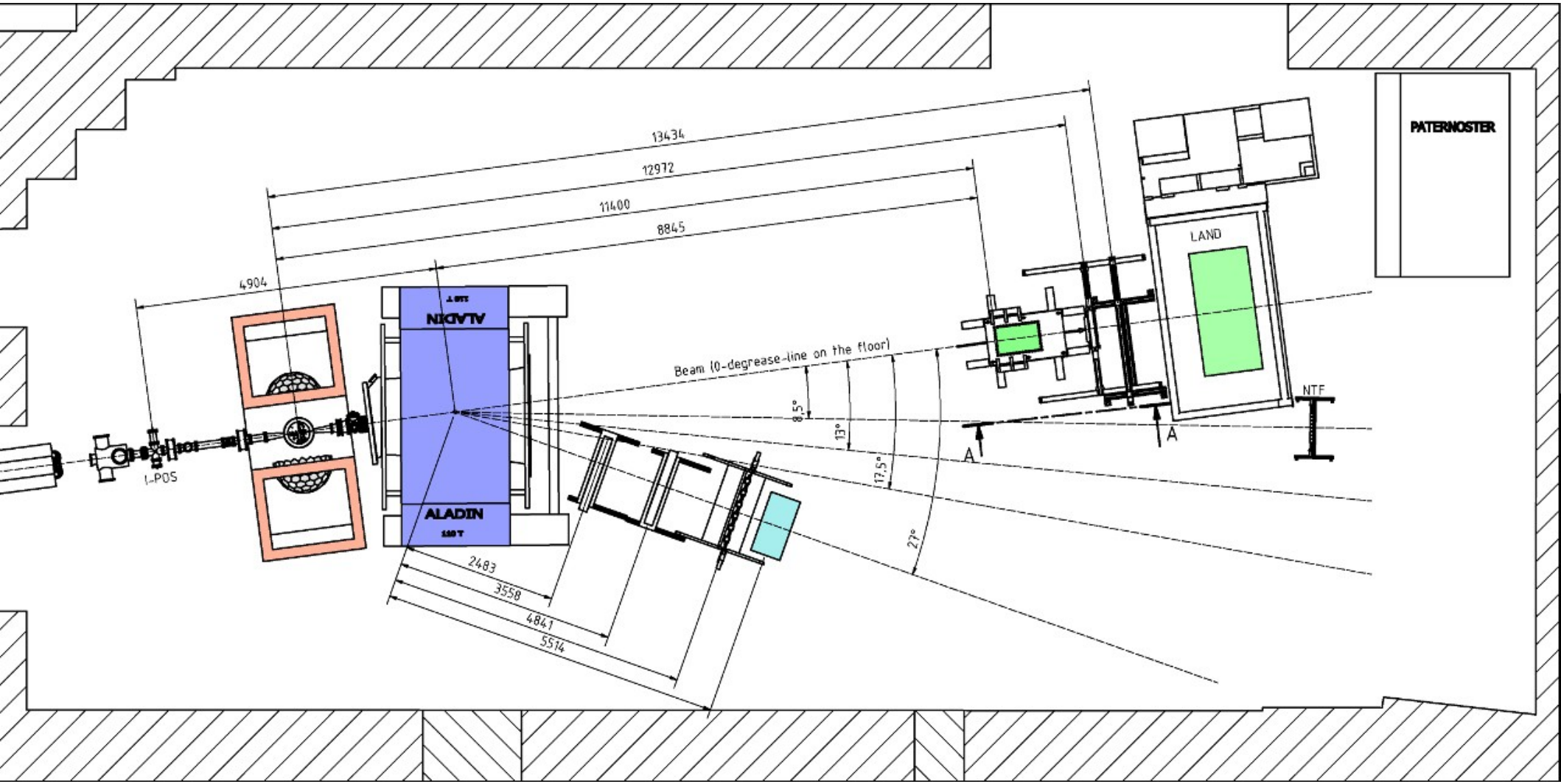


Håkan T. Johansson, Chalmers, Göteborg

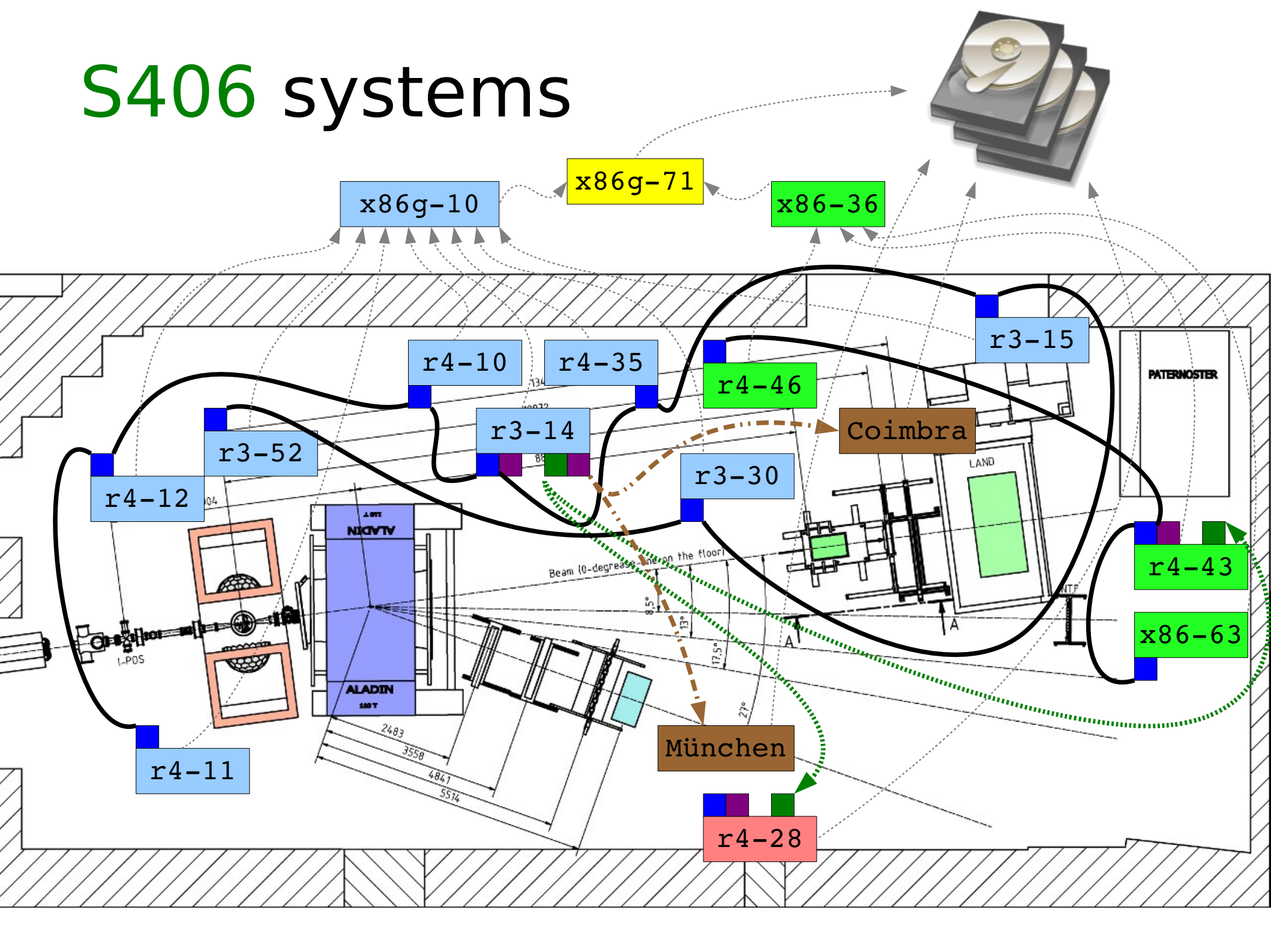
IEM-CSIC, December 2012

S406: deuterons in Cave C

- NeuLAND
- LAND
- HZDR RPC
- Coimbra RPC
- LaBr3/Cl3
- CsI
- CXB



S406 systems



S406 systems II

EB
x86g-10

x86g-71
TO

EB
x86-36

POS/ROLU
r4-10

NTF/DTF/CXB
r4-35

r4-46
RPC

r3-15
LAND

r3-52
Si

r3-14

Coimbra
RPC

r4-12
XB(l)

r3-30
NeuLAND

MASTER

"S2" (master)

r4-43

x86-63
MFI

r4-11
XB(r)

