μONE status and plans

Meeting Conventional Beams WG
EHN2 technical meeting #3

22 January 2018

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μ-on-e Test activity in 2018

For 2018 :

COMPASS has asked hadron beams, *but will use muons for alignment and calibration (M2 'modified')*

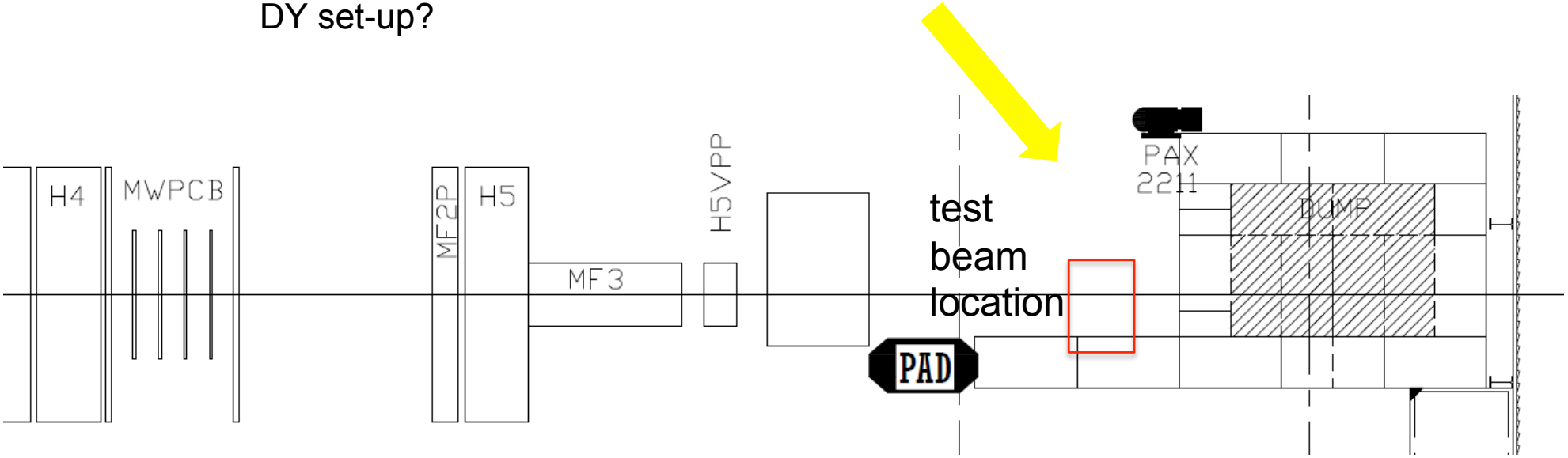
μ's will be run once per 1 - 2 weeks

(beam experts will simulate momentum and spatial distribution of muons behind COMPASS)

AoB: EHN2 Test Beams 2018

Slide from Johannes (11/12/2017)

- Wish[illegible] all parties to do tests with μ in EHN2
- L[illegible]: Beam dump
- [illegible] for a bit of coordination:
  - Please send me a short description of your set-up plus possible dates and services needed
  - Safety visit to be scheduled
  - Compass running has absolute priority, will coordinate tests with Compass technical coordinator and run coordinator
  - Study needed for μ component in 2018 π beam + hadron absorber in Compass DY set-up?



μ-on-e Test activity in 2018

We have been allocated also 1 week ***(week 34, 22-29 August 2018)***
of high energy muon beam (160 GeV) in H8 (A138)
(optimization of this beam started)

Main aim of the 2018 test activities:

- *study of a possible final apparatus*
  - *use of calorimeter*
  - *study of event multiplicity*
  - *localization of the interaction vertex*
  - *Mutiple Scattering study*
- *how to select elastic events*
- **ambitious goal:** **very preliminary mesurement of $d\sigma/d\theta_e$ (even if with a large error?)**

