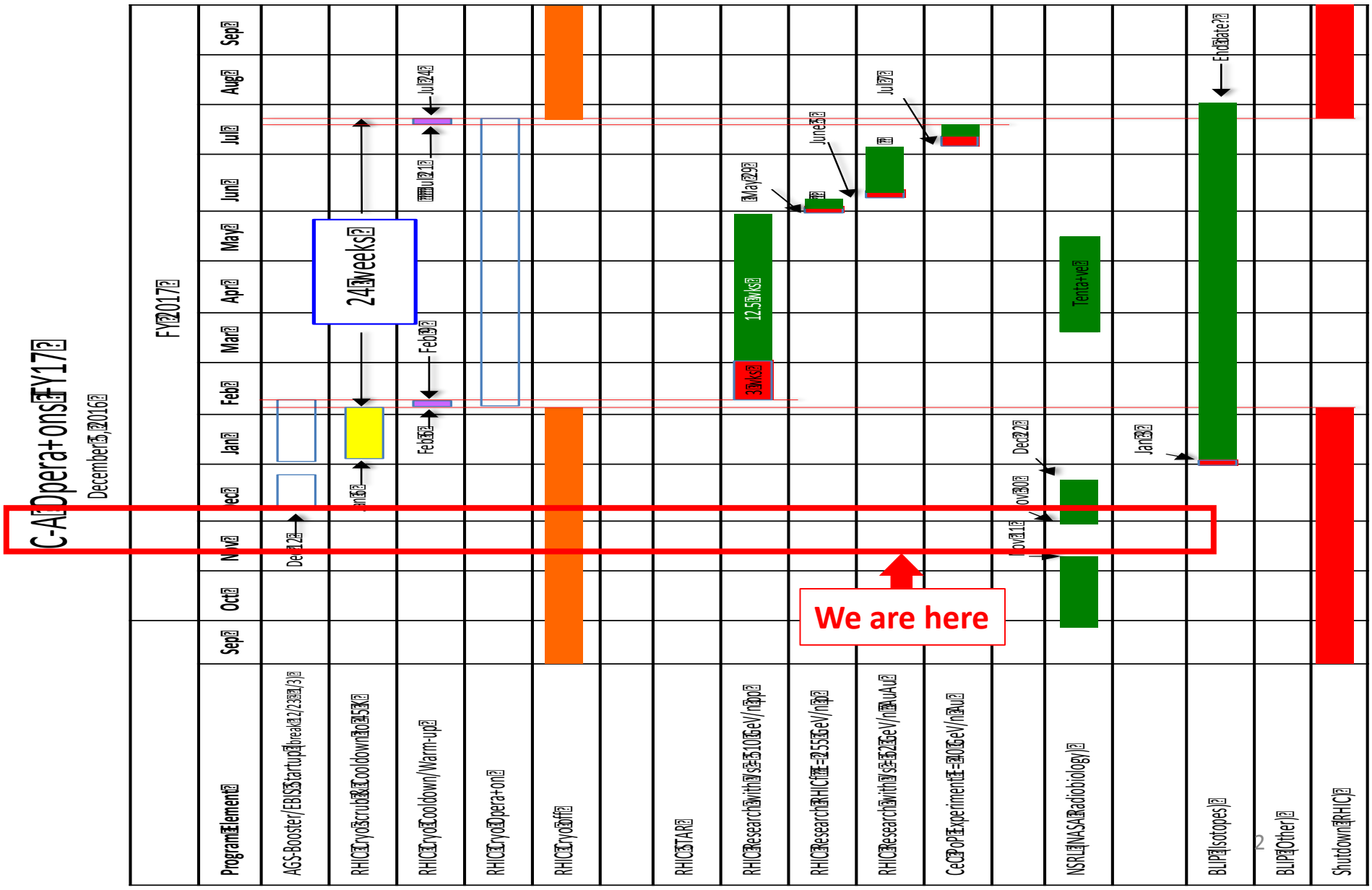
RHICf overall status

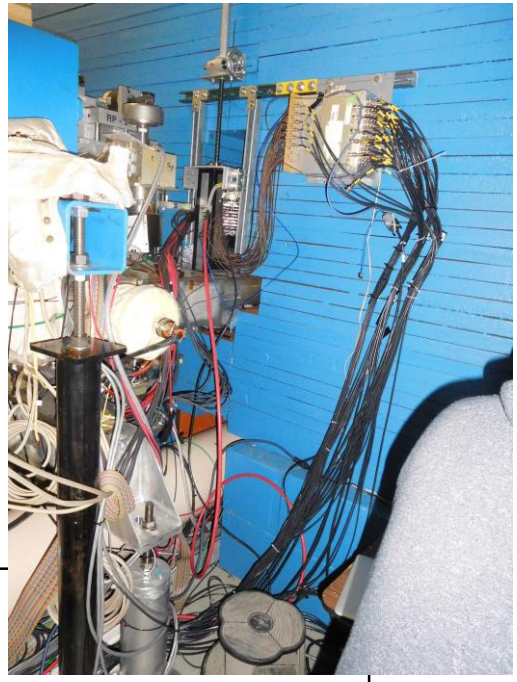
Takashi Sako

(ISEE/KMI, Nagoya University)

RHIC schedule

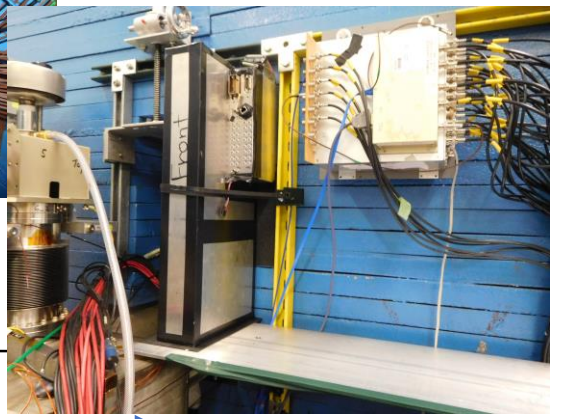


Status @ RHIC



For physics

Current position

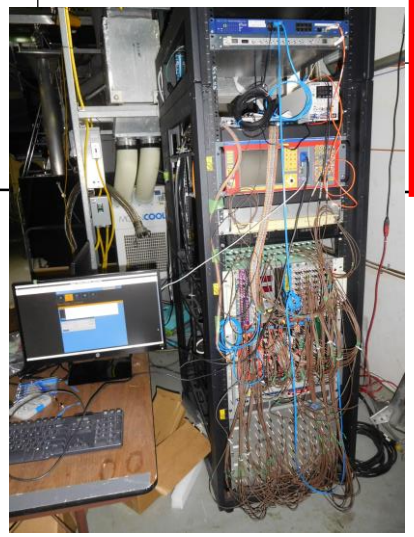


18m

STAR detector

long cables

DAQ electronics



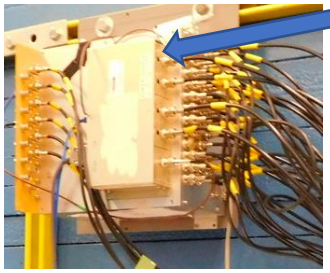
Rack room (server PCs)

Control room

Setup status

- Hardware
  - Main detector … ready, but
  - FEC problem … to be investigated in April [HIGH PRIORITY]
  - Threshold and HV setting ... Satoken and Menjo
  - Front counter … in preparation (Sako)
  - Installation support, vertical position measure…
- Software
  - RHICf stand alone DAQ … OK
  - Common DAQ with STAR … OK (data not confirmed)
  - Slow control and monitor ... Junsang+Minho
  - Analysis of common data ... Ueno