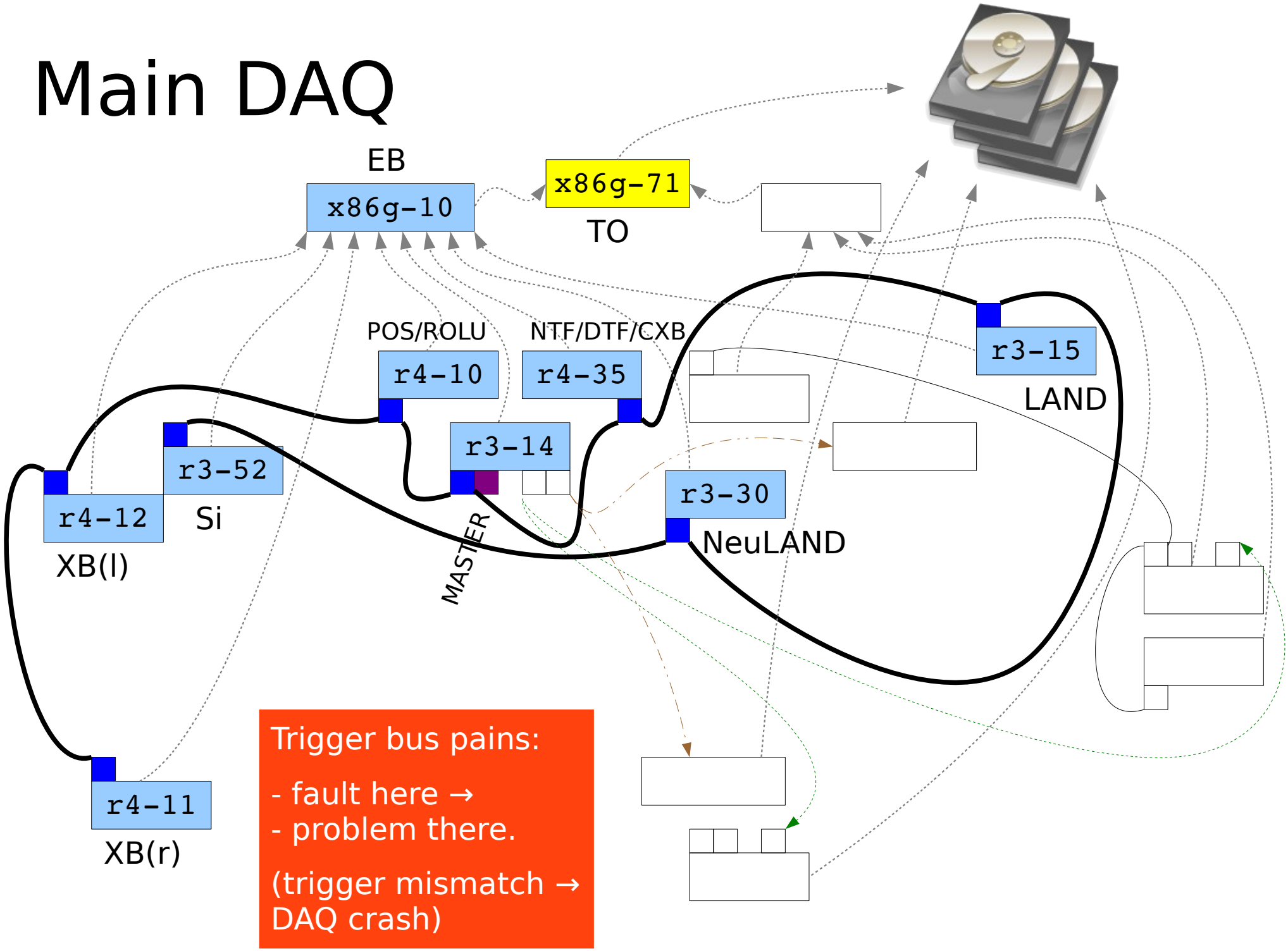
München
CsI

r4-28
$LaBr_3$

TRIVA / TRIXOR
trigger bus
VULOM
TRIDI

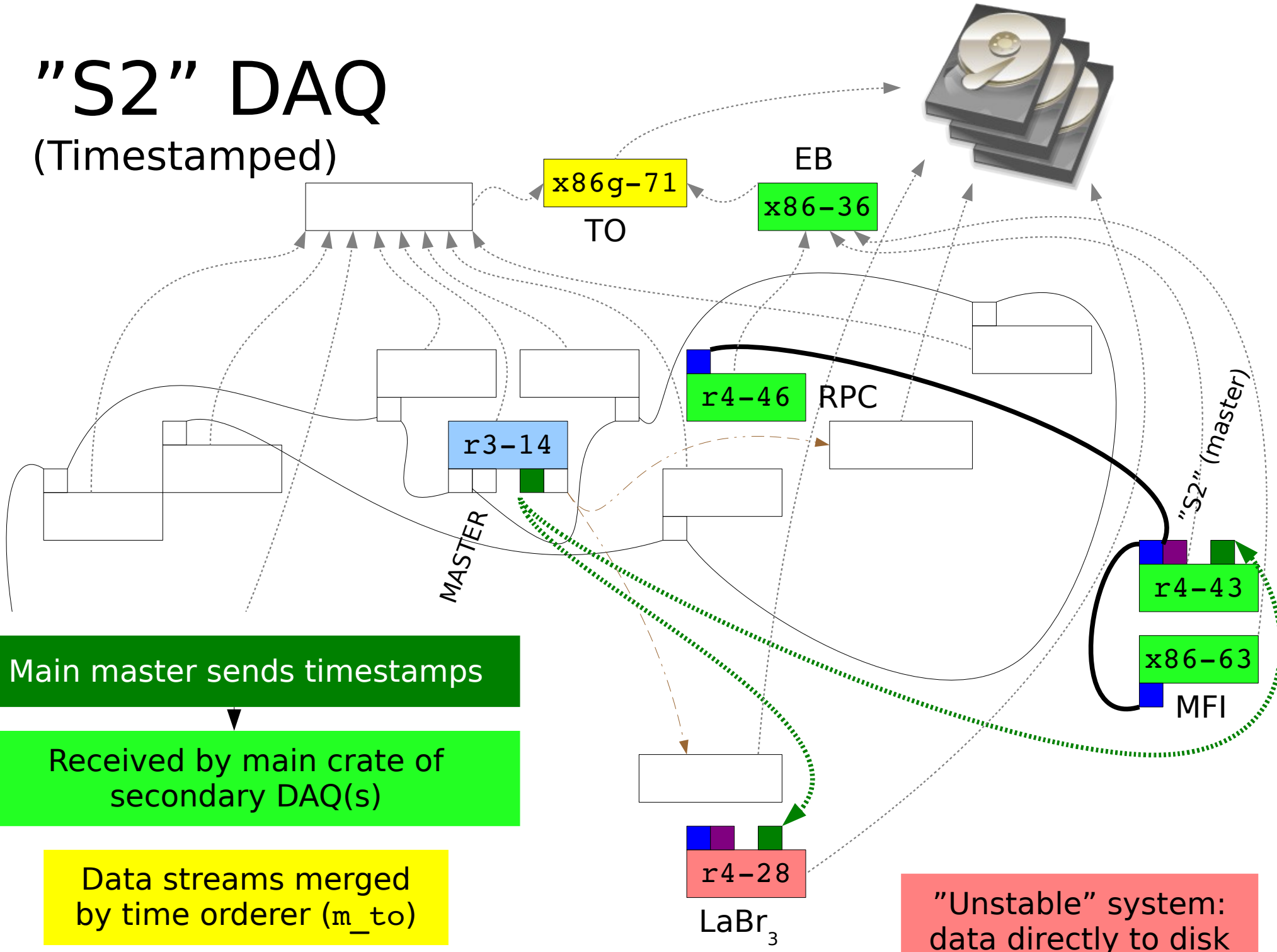
DAQ setup: D. Rossi, H. Simon

Main DAQ


EB
x86g-10
x86g-71
TO
POS/ROLU
NTF/DTF/CXB
r4-10
r4-35
r3-15
LAND
r3-14
r3-52
r4-12
Si
XB(l)
MASTER
r3-30
NeuLAND
r4-11
XB(r)
Trigger bus pains:
- fault here →
- problem there.