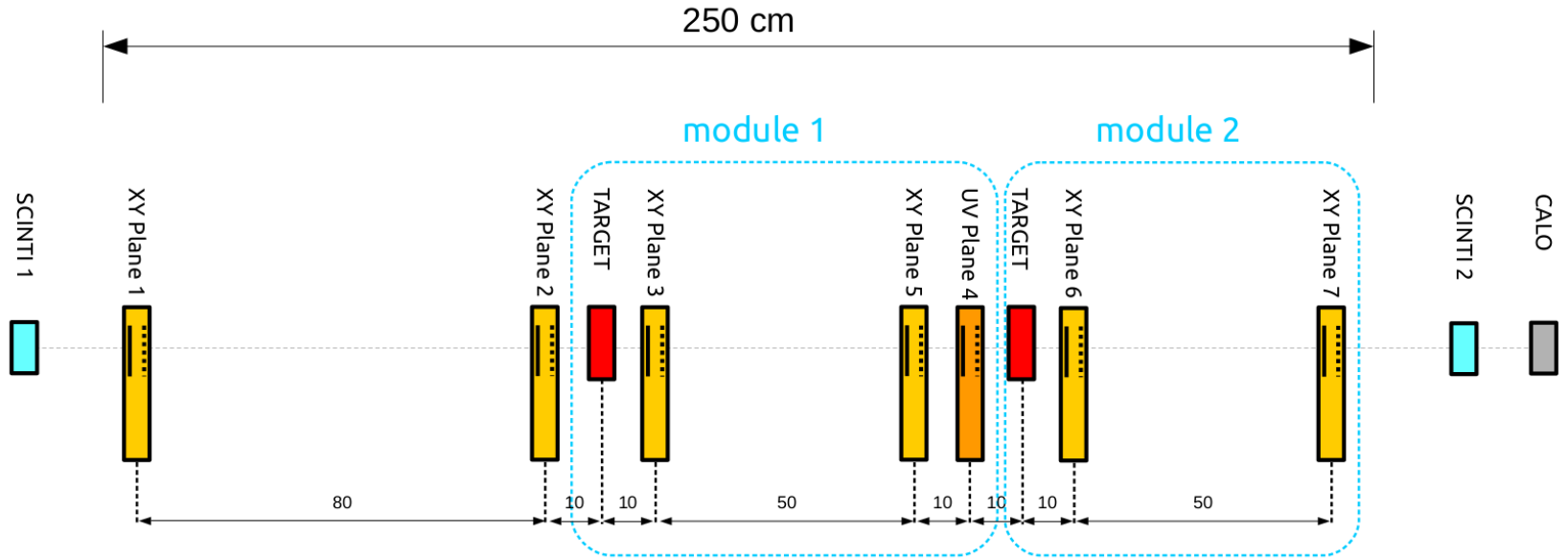
μ-on-e Test activity in 2018

We will take data with muon beams

- We will use the setup being prepared from E. Vallazza + M. Prest group

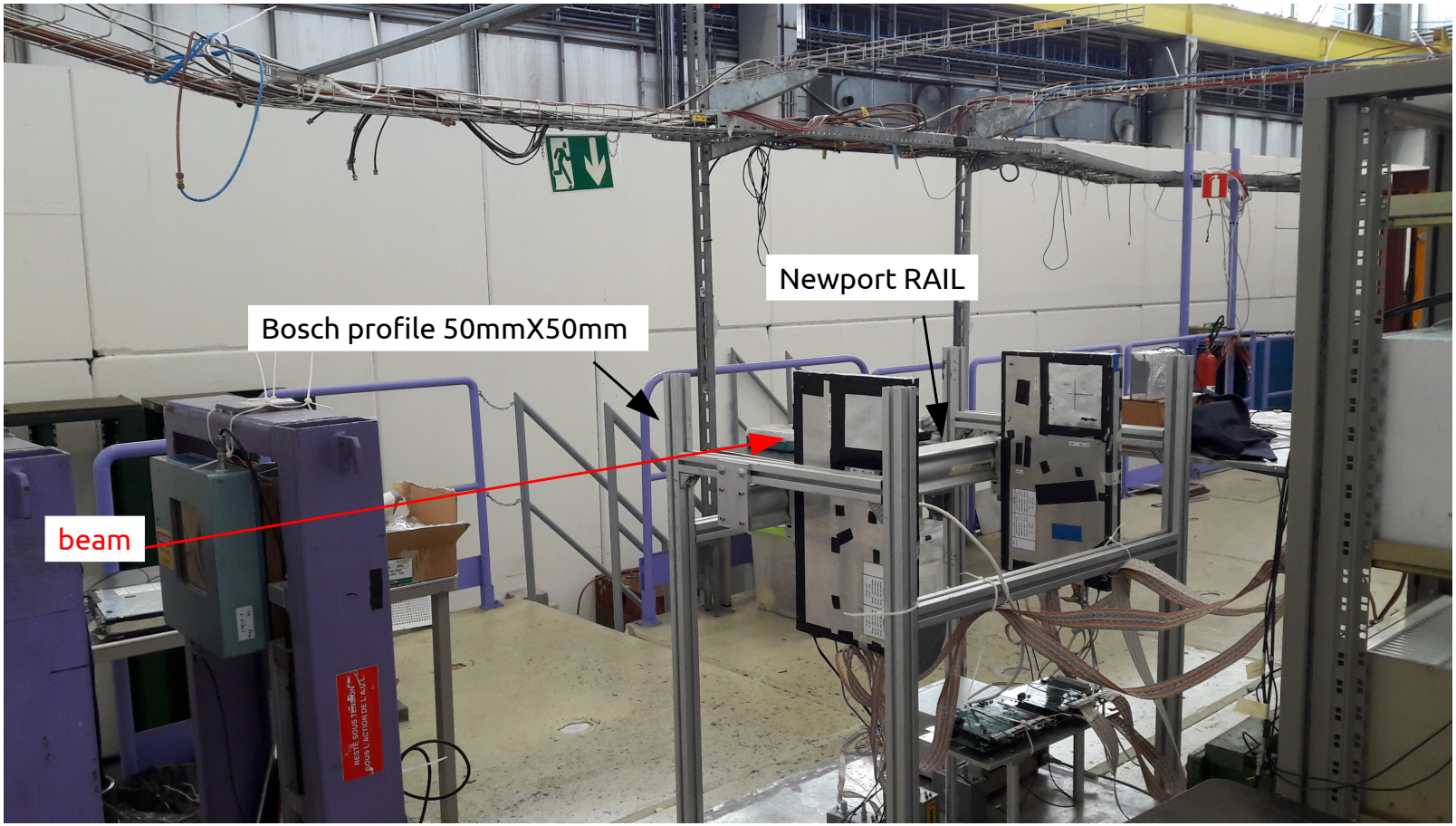
(they are producing and testing the missing electronics cards, preparing the mechanics, etc…)

Setup: 7 Si planes 95x95 mm2, 2 in front to measure incoming muon direction



μ-on-e Test activity in 2018

Table for silicon strip detectors installed for a testbeam (CERN T9, 2017)



μ-on-e Test activity in 2018

SERVICES:

★ Network connections

Connection to computing center (and from there to CNAF)

★ *No gas will be used*

★ Setup is a light structure, no crane necessary unless pre-assembled supporting mechanical structure will be used

★ Counting room: HV cables and signal cables

★ Survey for a first alignment

➡ Need to know properties of the muons arriving behind COMPASS

Summary

★ **Quite a lot of work planned in 2018**

From last meeting:

On C. Vallee request :

we must prepare for end 2018 a study of feasibility and cost of the infrastructure for housing the final apparatus behind COMPASS

(this is being done by the responsables of the NA)

★ **For > 2020 we must keep in contact with NA64 and their beam** requests *(they will not be necessarily uniform with ours…)*

μ-on-e Test activity in 2018

More information

μ-on-e Test activity in 2018

- We have been assigned in 2018 the week 34
  In H8-A138 (just downstream the one we used last year)

- In view of using electrons in East Area instead,
  I think it is not worthwhile now to ask for moving the week later in the year, but adjustment could be possible

  about East Area : I already asked if it is possible to negotiate sometime with users, and this is very possible.

all Testbeams user schedule for 2018

schedule issue date: 18-Jan-2018 Version: 0 LHC Exp. PS/SPS Exp. Other Exp. INT Exp.

