Kobayashi T.

Memo on Samurai standard detectors for S13 (PolP)

work periods @riken

31-May-2016(Tue)~3-Jun-2016(Fri)

6-Jun-2016(Mon)~9-Jun-2016(Thu)

14-Jun-2016(Tue)~15-Jun-2016(Wed)

- BDC
- SBT
- (SBV)
- FDC0
- FDC2
- FDC1-box filling
- (HODF24)

BDC -1

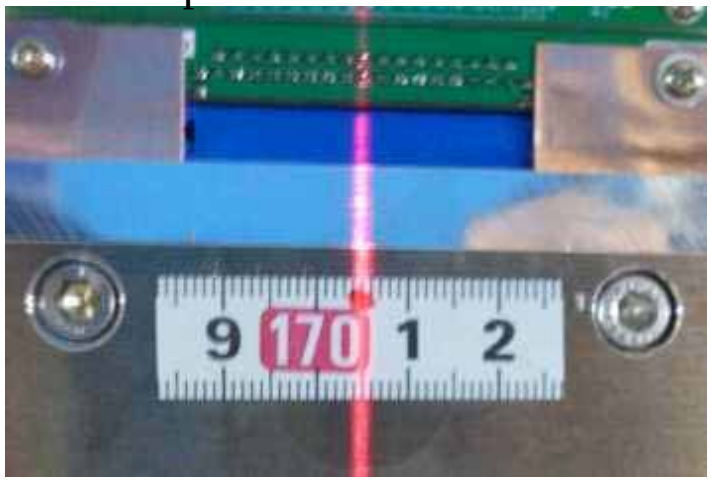
- Re-arrangement of BDC1 &2 — 1-Jun-2016(Wed) PM
  - move BDC1 to upstream by 155 mm
    - L(upstream edge of slide rail~BDC1 upstream side)= 525 mm
    - L(BDC1~BDC2)= 750 mm ← 1000 mm (standard)
- moved to new position — 2-Jun-2016(Thu) PM
  - cables (signal, HV, AC, network, gas) connected
  - Rotaries, gas bottles, gas pipes connected
- 16 ASD's : replaced from 80 nsec to 16 nsec — 6-Jun-2016(Mon) PM
  - ASD noise check @V_{th}= -0.4 V using visual scalers : OK
- Alignment of BDC platform — 7-Jun-2016(Tue) AM with Chiga
  - 0° line
    - STQ laser marker → Pol magnet top, Pol-magnet laser marker → STQ
    - downstream side of BDC-box's
  - vertical height
    - magnet center → east/west wall markers
    - 2 horizontal laser markers (west, east) on concrete floor → left/right & downstream side of BDC-box's
  - 6 markers are < 1/4 mm from zero (next page)
  - after the alignment
    - SBT-box & BDC1-GV : connected via bellows (L= ~93 mm)
    - SBV-box set, & connected to BDC2-GV via bellows (L= ~72 mm)

BDC -2

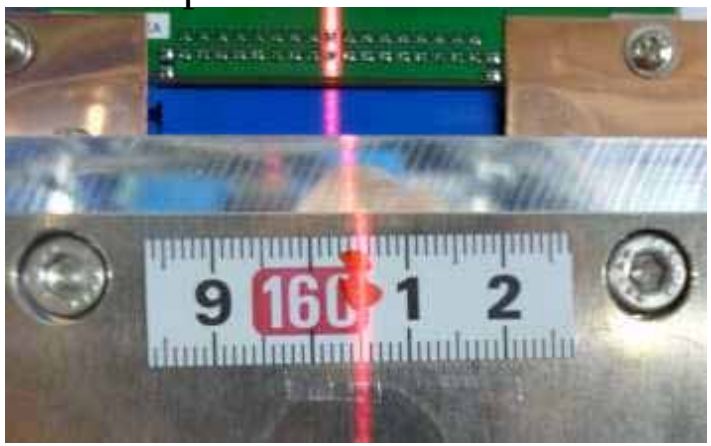
- Alignment by laser marker
  - deviation < ~1/4 mm from zero