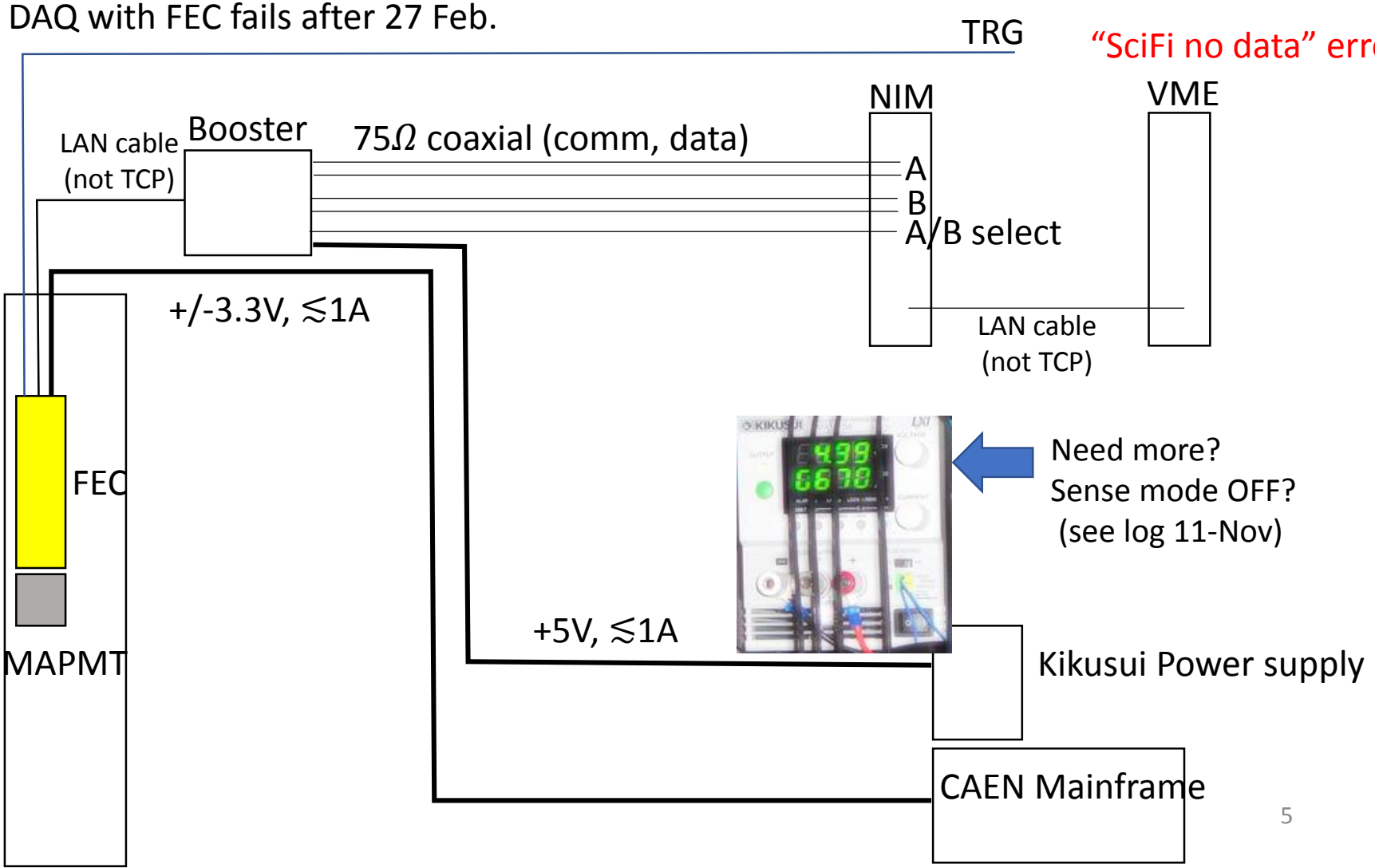
FEC configuration



Booster on preamp

FEC trouble

- DAQ fine until 23 Feb.
- Clock trouble
- DAQ with FEC fails after 27 Feb.



