

RD51 H4(PPE134)

Generic and Application driven R&D

Muon/Tracking: GEM and mm

Timing: PICOSEC micromegas

Project driven R&D

PBC: mm and GEM (AMBER/COMPASS++)

Detector Commissioning

e+e- collider : CGEM(BESIII)

FE electronics and DAQ

TIGER-GEMROC

VMM3a-SRS

Mon. 12/07/2021 – Wed. 21/07/2021

		Jun				Jul				Aug				Sep				Oct				Nov		
Week		24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	
Machine																								
North Area	T2-H2 option 2		CMS Outer Tracker 7	SPS & TT20 Setup 7	NA Setup 7	NA61 SHINE 16	FASER cal 7	ATLAS FCAL PULSE 7	STORM 7	KL 7	LEVER 7	CMS HGCAL 7	NA61 SHINE 7	ATLAS ZDC 7	NA61 SHINE 7	NA65 14	CMS HGCAL 7	NA61 SHINE 33						
	T2-H4 option			SPS & TT20 Setup 7	NA Setup 7	GIF RD51 9	LHCb CAL 18	NA64e 28				GIF 7	LHCf 14	CMS ECAL 14	LHCb CAL 7	GIF RD51 14	HERD 7	GIF 5						
	T2-H4 req.					CMS ECAL 9																		

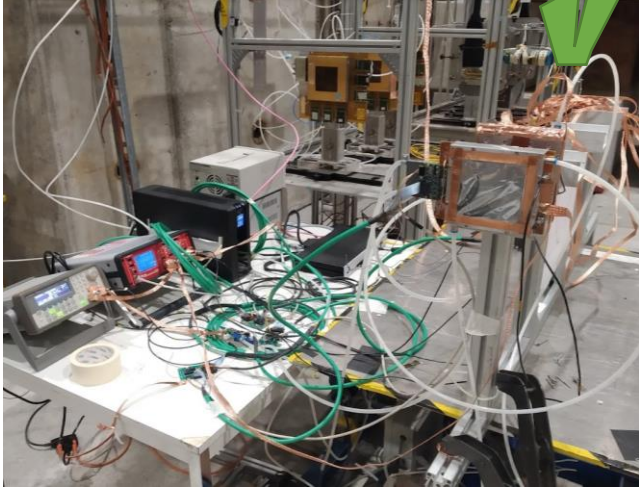
Confirmed Groups

Week 28-29	Project/Experiment	Beam Requirements	Reference Team
AMBER upgrade (mm & TIGER)	AMBER upgrade (mm & TIGER)	mu	INFN Torino
BES III	Upgrade of current inner drift chamber with a cylindrical GEM	mu, pi	INFN Ferrara
PICOSEC	Fast and Precise timing with MPGD (micromegas)	mu, e-	PICOSEC Coll.
RD51	New FE&DAQ for beam telescopes (SRS/VMM3a)	mu, pi, high rate	RD51 VMM

More info @ <https://indico.cern.ch/event/989298/timetable/#20210219.detailed>

RD51 H4(PPE134) 2021 Test Beam

Amber mm + TIGER FE



BESIII + Final readout (TIGER FE+GEMROC)



Amber mm+ tiger and rd51 tracker with SRS/VMM3a: planned measurements completed.

BESIII: new electronics (FE& readout) tested and reference with APV25 taken in the first two days of run. All program completed

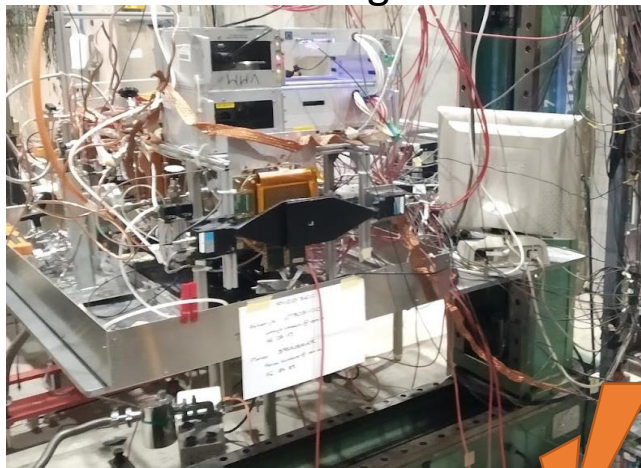
PICOSEC: Not all the planned measurement planned has been performed (50/50 between beam downtime and issues with our hardware). Nevertheless most of the important measurements completed (Large Area PICOSEC.. significant improvement in response uniformity compared to previous prototype tested in H4)

PION RUN (BESIII and RD51 Tracker, PICSEC with resistive mm and DLC photocatode): Very positive results - thanks to Nikos for the incredible beam – well tuned in short time.