7-Jun-2016(Tue) AM

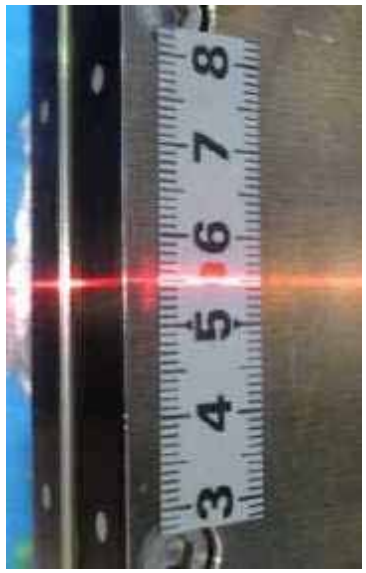
BDC1 top



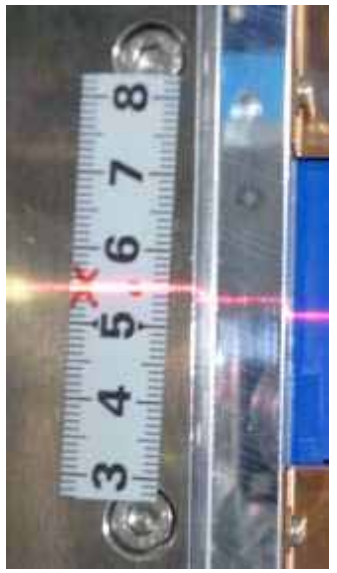
BDC2 top



BDC1 east

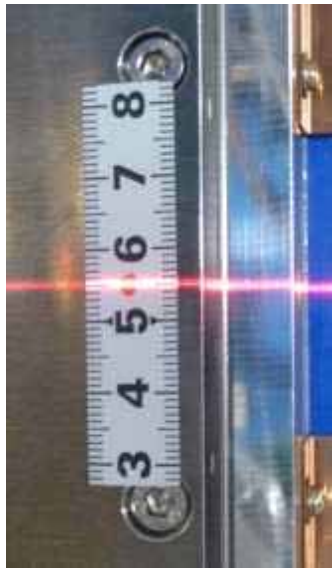


BDC1 west



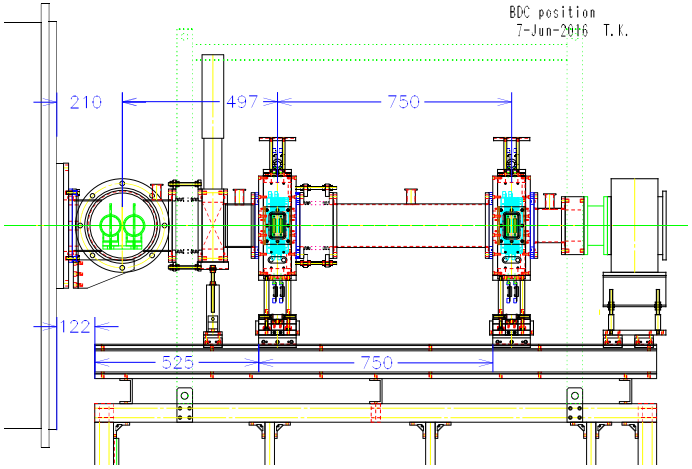
BDC2 east

BDC2 west



BDC -3

- BDC position summary
  - (SBV-box will be re-aligned by Sakaguchi)



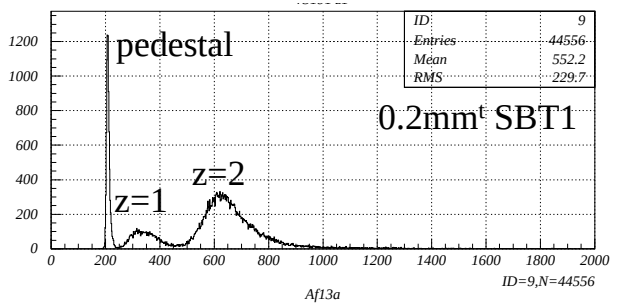
- gas flow test @P= 150 torr
  - i-C_4H_{10} : bottle#1 : ~2.1 kg left, bottle#2 : ~8.8 kg @8-Jun-2016(Wed)
  - overnight test with HV coditioning @HV= 1.1 kV (I < 5nA)
    - pressure stability : seems to be OK
  - gas consumption rate ~ 0.4 kg/day @NV=25
  - pumped down after test
- Test of DAQ readout & monitor program 14-Jun-2016(Tue) PM with Togano
  - HV= ~40V (min.), vacuum
  - add ~900nsec to trigger
  - test pulse (from TCAL) to test inputs
    - all channels alive
  - without test pulse
    - no hit for ~200 k events : noise OK