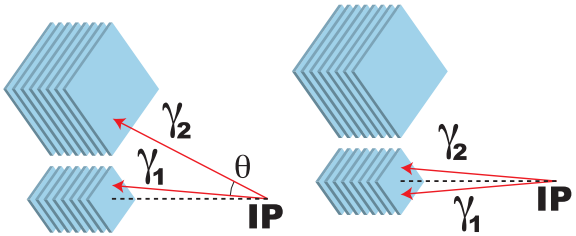
Agreement of “RHICf week”

- From 29 May to 5 June
- 2 days for beam setup
  - 1 day (1-3 shifts) for β^*=10m setup
  - 1 day for radial pol setup
- 2 days for physics data taking
  - Position scan (2-3 positions to be optimized)
  - Low pile-up run
  - High threshold run…
- Contingency
  - Installation/uninstallation included?

Operation plan

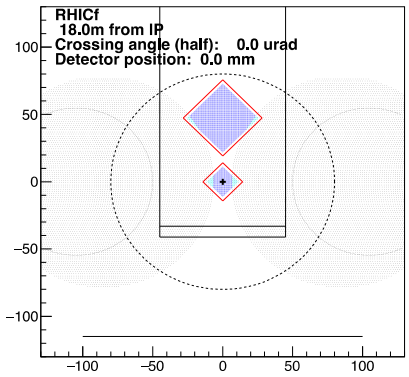
- BUR plan
  - 18kHz event rate at the detector
  - Prescaling single events down to 1kHz
  - Type-I pi0, ≲100Hz w/o prescale
  - Pileup is 0.13

Parameter	Value
Beam energy (GeV)	255
Beam intensity (protons per bunch)	2×10^{11}
Number of colliding bunch	111
Number of non-colliding bunch	9
Beam emittance (mm mrad)	20
β^* (m)	10
Luminosity ($cm^{-2}s^{-1}$)	2.0×10^{31}
Polarization direction	radial
Polarization amplitude	0.4–0.5
β^* setup time	1 day
Radial polarization setup time	1 day
Data taking time	2 days

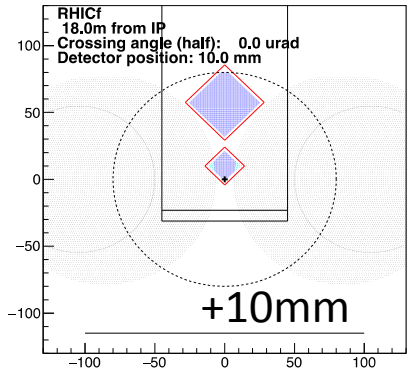


Type-I

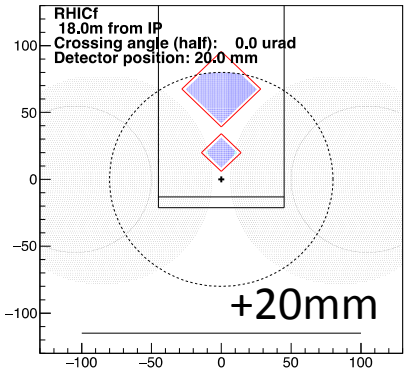
Type-II
(same as single high-E photon)