RD51 GEM telescope + SRS/VMM3a



PICOSEC micromegas



	BESIII	AMBER/mm	PICOSEC	RD51 SRS/VMM tracker
Setup (beam and frequent accesses)	First 8h	First 8h	First 8h	First 3h
Measurements	<p>Performance studies of the BESIII full readout chain (TIGER+GEMROC) with planar GEM prototype.</p> <p>✓ Reference measurement with APV25 electronics @ different detector/electronics settings (2days).</p> <p>✓ Measurements repeated with TIGER+GEMROC (2days)</p>	<p>mm tracker readout with TIGER. Telescope (detector and electronics) ✓</p> <p>Required beam >= 3days</p>	<p>MCP-PMT characterization for timing & reference measurement to validate setup [1/2day] ✓</p> <p>Multipad PICOSEC (single pad response, uniformity between pads, uniformity inside the pad, signal sharing) [5days] ✓</p> <p>New FE amplifier and SAMPIC readout [2days – in parallel with other measurements]</p> <p>DLC photocathode [1/2 day – in parallel with other measurements]</p> <p>Single Gap Picosec [1 day – in parallel with other measurements]</p> <p>Resistive Multipad [2days]</p> <p>SiPM PICOSEC [1day]</p>	<p>Commissioning of the new DAQ system based on VMM3a (tracking and timing [ns], uTPC, high rate) ✓</p> <p>Scan at different detector and electronics settings. ✓</p> <p>Required beam >= 3days</p> <p>If commissioning will be satisfactory different detector can be tested (detector tilting, GEM thicker drift, GEM smaller pitch, micromegas)</p>
Foreseen Accesses	After 2 days, few hours to exchange electronics	No	Yes to change measurement configuration (short accesses)	Few (detector tilting, replacement)
Special conditions	Beam should be the same all time	Muons	Muons	Muons (few hours of pions/high rate)

~6 days

~3 days

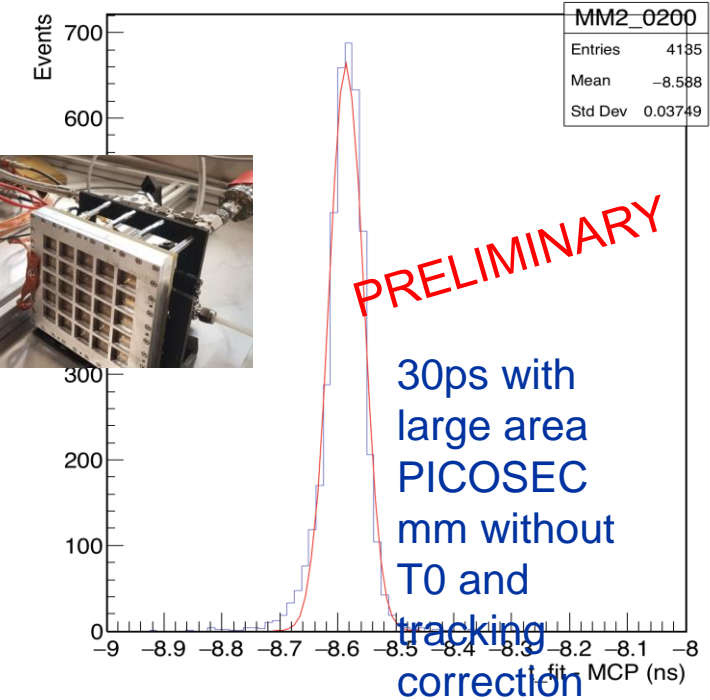
~6 days

~3 days

Just appetizers.. Analysis ongoing...