(trigger mismatch → DAQ crash)

”S2” DAQ

(Timestamped)



Main master sends timestamps

Received by main crate of secondary DAQ(s)

Data streams merged by time orderer (`m_to`)

”Unstable” system: data directly to disk

TRB + FEBEX standalone

(Sync by event numbers)

r3-14

Coimbra

TRB

RPC

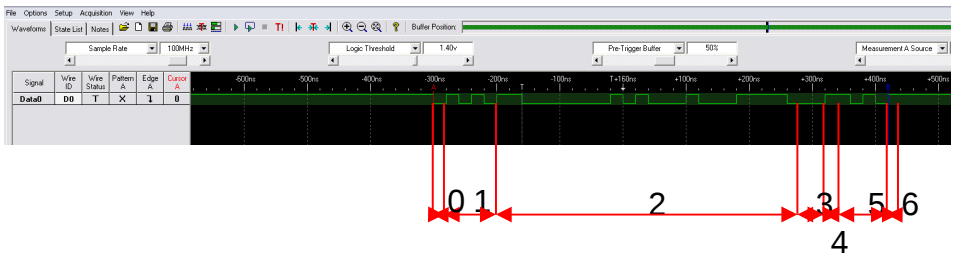
Main master sends event numbers

Received by secondary DAQ(s)

