

PSD – PS Beam Test 2022

FABIO

PS: September 2022



schedule issue date: 10-May-2022

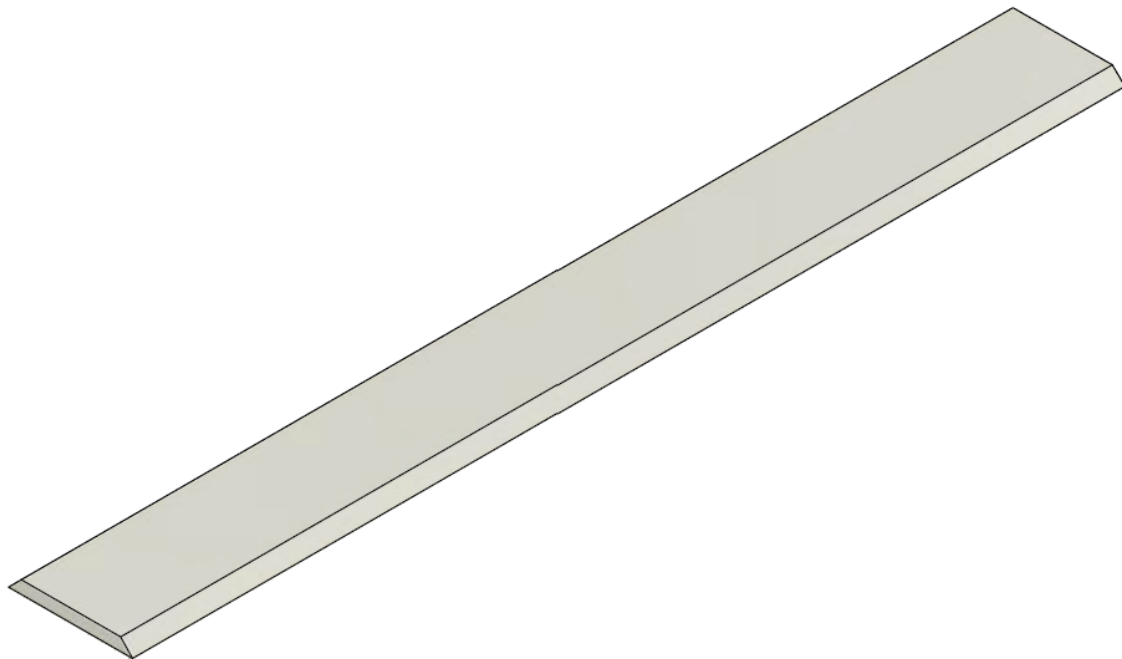
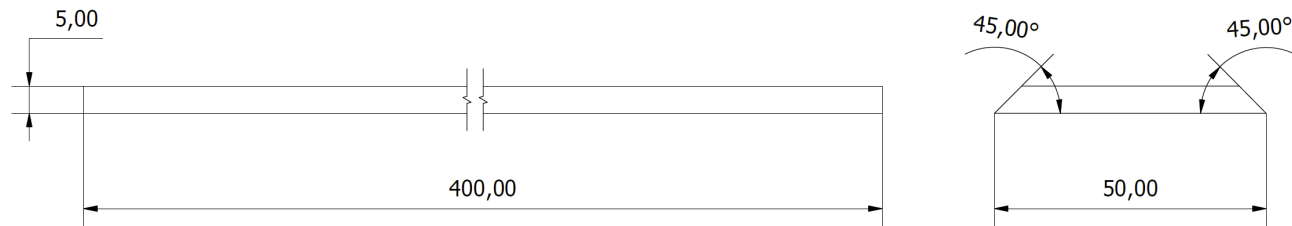
Version: 1.01