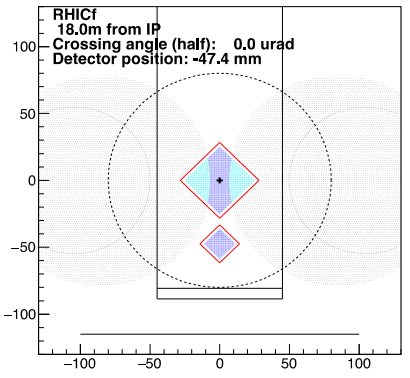
Position 1



Position 2

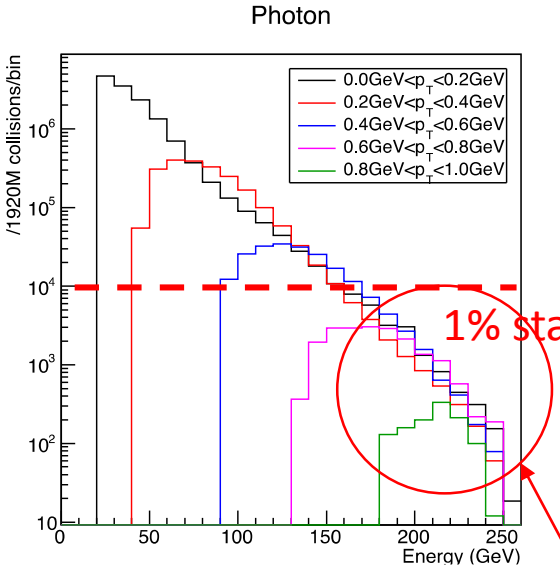


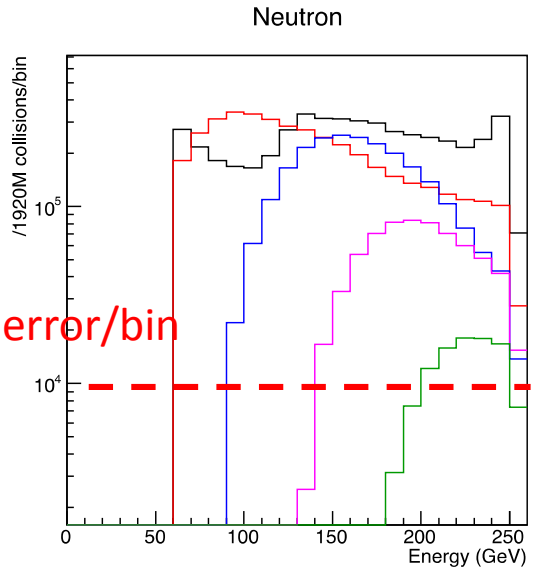
Position 3



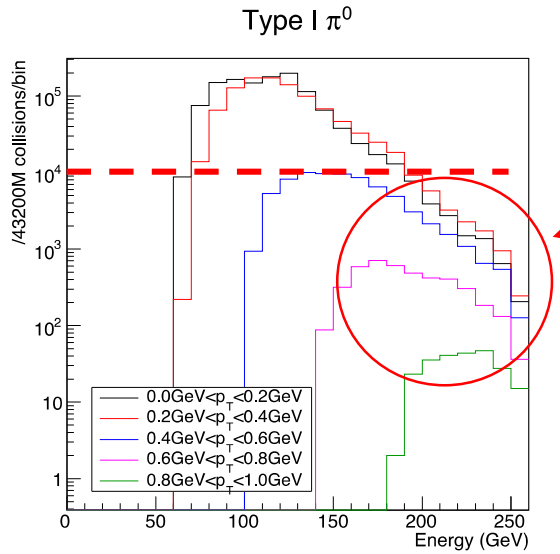
Position 4

Expected statistics in 12 hours (positions 1,2,3)





1% stat error/bin



Neutron SSA

$p_T(GeV)$	N $(\times 10^3)$	δA
0.0–0.1	2,310	0.0013
0.1–0.2	2,570	0.0012
0.2–0.3	1,710	0.0015
0.3–0.4	2,190	0.0014
0.4–0.5	1,210	0.0018
0.5–0.6	1,130	0.0019
0.6–0.7	402	0.0032
0.7–0.8	260	0.0039
0.8–1.2	104	0.0062