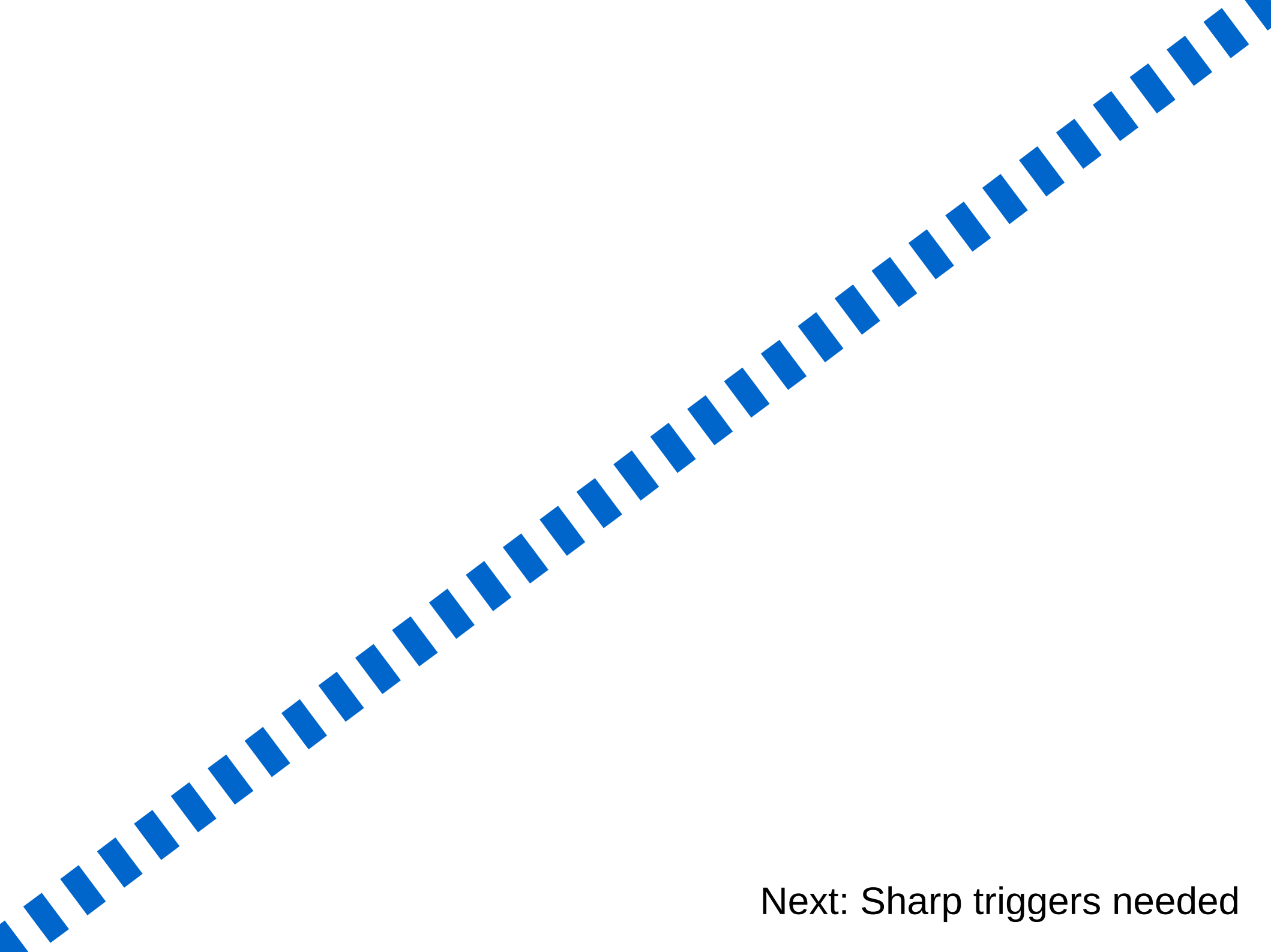
München

FEBEX (adc)