		Mon 29 Aug	Tue 30 Aug	Wed 31 Aug	Thu 1 Sep	Fri 2 Sep	Sat 3 Sep	Sun 4 Sep	Mon 5 Sep	Tue 6 Sep	Wed 7 Sep	Thu 8 Sep	Fri 9 Sep	Sat 10 Sep	Sun 11 Sep	Mon 12 Sep	Tue 13 Sep	Wed 14 Sep	Thu 15 Sep	Fri 16 Sep	Sat 17 Sep	Sun 18 Sep	Mon 19 Sep	Tue 20 Sep	Wed 21 Sep	Thu 22 Sep	Fri 23 Sep	Sat 24 Sep	Sun 25 Sep	Mon 26 Sep	Tue 27 Sep	Wed 28 Sep	Thu 29 Sep	Fri 30 Sep	Sat 1 Oct	Sun 2 Oct	
Week		35							36							37							38							39							
Machine		8h				18h				8h				8h				18h				8h				18h				8h				18h			
East Area	T8 - Irrad	F. Ravotti																												EA-Irrad							
	T9	Gamma MeV				X. Wu				HERD							M. Boselli							BL4S													
	T10	ALICE ITS3				TOTEM							F. Garcia							M. Suljic				ALICE ITS3				X. Wu				PAN					
	T11	J. Kirkby																												CLOUD							
	TT2A	N. Patronis																												nTOF							

For further information contact the PS/SPS-Coordinator. Email: Sps.Coordinator@cern.ch, Tel: +41 75 411 5275.

The main goal of this beam test is to check the whole DAQ chain before the SPS beam test with ions in late November (23-29 November)

► Short bar with trapezoidal face

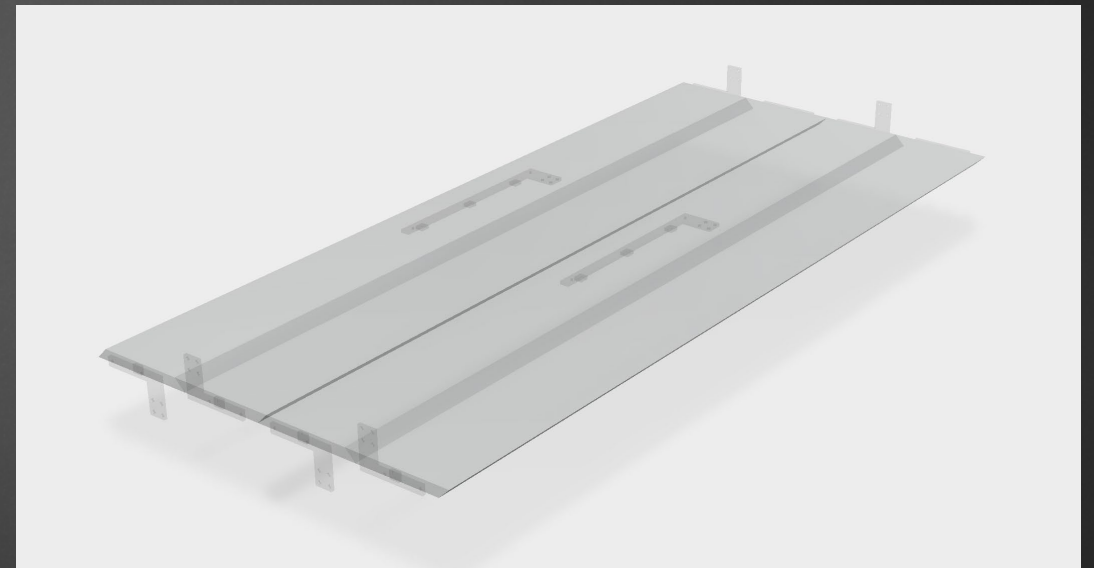


We plan to build:

- 4 short bars 40 cm long
- 4 short bar 30cm long

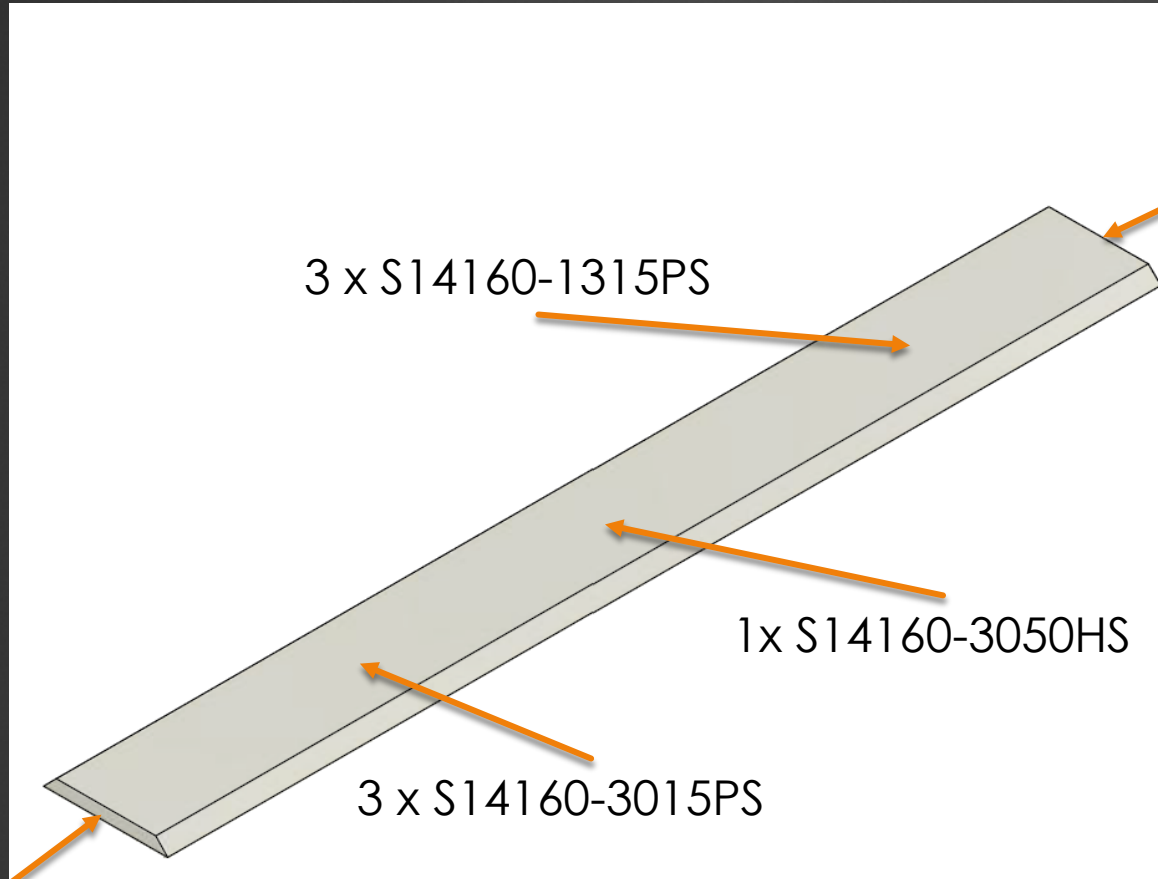
And then assembly two orthogonal planes

4 bars will be machine in Bari
2 bars will be machine in Lecce
2 bars will be machine in GSSI