	Mar			Apr				Mai					Jun					Jul					Aug					Sep					Oct					Nov					Dec		
Week	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50					
Machine																																											
East Area T9	P356 ARIADNE 19			AZALEA 7		CMS MTD 7		RE22 muons 7	EnuBet 14		TIC 7	INSU-LAB 7	LHCb TORCH 21			RE13 T2K sFGD 14		BL4S 7	ALICE FOCAL 7	RE22 PANDA 21			RE22 muons 7	RE13 T2K TPC 14			EnuBet 14		BL4S 12		ALICE PHOS 14		SHiP com-bined 7	LHCb TORCH 21										
East Area T10	ALICE TOF-MRPC 12		RE21 CBM-PSD 7	ALICE ITS 7		ALICE ITS 7				ALICE ACORDE 7	ALICE TOF-MRPC 14		ALICE ITS 7	ALICE MFT 14		ALICE ITS 7	eAstro-gam 14		ALICE ITS 7	P355 35				RE21 CBM-PSD 7	ALICE ITS 7	ALICE FIT 14		SHiP com-bined 14		ALICE ACORDE 7	ALICE ITS 7	ALICE TOF-MRPC 12										
T2 - H2		HERD FIT 7	NA62 GTK 7	NA61 SHINE 14							Calice (Ahcal) 7		ATLAS ZDC 7	Calice (Ahcal) 7	NA61 K 60GeV/c 7	NA61 SHINE 21			AXIAL 7	KLEVER 7	LEMMA 7	CMS HGCAL 7	CMS HCAL 14	Calice (Sdhcal) 14	HERD 7	NA61 SHINE 7	CMS HGCAL 7	NP02 26				NA61 SHINE 28										
T2 - H4		NA63 9	CMS ECAL 7	GIF 14		NA64 42							CMS ECAL 7	AIDA WP14 7	SHiP nobeam 7	SHiP Muon 14	SHiP Charm 7	GIF 21				DsTau 7	NP04 7	NP04 7	CMS MTD 7	NP04 14		CMS ECAL 7	NP04 14		GIF 7	NP04 12	RE29 DAMPE 7	HERD 7	ATLAS ZDC 7	CaloCube 7					
T4 - H6		Clic pix 7	CMS Outer Tracker 9	ATLAS ITK 14		ATLAS ITK/Kartel 7	ATLAS eHGTD 7	RD42 7	ALICE muons 7	CERF 7	CMS Outer Tracker / AIDAwp2 7	Clic pix 7	CMS ITK 7	ATLAS ITK 14		ATLAS AFP 14		ATLAS HGTD 7	ATLAS BCM 7	Clic pix 7	ATLAS ITK 14		ATLAS AFP 14		ALICE muons 7	RD42 7	AIDA WP7 7	ATLAS ITK/Kartel 14	ATLAS eHGTD 7	CMS Outer Tracker 7	Clic pix 5										
T4 - H8		UA9 9	TOTEM PPS 7	ATLAS HV-CMOS 14		LHCb 14		ATLAS Tilecal 14		ATLAS HV-CMOS 7	TOTEM (+UA9) 7	ATLAS TRT 7	LHCb 21		crysbeam 7	CMS ITK 7	ALICE FOCAL 14		TOTEM (+UA9) 7	mu-e 7			FCCee 7	TOTEM (+UA9) 7	ATLAS HV-CMOS 7	CMS ITK 7	LHCb 26		ATLAS Tilecal 14		UA9 7	HNX 14		NUCLEON 7							

For further information contact the PS/SPS-Coordinator. Email: Sps.Coordinator@cern.ch, Tel: +41 75 411 3845.

The latest version of the schedule are available here: http://sps-schedule.web.cern.ch/sps-schedule/
This schedule in synchronized with injector schedule v0.6.
No beam to the North Area during Technical Stops (TS), Coldex, UA9 and Machine Developments (MD).
For TS a RP cool down time is needed and will be announced in the days preceding the stop.
Submit your ISIEC at least 2 weeks before your allocated beam time using https://ep-th-safety.web.cern.ch/isiec

Week 34 : 22-29 Aug

μ-on-e Test activity in 2018

Conditions for running behind compass in 2018:

Startup around mid-april : start with 2 weeks of M2-modified

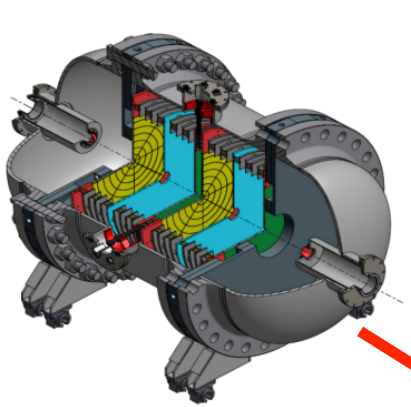
Simulations have been started (see study by Dipanwita BanerJee)
to determine beam parameters at the entrance of our setup
(*see plots)*

Energy could be 190 GeV→ is this ok for us?? **YES**
simulation undergoing as for the case of lower energy from Dipanwita

MAIN NOVELTY: COMPASS will put a TPC prototype in the same area, in front of us…..