PICOSEC micromegas

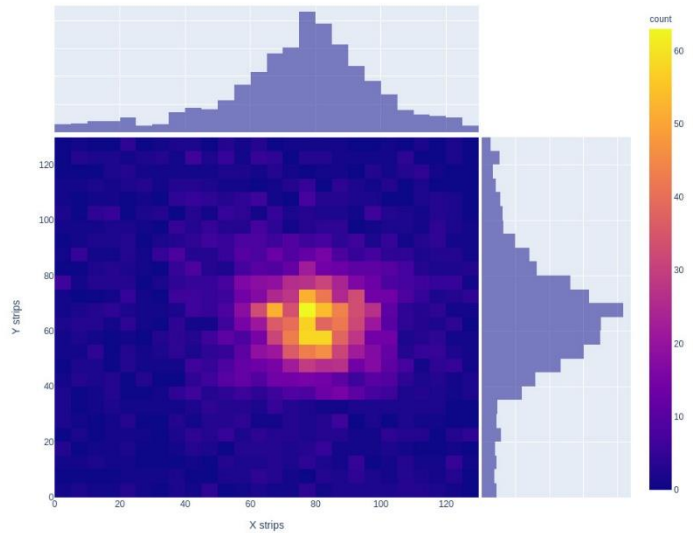
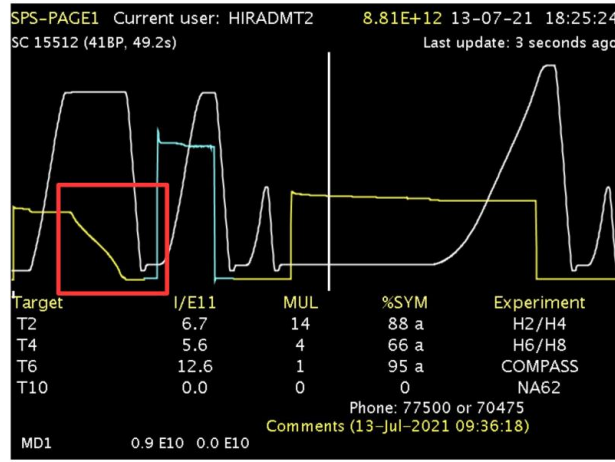
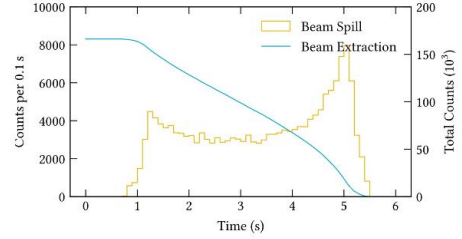
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1	Constant	6.64419e+02		1.46156e+01		7.41365e-02		1.14686e-06	
2	Mean	-8.58541e+00		4.99290e-04		4.09384e-06		1.07030e-01	
3	Sigma	2.94522e-02		4.45650e-04		2.16357e-05		6.99361e-03	



RD51 tracker + SRS/VMM3a

Time profile of the beam spill

1. Time profile of the beam spill
2. Generated from this: extraction profile of the beam



BESIII high intensity pion run with TIGER+GEMROC 100KHZ/channel recorded

Not possible without:

- SPS ready earlier than announced (Friday 9th of July) ...
- **“Out of working hours” tuning from Nikos and Bastien** – 10th /11th July (all Saturday, all Sunday). Without this we would have lost two days of beam ...
- Well done tuning. Both muons and pions satisfying our needs...
- **Support in North Area: installation, handling and transport, gas, flammable gas survey, radio protection, safety** - everyone ready to accept last minutes changes in the plans and to provide us therequired support...
- Good sharing with GIF++ and appreciated patience of GIF++ colleagues for our “regular” accesses...

A warm thank to:

Nikolaos Charitonidis, Bastien Rae, Michael Lazzaroni (et toute l'équipe), Francois Grenouilleau (et toute l'équipe), Silvia Schuh-Erhard, Philippe Boisseaux-Bourgeois, David Jaillet, Eric Montana, Nicolas Broca, Pascal Galland, Romain Bonnard, Benoit Cumer, Dirk Mergelkuhl, Alexandre Beynel, Frederic Lionel Aberle (et toute l'équipe), Letizia Di Giulio, Laetitia Bardo, Laure Tranchand, James Devine, Martin Jaekel, Katerina Kuznetsova, Giuseppe Pezzullo... **and to everyone we forgot by mistake ...**