GSSI will take care of the mechanics of the prototype

- ▶ We plan to equip each bar with different SiPMs



1 x S14160-1315PS

3 x S14160-1315PS

1 x S14160-3050HS

3 x S14160-3015PS

1 x S14160-3015PS

The SiPMs on the two sides will be mounted on PCB fixed in supporting endcaps

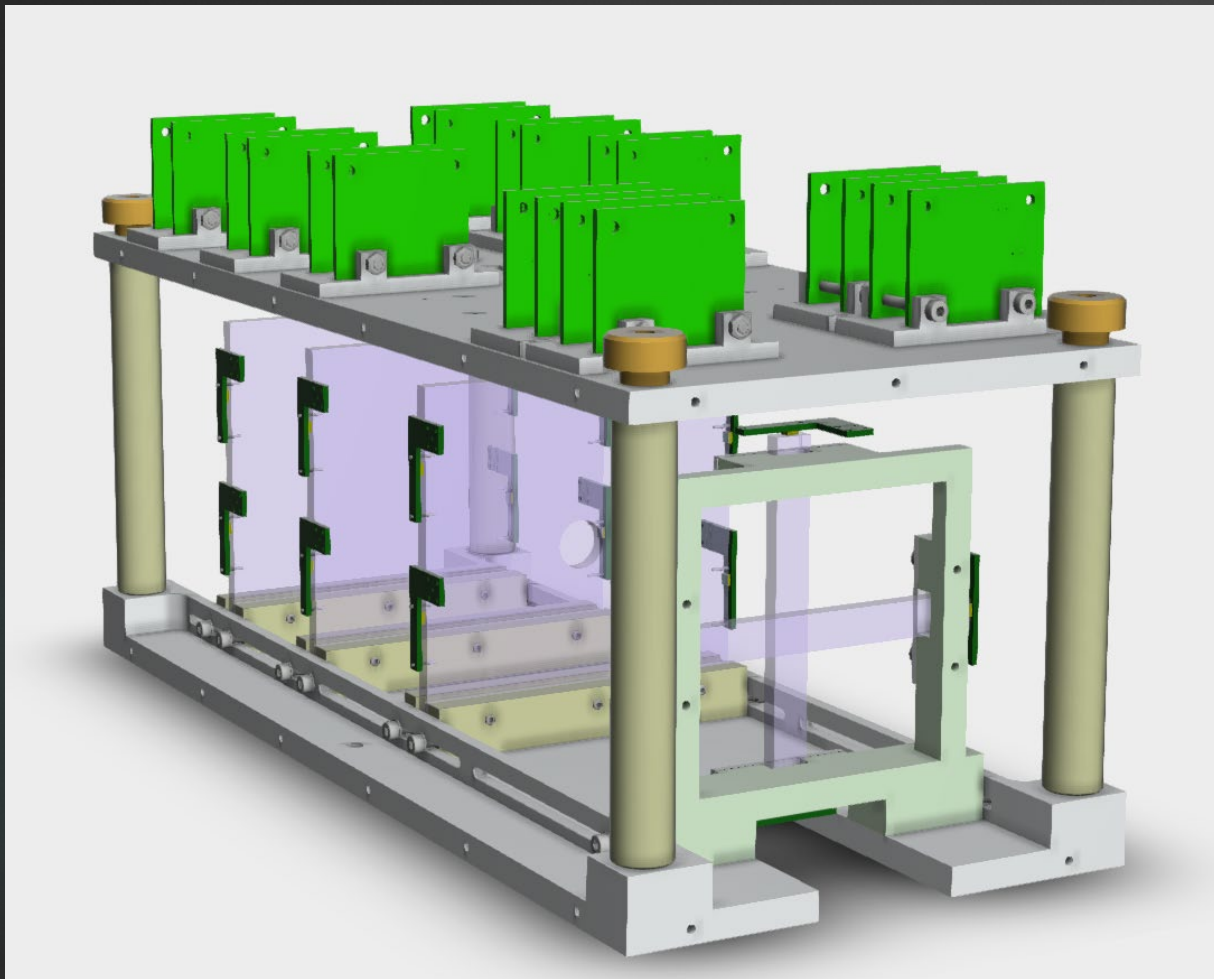
The SiPMs on the top of the bars will be mounted on PCB with 3 SiPM each

S14160-3050HS (TSV Tecnolgy) will me mounted on a dedicated PCB

All the SiPMs will be glued on the scintillator surfaces

- ▶ Each bar will have 5/6 readout channels
- ▶ The total number of readout channels needed is $8 \times 6 = 48$
- ▶ The BetaChip evaluation board that we plan to use has 32 channels that can be used for this test
- ▶ We plan to use both BetaChip and Citiroc chip (CAEN DT5550W) to readout and compare the results

Trigger system



2 «fingers» H-V 100x10x5 mm to define a small area

1 Tile 100x100x10 with a central hole (2 cm diameter)

2 Tile 100x100x10 for all particles trigger

Each plastic scintillators has a double readout to reduce the effect of self trigger due to the dark noise of SiPM

SiPM Advansid NUV 3x3mm² 40um cell
Adanvasid TransImpedence amplifier with analog signal fed into DT5495 CAEN