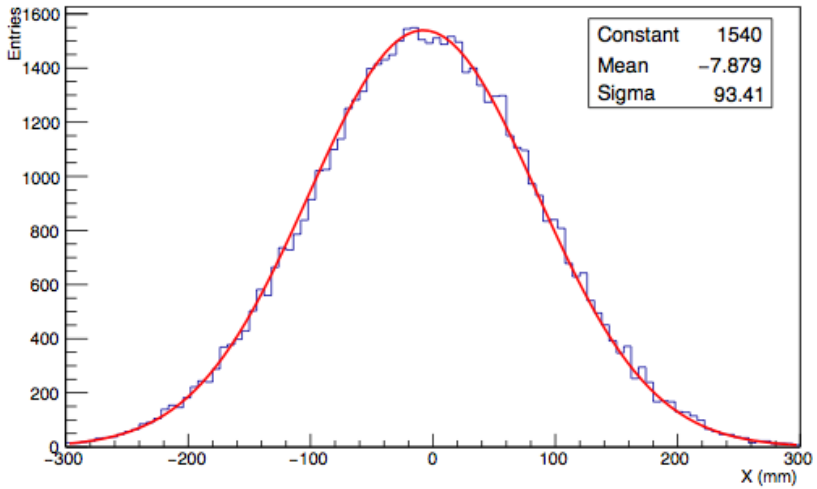
EHN2 Test Beams 2018

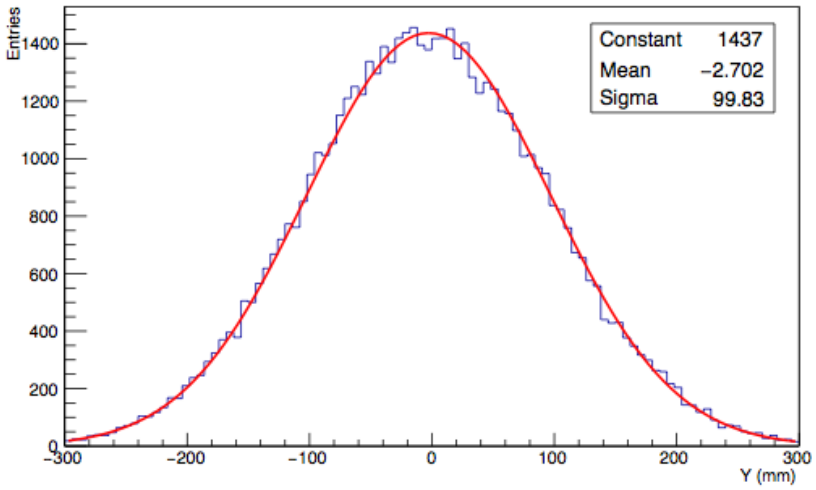
- MUonE: Measure μe scattering on 2 target modules with Silicon instrumentation + 1 EM calorimeter. Total length 3m.
- Compass TPC: Measure μp scattering in high pressure TPC + Silicon telescope

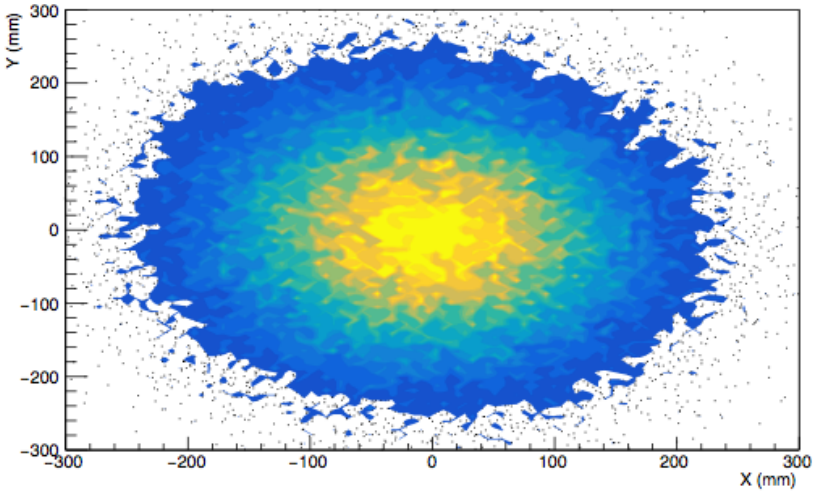


Beam Distribution Studies with HALO

- Beam Distribution at Downstream End







σx = 93.4 mm; σy = 99.8 mm

Flux for 10^{13} pot/spill ~ 1[illegible]/ cm^2

Note: Change of scal[illegible]