CsI



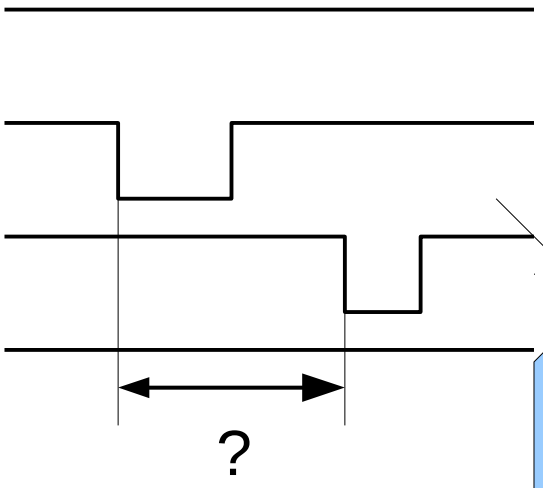
By: J. Frühauf,
M. Palka, A. Blanko



Next: Sharp triggers needed

Reminder:

Trigger alignment - measurement



The triggers need to be aligned to make good coincidences

FPGA: self-triggered multi-event softscope

VME readout

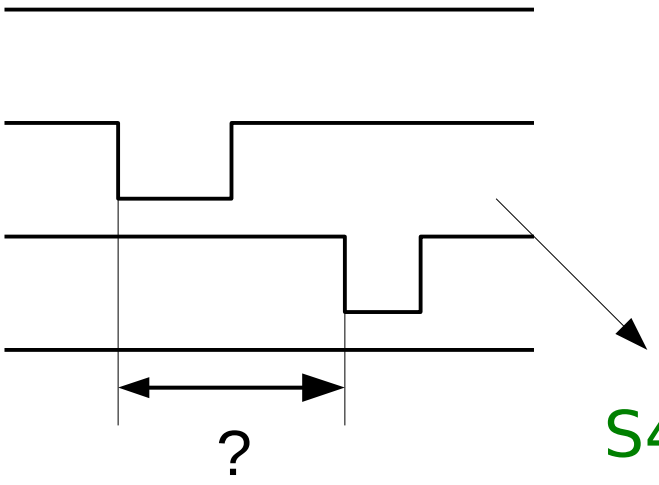
```
...
Ch 22:  138-255e
Ch 23:  98-110
End
Start
Ch  9:  125-142
Ch 10:  126-143
Ch 11:  114-131
Ch 12:  127-144
Ch 21:  0-255e
End
Start
Ch  9:  125-142
Ch 10:  126-143
...
```

Analysis (histogramming)

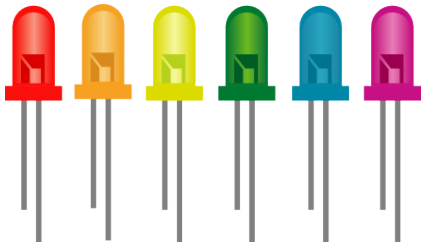
```
     Timing relative to *
-----------------------------------------
 1 :                    *                :
 2 |9A                                    |-193/ 5
 3 |                 _554-._              | -41/10
 4 |                     .43._            |  -7/ 8
 5 |                    _A9_              | -16/ 5
 6 |                      8A-             |  -2/ 4
 7 |                     -43._            |  -7/ 8
 8 |                     -43._            |  -8/ 8
 9 |                    .---.....-7886-._  .--| 104/11
10 |                    .-----__..57886-__  .-| 112/11
11 |       34543-.-3555555555555444433--.___  |  51/40
12 |                    _34543-.345555555555555|  98/18
13 |_ _ ___ _ _ .3995                         | -55/ 5
14 |                                          |1200/nan
15 |                     697._                |  -9/ 6
16 |                    .34443---_..---333333-3-|   5/19
17 |                                          |
18 |                                          |
19 |                                          |
20 |                                          |
21 |                                          |
22 |                                          | 220/ 0
23 |  A8                                      |-180/nan
24 |                                          |
-----------------------------------------
```

2-log counts/bin (_ . - = 0,1,2)

Triplex (TACQuila) triggers broad



S406:

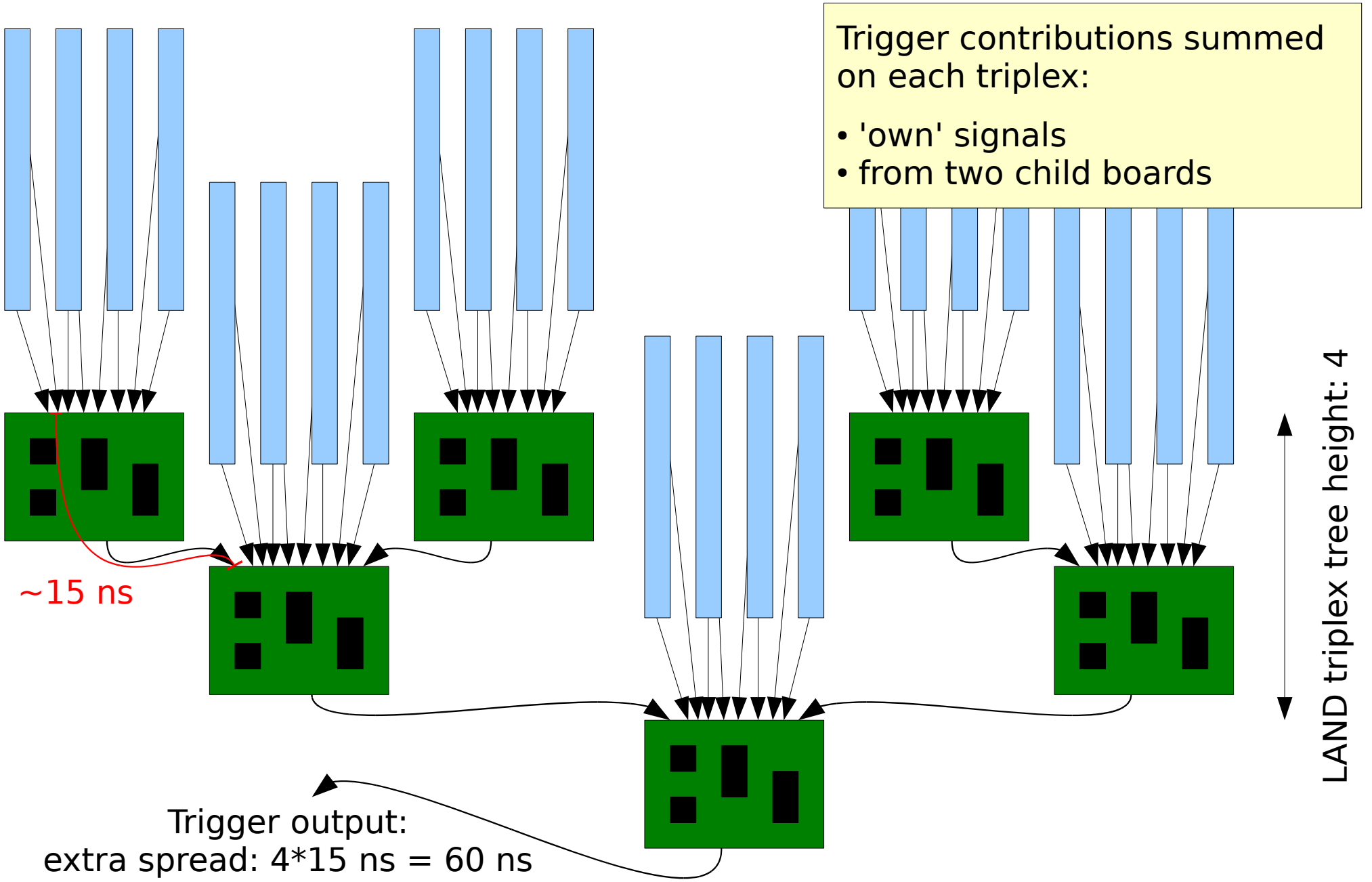


Triggers need to be sharp
to allow high rates.

