6-May-2016
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Memo on Samurai standard detectors
FDC0, FDC2, (FDC1) for S13 (PolP)

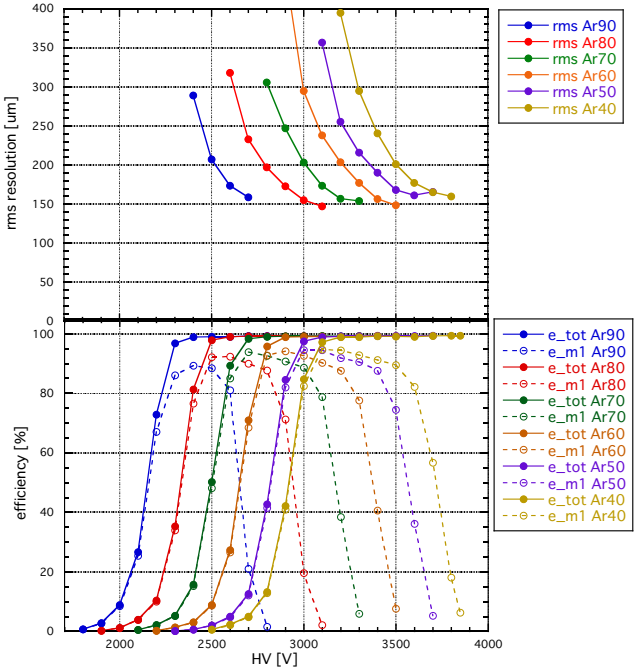
- FDC2(p) gas mixture bench test for ^{6}He
  - P20 will be used: FDC2 gas exchange started
- FDC0 bench test with P20
- FDC1 He circulation

FDC2P bench test using Ar+CH_4 mixture

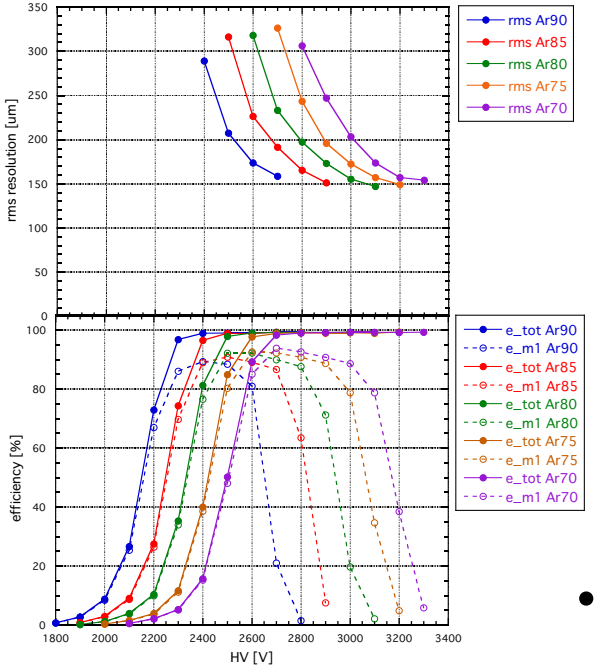
- Motivation for FDC2 gas mixture mainly for low-Z particles
  - P10 used in S18{^{11}Li(p,pn)}
  - criteria : more stability, moderate HV, shorter drift time
- Bench tests using FDC2P
  - MIP : β rays, cosmic μ
  - gas : P10 (Ar90%+$CH_4$10%) ~ P60 (Ar40%+$CH_4$60%)
  - efficiency, position resolution @V_{th}=-0.8V
- Summary (conclusion)
  - P20 selected for ^{6}He beams (S15)
    - it may not be the optimum
    - ~30KJPY for one bottle (47L, 14.7MPa) ~ as cheap as P10
  - HV for ^{6}He (?):
    - HV(ε=50%)~2.33kV, HV(σ~250um)~2.7kV for MIP(z=1)
      - ΔE(^{6}He)/ΔE(MIP)~2x2^2=2^3 , ΔHV~80V for ΔG~2
    - HV(ε=50%, ^{6}He)~2.1kV, HV(σ~250um, ^{6}He)~2.45kV (?)
  - possible problems
    - 0.5 MHz ^{6}He beam {~40mm(H) x ~150mm(V)} through FDC2
- FDC2 status
  - gas exchange started 28-Apr-2016~
    - P20 + 2-propanol
    - x7 exchange before 28-May-2016

FDC2(p) : efficiency, resolution

- P40 ~ P10 (Δf=10%)