Deflection o[illegible] downstream (due to S[illegible] SM2) ~ 30 cm from [illegible]ected beam axis

Very preliminary

μ-on-e test activity in 2018: *summary remarks*

★ We must be ready for the first 2 weeks of muon beams requested by COMPASS

michela+erik group preparing the tracker
C targets of 90x90 mm to be prepared
contacts have been taken for getting the calorimeter *(CsI from Florence or Pb-glass)*

★ Test of TPC of COMPASS: bad news, but a positive aspect could be that they need μ for the test (μ-p study) *(comment…..)*

★ Simulation of the muons behind COMPASS undergoing , also for muons from pions decay (beam requested in 2018 by COMPASS)

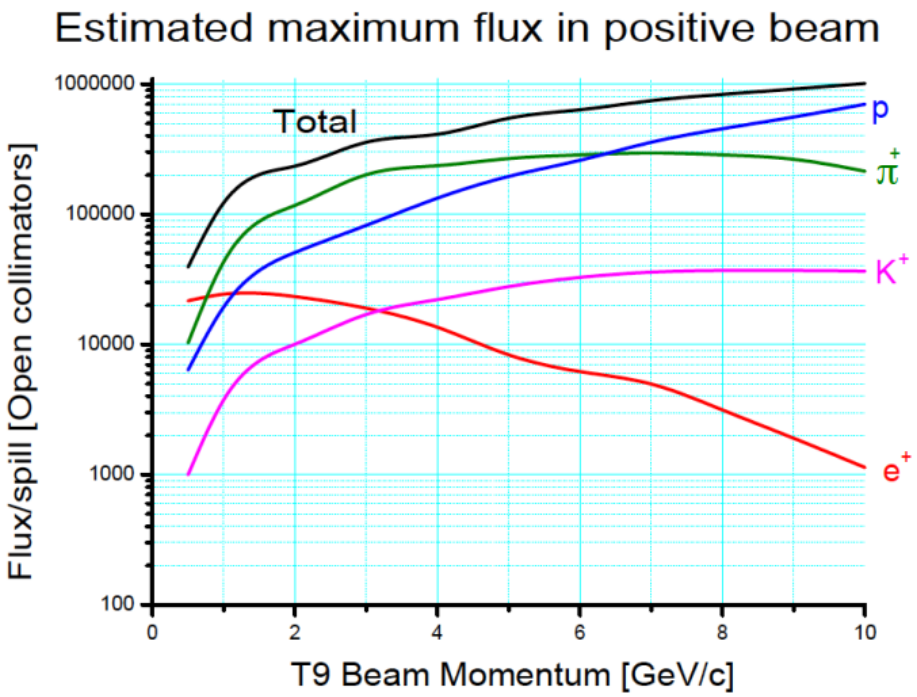
★ Eventual improvement possible? *(re-focus, see Lau's comment)*

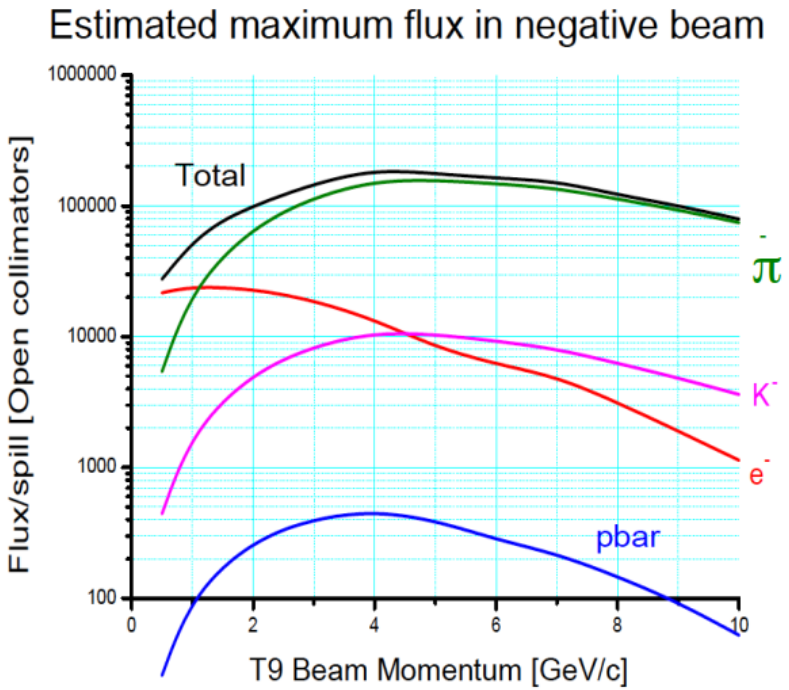
★ Electron beams available in East Area with E_e= 1-15 GeV (poor purity though), if we decide to take low energy data