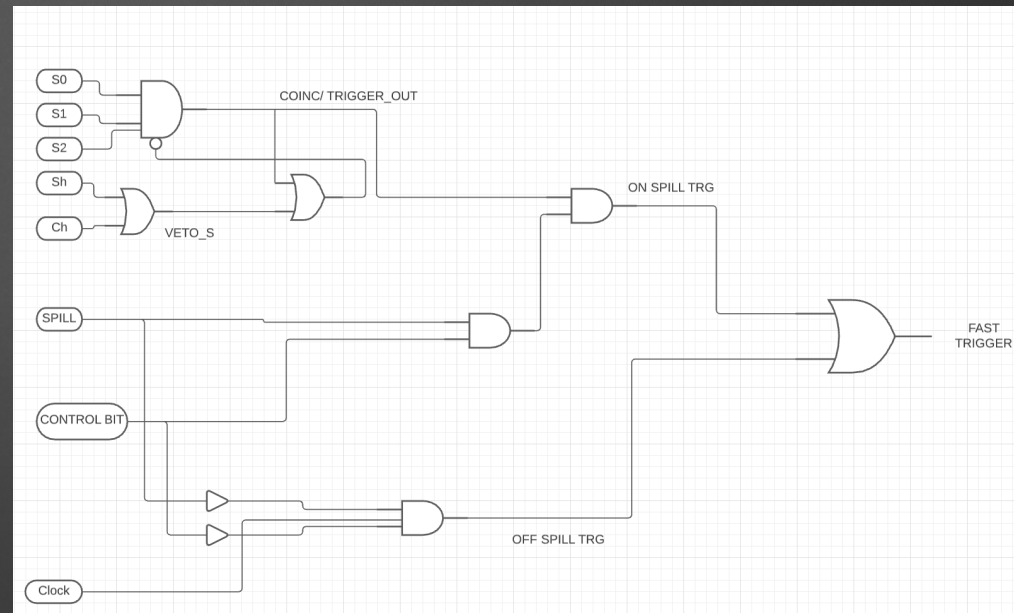
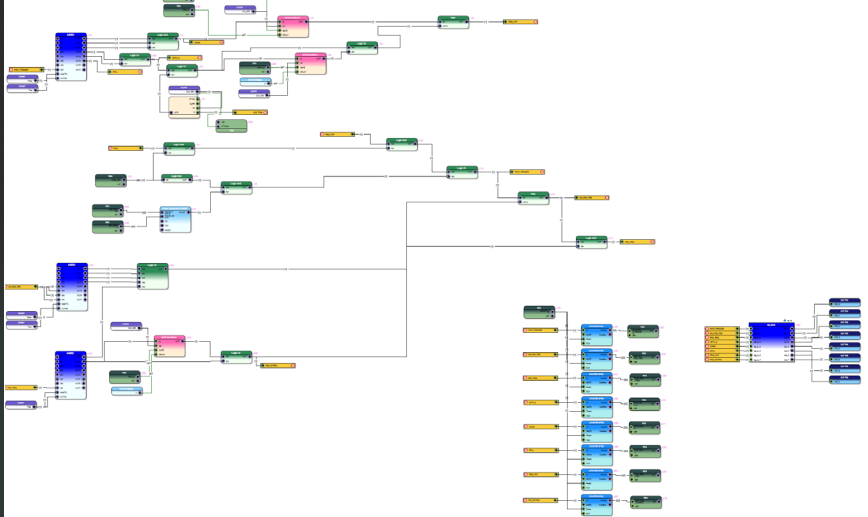
Trigger logic

The trigger logic already implemented in DT5495 with SciCompiler (already used in 2021 beam tests)

The implemented logic will provide a trigger signal (NIM and/or TTL) in 50ns (TBC)

The trigger logic could handle Spill signal from the PS machine and the busy signals from all the subdetectors.