BDC -4

- Estimation of HV for He
  - no systematics of gain change @P= 150 torr
  - for 80 nsec ASD
    - HV(50%)~ 0.87 kV, HV(100%)~ 1.07 kV
  - for 16nsec ASD
    - HV(50%)~ 0.93 kV, HV(100%)~ 1.13 kV if $\Delta G \sim 2$
    - HV(50%)~ 0.99 kV, HV(100%)~ 1.19 kV if $\Delta G \sim 4$

SBT1,2

- plastic scintillators replaced & set to SBT-box 1-Jun-2016(Wed) pm
  - 130 x 130 x 2 mm^t ← 0.2 mm^t
  - scintillators : used in kubota-exp (Dec-2014), cleaned by alcohol
  - covered by 4 sheets of 12 um-thick Al-Mylar
- (cf. tested during TPC run) 31-May-2016(Tue)
  - z=1 & 2 @300MeV/u can be separated using 0.2mm-thick scintillators
-



- cables (signal, HV, booster) etc 8-Jun-2016(Wed) PM
  - connected
  - signal etc. checked using ^{137}Cs source
    - < 300mV @1.6 kV
    - Amp/FO offsets adjusted
    - Vth= -40 mV, width= 40 nsec

SBV, SBV-box

- PMT guide + light shield parts — 1-Jun-2016(Wed) PM
  - installed
- mounted on BDC platform — 7-Jun-2016(Tue) AM
  - cables (signal, HV, booster) connected — with Chiga

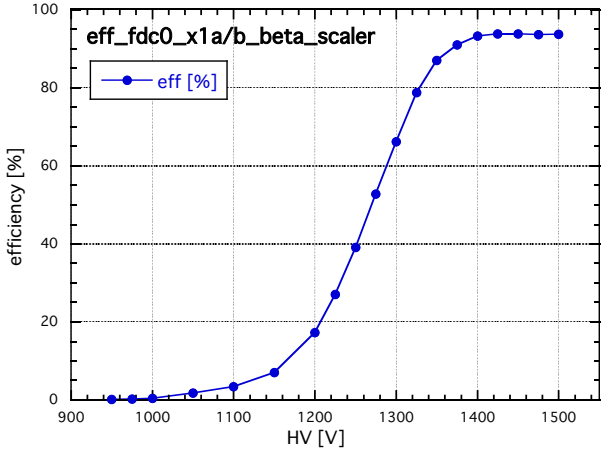
FDC0 -1

- ASD replacement — 7-Jun-2016(Tue) PM
  - 16 ASD's are replaced from 80 nsec to 16 nsec
- Alignment — 7-Jun-2016(Tue) PM
  - Base plates w Al angle : fixed to pol-magnet stand
    - level in directions is adjusted by levels
      - slope from horizontal plane < 0.1 mm/m
  - vertical height
    - roughly adjuster using jig & rotating laser marker
      - probably ~1mm higher than beam level
  - 0 deg line
    - not adjusted since laser marker does not hit the detector
    - adjusted to the geometrical center of base plates

- new MFC system made
  - MFC= 20+10 ccm (cf=1.0, Ar)
- cables (signal x16, asd-power x16, HV, gas) connected — 7-Jun-2016(Tue) PM
  - check using test pulse input
    - all channels alive using visual scalers
    - no noise hits @V_{th}=-0.4 V
  - hit pattern test using ^{90}Sr source & @HV=1.35 KV
    - all planes OK (y2b-w10 might have lower efficiency?)
- HV conditioning @HV=1.0~1.2 kV — 8-Jun-2016(Wed) PM~