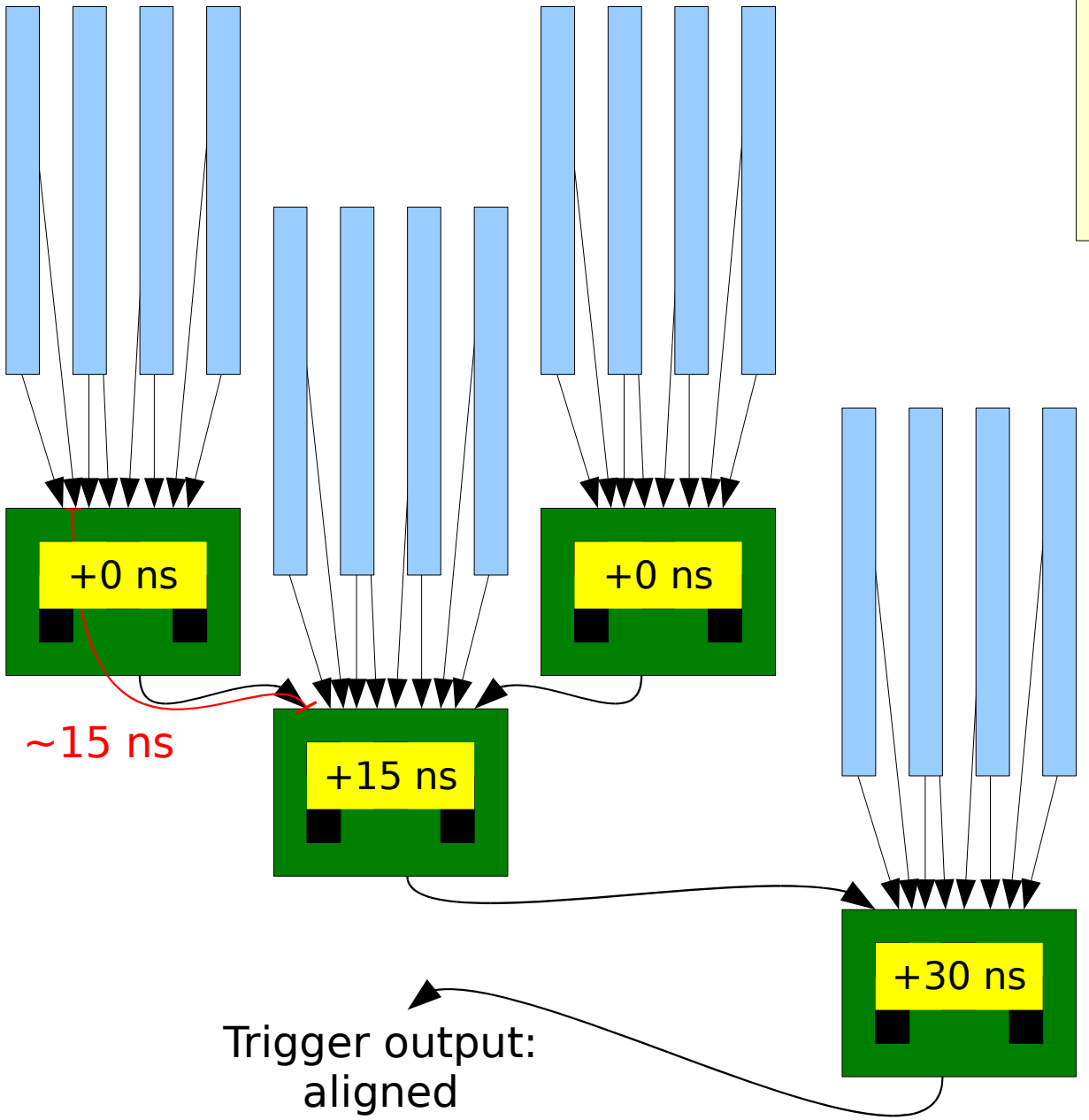
```
                    Timing relative to *    (scale = 1*10 ns)
-------------------------------------------------------------
 1 : POS!ROLU   :                    *                      :
 2 | NTF        |..............A8.........................| -58/ 5
 3 | NTF cosm   |...................6A6....................|   0/ 4
 4 | DTF        |___.___._____..773--.._..._....-.........-| -53/10
 5 | DTF cosm   |_________._._.__ __..763-.............-.....|  -5/10
 6 | LAND       |.___.__._.-3334333-----.-.-...-...._-.....| -63/22
 7 | LAND cosm  |        _      _.--333--.___ _ _       _  _ | -19/22
 8 | XBp L      |...--.....--36764---.-----4543-------.----| -69/ 9
 9 | XBp R      |.-.----...--6874454-----------------------| -69/10
10 | XB backw   |--3---333467766654333333333-33333333-3-3| -96/20
11 | XB allor   |333-33333336776676533333333333-333333333| -75/12
12 | POS raw    |                     BA                   |   0/ 0
13 | XBp L | R |------------37874443-33-334433333---3-3-3| -62/10
14 | NeuLAND    |_......_._3435654433---.....-.........--..| -53/18
15 | NeuL cosm  |.__ .___..___--4555433.........-.__......_| -29/21
16 | CXB cosm   |                                          | -10/-0
17 |            |                                          |
18 |            |                                          |
19 |            |                                          |
20 |            |                                          |
21 |            |                                          |
22 |            |                                          |
23 |            |                          _               |-210/ 0
-------------------------------------------------------------
```

2-log counts/bin (_ . - = 0,1,2)

Triplex tree - different delays



Triplex tree - same delay



Trigger contributions summed on each triplex:

- local signals
- from two child boards

Solution simple:

Align contributions by delaying output-near local contributions.

(in CPLD firmware)

Do not repeat this mistake with other new detectors...

Finale!

Thank you!