The trigger could be provided to the Chinese Main Trigger board

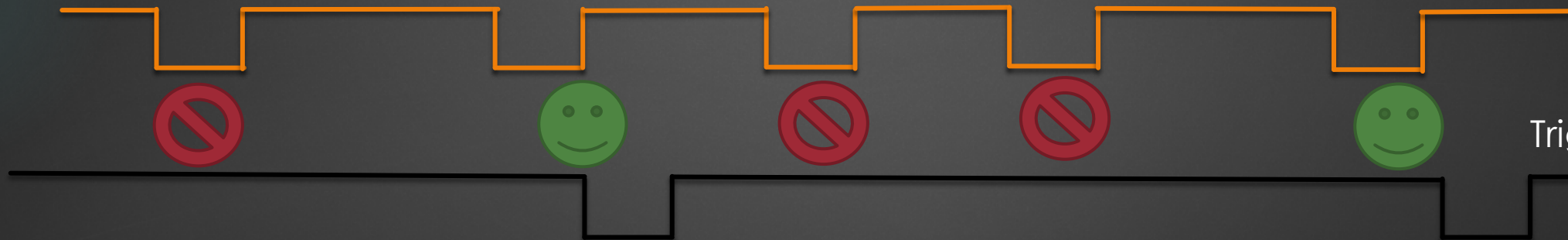


- ▶ We will use the same DAQ system used in the 2021 beam tests
- ▶ The CITIROC will work in autotrigger mode (AND between adjacent channels) and the Trigger System will provide the acknowledgment signal.



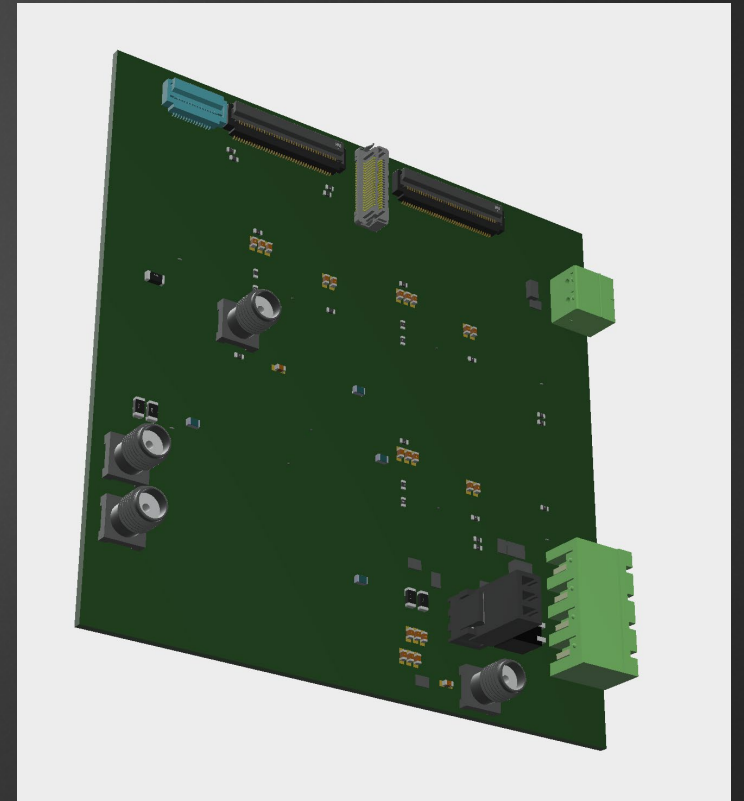
PSD Self Trigger

Trigger System



In the example two signal have been acquired since the acknowledgment signal is arrived in the defined time window

- ▶ Some desiderata to be added to the evaluation board
 - ▶ External trigger input (NIM or TTL)
 - ▶ Busy output
 - ▶ AND logic between chip
 - ▶ Possibility to start and stop the acquisition via a command broadcasted TCP/IP
 - ▶ ...



Action item

- ▶ Production of scintillating short bars
 - ▶ BARI, GSSI, LECCE
- ▶ Design of the beam test mechanics
 - ▶ GSSI
- ▶ Setup of triggering system
 - ▶ BARI
- ▶ Set-up of CITIRCO DAQ chain
 - ▶ BARI, GSSI, LECCE
- ▶ Set-up of BetaChip DAQ chain
 - ▶ ICCUB
- ▶ CNAO beam test logistic
 - ▶ PAVIA
- ▶ CERN beam test logistic
 - ▶ BARI, GSSI