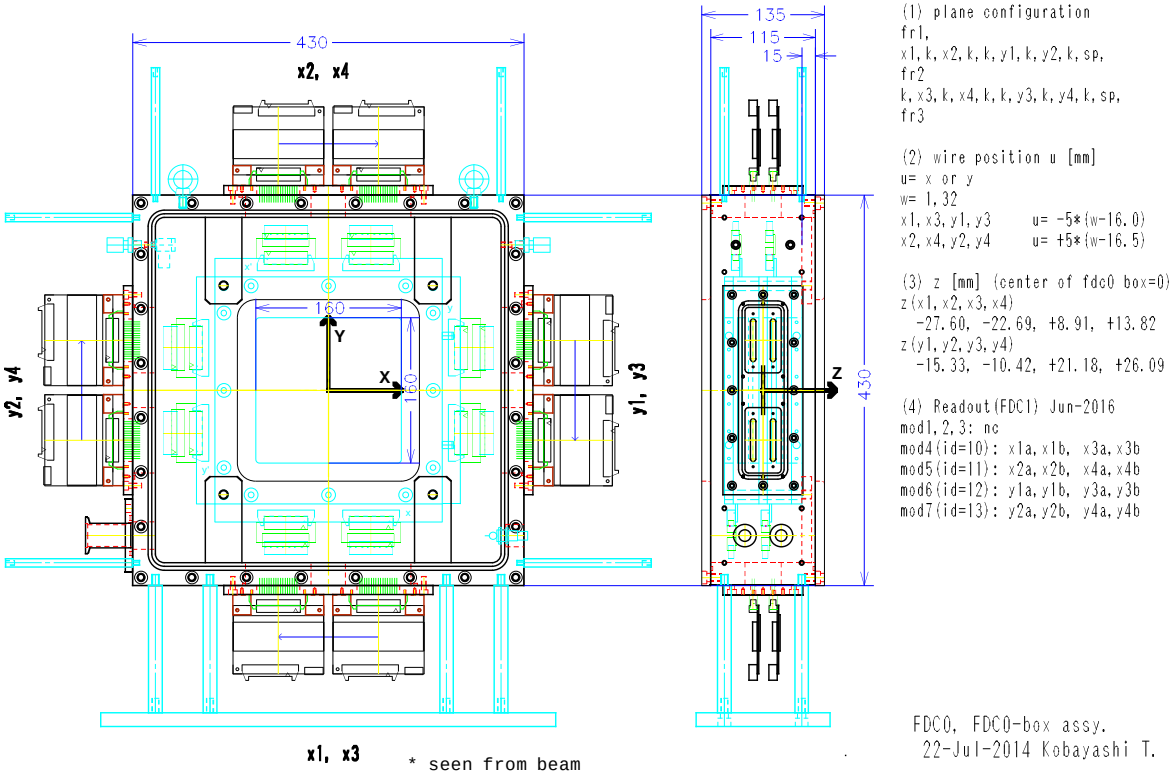
FDC0 -2

- Test of DAQ readout & monitor program — 14-Jun-2016(Tue) PM with Togano
  - HV= ~40V (min.) , V_{th}= -0.4 V
  - test pulse (from TCAL) to test inputs
    - all channels alive
    - address mapping modification in monitor program : OK
  - without test pulse to test inputs
    - no hit for ~200 k events : noise OK
- HV plateau check using joker scintillator — 15-Jun-2016(Wed) AM
  - joker scintillator(200x150x1^{t}) + temporary jig prepared
  - efficiency using ^{90}Sr source & hardware coincidence
    - for x1a+x1b
    - HV(V_k=V_p)= 0.9~1.5 kV
  - comparison with previous bench test using 80 nsec ASD
    - ΔHV(50%, 16nsec-80nsec) ~ 85 V
    - corresponds to ΔG~4, since ΔHV~45 V for ΔG~2
- Estimation of HV for He
  - HV(ε=50%)~ 1.15 kV, HV(ε=100%)~ 1.3 kV,

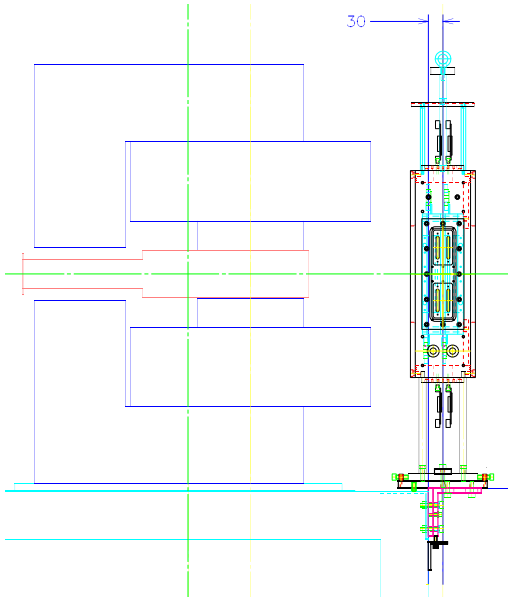


FDC0 -3

- Configuration



- Position
  - geometrical center of FDC0-box
    is ~30mm downstream of pol-magnet stand



