PHENIX TEC Electronics 10/95

TEC Specifications	
Total Channel Cnt (Baseline)	29856 (pls 3-6)
Anode Wire Spacing	4 mm
Drift Distance	3 cm
Shaping Time	70 ns
Input Capacitance	15 pf
Preamp Input Charge Sensitivity	1 fC - 4 pC
Front-End ENC($C_{in} = 15pF$)	1500-2000 e's
Hit Wire Rate	200 Hz

TEC Operating Param.	50%Xe+45%He+5%C_4H_{10}	P10	95%Xe+5%C_4H_{10}
Drift Velocity	15 mm/μs	25 mm/μs	15 mm/μs
Dynamic Range	1000	150	1000
$(dE/dx)_{mp}$	0.20 keV/mm	0.16 keV/mm	0.356 keV/mm
$(dE/dx)_{mp}$/(70ns Shp Tm)	0.21 keV	0.28 keV	0.37 keV
(dE/dx) Sens. Range Min	0.02 keV (10% mip)	0.028 keV (10% mip)	0.037 keV (10% mip)
(dE/dx) Sens. Range Max	20.0 keV (max trd)	4.2 keV/mm (max dE/dx)	20.0 keV (max trd)
No. (Prim e^-/mm)$_{mp}$	9.0	6.0	16.0
No. (Prim e^-/Shp Tm)$_{mp}$	9.4	10.5	17.0
Range Preamp Inpt Chg/70ns	1 fC - 1 pC	1 fC - 150 fC	1 fC - 1 pC
Max Preamp Integrated Chg	4 pC	4 pC	4 pC
Detector Effective Gas Gain	5×10^3	5×10^3	5×10^3

Preamp and Shaper

- Unipolar shaping
- Dual gain shapers 5×, 25×
- Tail cancellation adjustable for both Xe and P-10
- Calibration and channel disable included on chip
- 8 channel chip, 40 mW/channel

FADC

- 1.2 μm CMOS process in FADC
- Set the FADC levels with 4 DAC levels. Two ranges, two offsets.
- Non-linear levels can be done with different numbers of resistors of the same value in series.
- 5 bit FADC
- We will use 00000 for underflow, 11111 for overflow
- Single channel chip, 150 mW/channel
- Bottom FADC level is set at 40 mV
- 28 Low range (high gain) comparators for dE/dx, 3 High Range (low gain) comparators for TR.
- Comparator Levels Low Range (High Gain)

  $(MinIon)_{mp}$ = 14 fC (P-10), 18.5 fC (95% Xe)

  Set 2 fC= lowest level 40 mV

  10 levels, Δ40 mV : 40 mV - 400 mV (2 fC- 20 fC)

  18 levels, Δ80 mV : 480 mV- 1.84 V (24 fC- 92 fC)

- Comparator Levels High Range (Low Gain)

  $(MinIon)_{mp}$ = 2.8 fC (P-10), 3.7 fC (95% Xe)

  Set 2 fC = 8 mV

  3 levels, Δ400 mV : 800 mV - 1600 mV (200 fC- 400 fC)

TEC FADC Comparitor Levels	Voltage Levels	Chg into Preamp	E Dep/70 ns P-10	E Dep/70ns 95%Xe+5%C_4H_{10}
Low Range 1-10, ×25 Gain	40 - 400 mV	2 fC- 20 fC	.04-0.4 keV	0.04-0.4 keV
Low Range 11-28, ×25 Gain	480 - 1840 mV	24 fC- 92 fC	0.48-1.84 keV	0.48-1.84 keV
High Range 29-31, ×5 Gain	800 - 1600 mV	200 fC- 400 fC	4.0-8.0 keV	4.0-8.0 keV

- **References**

  EO'B, PHENIX V, p.66, **EO'B, PHENIX III**, p.73,44,

  EO'B, PHENIX I,p.15,**EO'B, E814 IV**,p.148