High-E EM trigger is effective to avoid prescaling

High-E EM trigger is effective not to lose Type II pi0

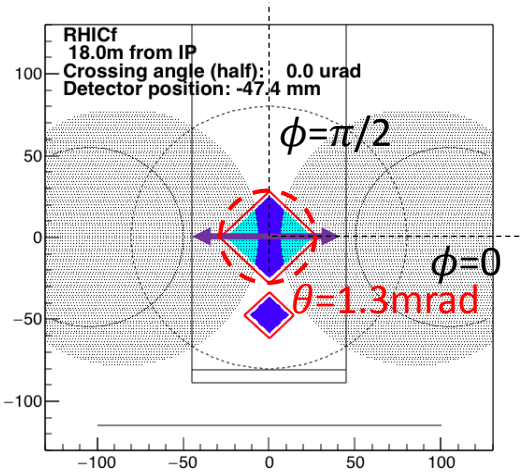
- 800Hz for single event, 57Hz for pi0 are assumed
  => How flexible is the prescaling?
- After 12 hours, high threshold energy and EM enhanced trigger to increase statistics in high energy photons and π^0

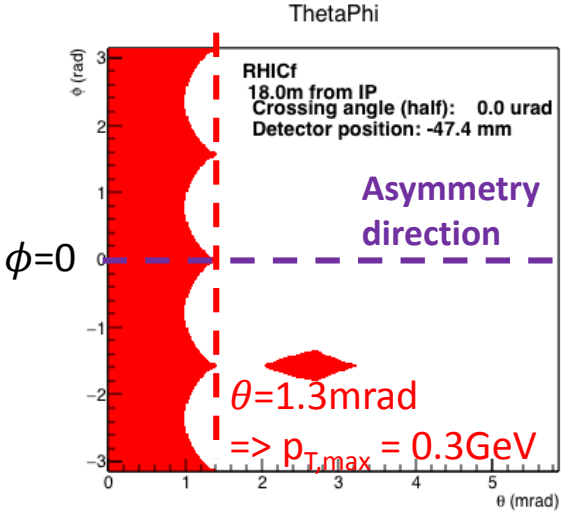
Backup plan for time shortage

E-mail by Wolfram

> In the past most people have used sqrt(6) sigma to define the emittance. The are the larger values (19-23 um).
>
> We have now moved to use 1 sigma everywhere (this is now the international standard), and this gives the smaller values (3.1 - 3.9 um).
>
> If you divide 19-23 um by 6, you get 3.2 - 3.8 um.

- β^*=10m or 0.65m?
  - Emittance=20um was defined as √6 σ
  - => 1σ is about 3-4 um
  - 1σ beam spread at 18m with β^*= 0.65m is 2.7mm; acceptable?
  - 1σ beam spread at 18m with β^*= 10m is 0.7mm; ideal
  - We must reduce luminosity both for DAQ and pileup => beam separation? Drawback is higher beam-gas BG.
- Radial pol
  - With vertical pol, we lose a SAA sensitivity to the high p_T region as described in the BUR





Shift

- Long access is panned on 5-April
- Startup on 12-April
- Main investigation on 19-April?
- Sako for replacing FEC if necessary

https://docs.google.com/spreadsheets/d/1VEmSIVkNRjcZ9xpuZlFeHhqxwM-Q3KRy7zU5eAMyZkI/edit#gid=1005292374

RHICf shift plan from April to June 2017

		EVENT	Goto	Nakagawa	Itow	Sako	Menjo	Junsang	Minho	Satoken	Zhou	Ueno
9-Apr	Sun											
10-Apr	Mon		A				x					
11-Apr	Tue						x					
12-Apr	Wed	access?				x						
13-Apr	Thu											
14-Apr	Fri											
15-Apr	Sat											
16-Apr	Sun											
17-Apr	Mon											
18-Apr	Tue					x						
19-Apr	Wed	access?				x						
20-Apr	Thu		D									
21-Apr	Fri											
22-Apr	Sat		x									
23-Apr	Sun											
24-Apr	Mon											
25-Apr	Tue											
26-Apr	Wed	access?										
27-Apr	Thu											
28-Apr	Fri											
29-Apr	Sat						x					
30-Apr	Sun											
1-May	Mon					x	x					