The possibility of measuring μ-e cross section must be pursued

More information

T9 Maximum Beam rates

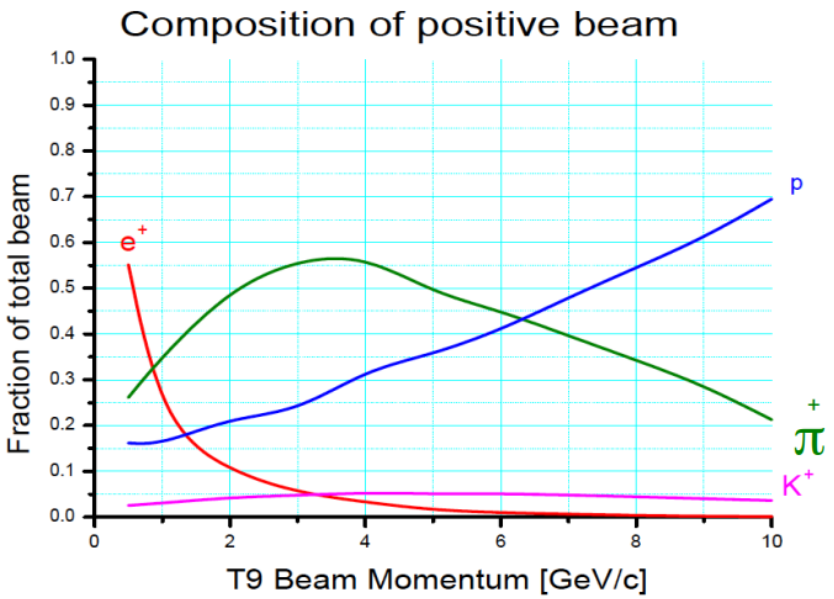


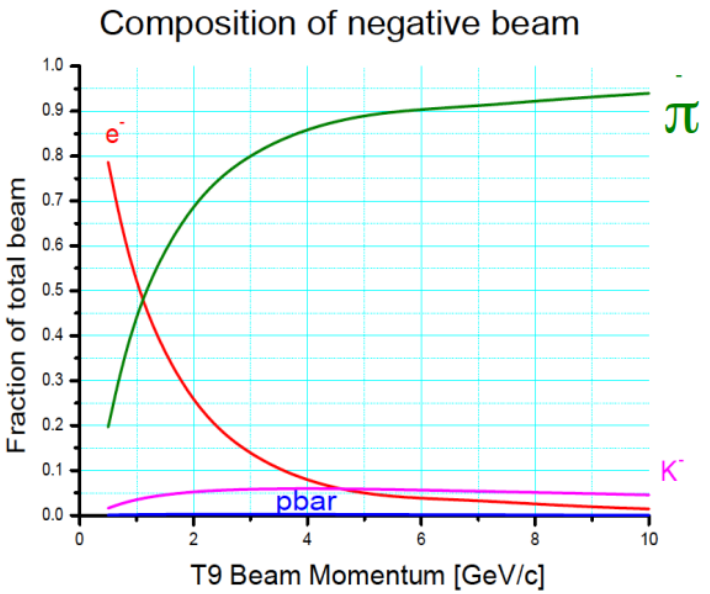


For wide open collimators, i.e. $\Delta p/p \approx \pm 7.5\%$

μ-on-e Test activity in 2018

T9 Beam Composition





With electron enriched target (otherwise $e^{\pm}$ strongly reduced)

μ-on-e Test activity in 2018