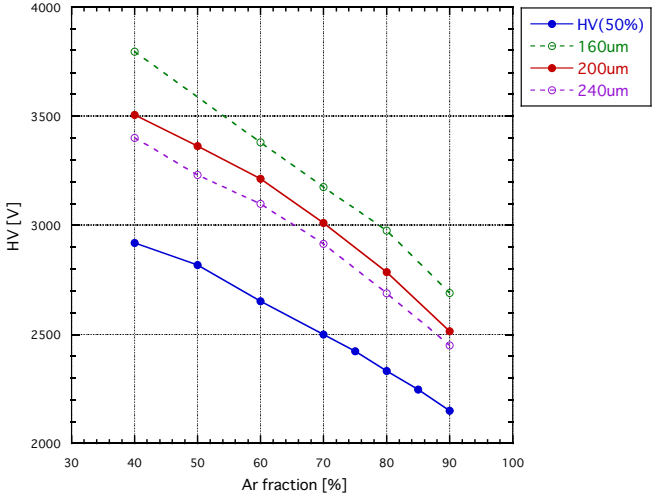


- P30 ~ P10 (Δf=5%)

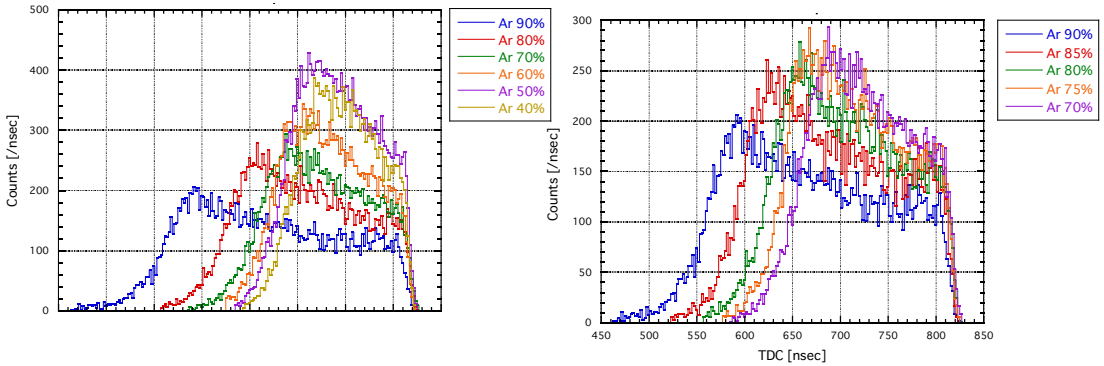


- ΔHV~ 80V for ΔG~2, P20

- HV setting for given resolution

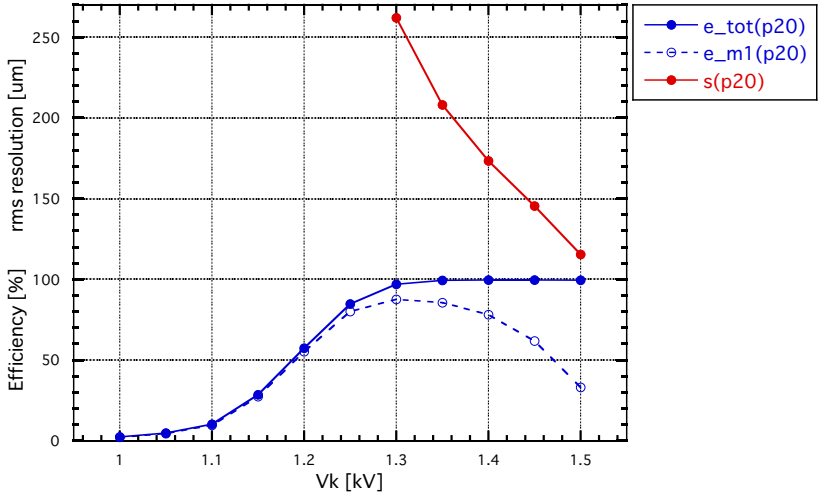


- TDC dirtribution @200um



FDC0 bench test using P20

- Efficiency & resolution : $V_k=V_p$, @V_{th}=-0.4V

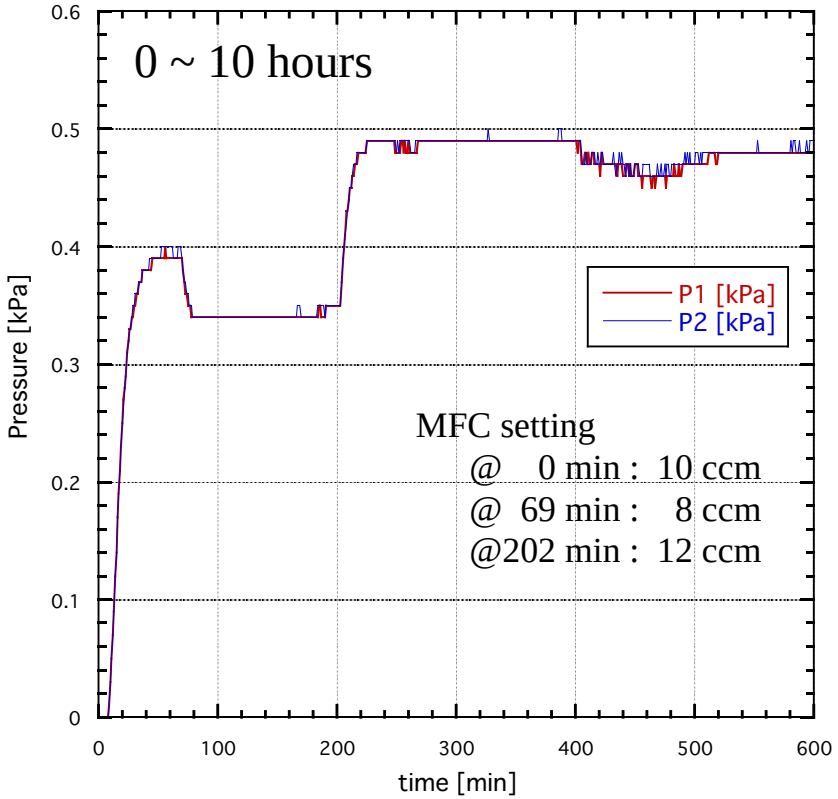


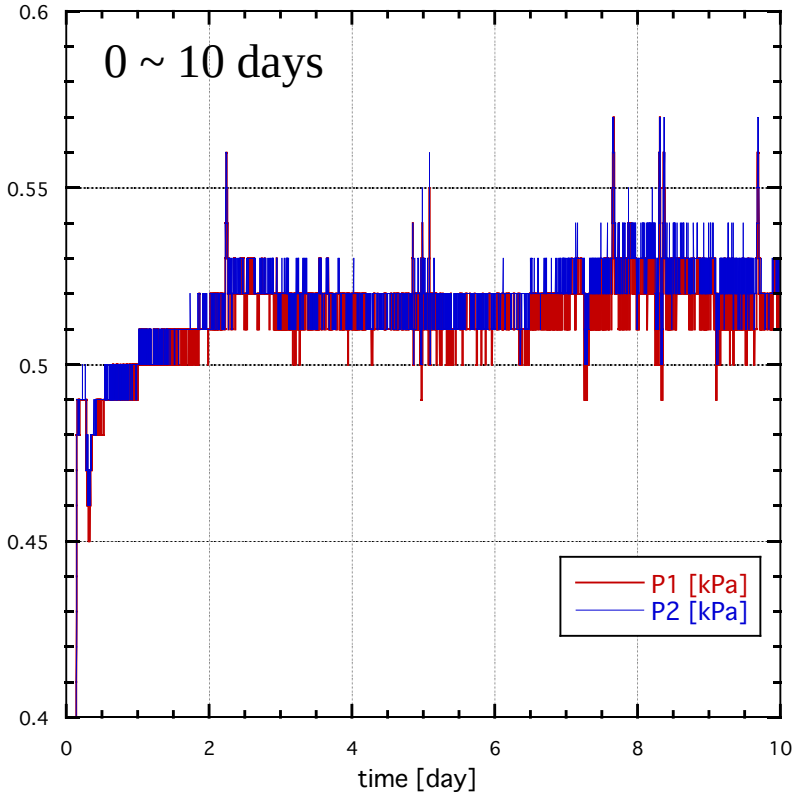
- unstable @1.55kV
- ΔHV~44 V for ΔG~ 2
- P10, P20
  - HV(50%, P10)~ 1.08kV
  - HV(50%, P20)~ 1.18kV
- Vp=Vk, Vp≠Vk
  - ΔHV(50%)~ 10V

- HV for ^{6}He (?)
  - ΔE(^{6}He @200MeV)/ΔE(μ)~ 8= 2^3, ΔV(He-μ)~ 132 V
  - HV(^{6}He, σ~200μm) ~ 1.36-0.13~ 1.23 kV ?
- possible problems
  - 0.5 MHz beam in ~20mmx20mm(FWHM)
- FDC0 status
  - base plates on Pol-p magnets stand mounted
  - will be connected to 2 ASD-PS's and 4 AMSC-TDC's (FDC1)

FDC1 gas circulation

- Samurai vacuum chamber He filling & FDC0 vacuum window
  - avoid reverse pressure
  - ΔP<0.1kPa from Sakaguchi
- bench test : stabilize the pressure at +0.2~0.3kPa relative to atmospheric pressure
  - He gas, MFC at input, needle valve at output, 2 manometers & PC's
  - monitor 2 pressure values using 2 manometers relative to atmospheric pressure
  - stability test for 10 days





- ΔP~ 0.2 kPa will be set