FDC2 -1

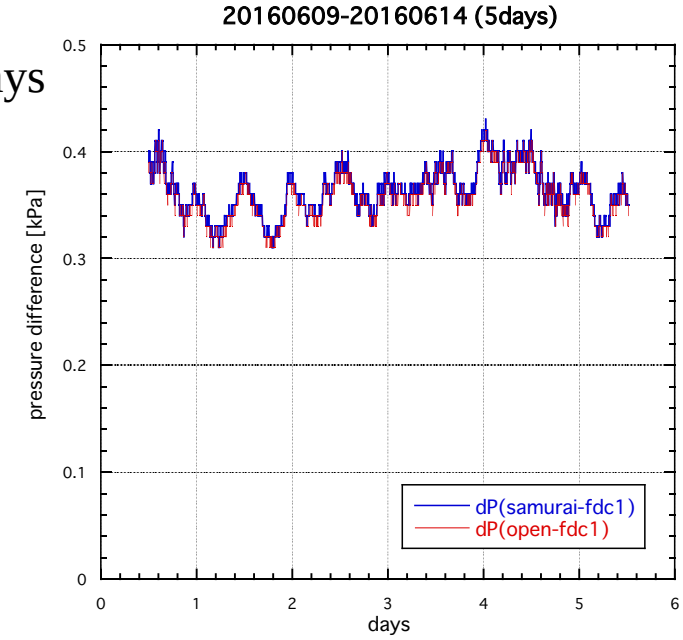
- Detector gas
  - gas : P20 + 2-propanol
  - gas purge
    - 28-Apr-2016(Thu) ~ 2-Jun-2016(Thu) , ~35 days
      - MFC= 171 + 57 (cf=1.0, N_2) → flow rate ~ 0.27 L/min
      - ~x8 exchange ~ 2 bottles
    - 7-Jun-2016(Tue) ~
      - MFC= 105 + 35 (cf=1.0, N_2), with FDC0
- FDC2 moved to new position 7-Jun-2016(Tue) PM
  - cables (signal/control, HV, AC, network, gas) connected
    - 16 BNC-BNC cables : 16 x 4m-cables added
    - covered by wooded trays
    - standard AC cable is too short : spare long cable used
    - gas (P20+2-propanol) flow rate ~ 130 ccm since 7-Jun-2016 PM
      - @ MFC(mix)= 105+35, MFC(FDC0)= 20+10
      - bubbler ref. T~ 6°
    - gas bottle : 9.6 MPa(#2, open), 13.9 MPa(#1, close)
- HV check
  - HV= 1.0 ~ 2.4 kV
  - hit pattern checked using β source & visual scalers up to 2.6 kV

FDC2 -2

- HV conditioning — 8-Jun-2016(Wed) PM~
  - @ HV=2.3 kV : I(x)~ 40 nA, I(U)~ 150 nA, I(V)~ 120 nA
  - HV= 2.0 kV : 9-Jun-2016(Thu) PM ~ 14-Jun-2016(Tue) PM
- Test of DAQ readout & monitor program — 14-Jun-2016(Tue) PM with Togano
  - HV=1.0 kV, V_{th}= -0.8 V
  - test pulse (from TCAL) to test inputs
    - all channels alive
  - without test pulse
    - no hit (actually 1) for ~200 k events : noise OK
- HV conditioning
  - @HV= 2.3 kV : I(x)~ 40 nA, I(U)~ 125 nA, I(V)~ 95 nA
  - HV= 2.3 kV — 15-Jun-2016(Wed) PM ~
- Estimation of HV for He
  - HV(50%)~ 2.1 kV, HV(100%)~ 2.4 kV

FDC1 He filling + pressure control

- He purge
  - 18-May-2016(Wed) ~ 7-Jun-2016(Tue), ~20 days
    - flow rate ~(20-)40 ccm using 2 MFC's (cf=1.0 Ar)
    - ~x9 exchange
  - 7-Jun-2016(Tue) PM ~
    - input: 1 MFC (<20ccm, Ar), output: Needle valve
    - 20 ccm & NV~ 2 → ΔP(relative to atmospheric pressure) ~ 0.35 kPa
    - memo : rackのadjuster下の絶縁板を取らないこと。
- Stability test
  - ~12:00 9-Jun-2016(Thu) ~ 12:00 14-Jun-2016(Tue), ~5 days
  - monitors
    - ΔP(FDC1 - atmospheric pressure)
    - ΔP(FDC1 - samurai vacuum chamber)
  - flow rate~ 20 ccm (MFC), output needle valve= 2.0
  - day-night difference ?
- Pressure difference monitor
  - 14-Jun-2016(Tue) 12:30 ~



- 床上げ 7-Jun-2016(Tue) PM, 千賀、小林
  - 設置計画ではHODF24のcaster/adjusterの1つだけが回転円盤に乗る
  - HODF24架台の歪みを減らす為に、HODF24の下の床に（急遽）12mm厚コンパネを敷く
  - コンパネに架台を載せる際には、境目に鉄板を敷いた。