

PID for pass2

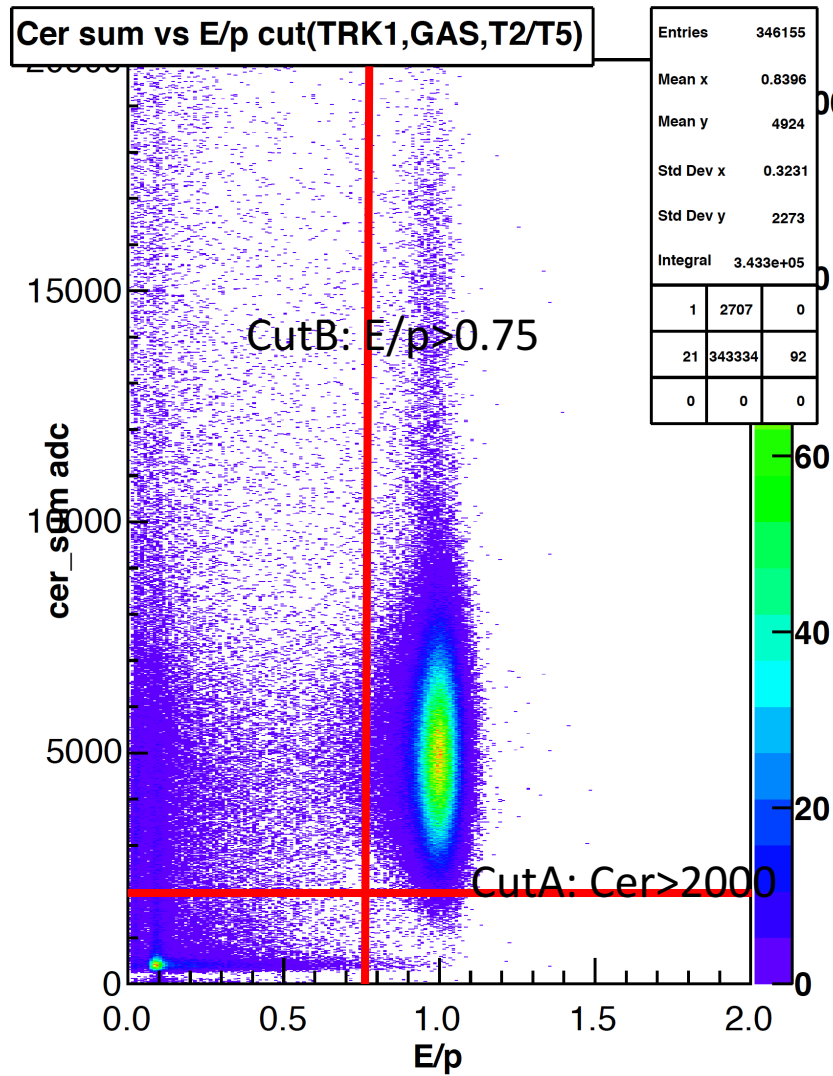
Tong Su

Regular Way to Check PID

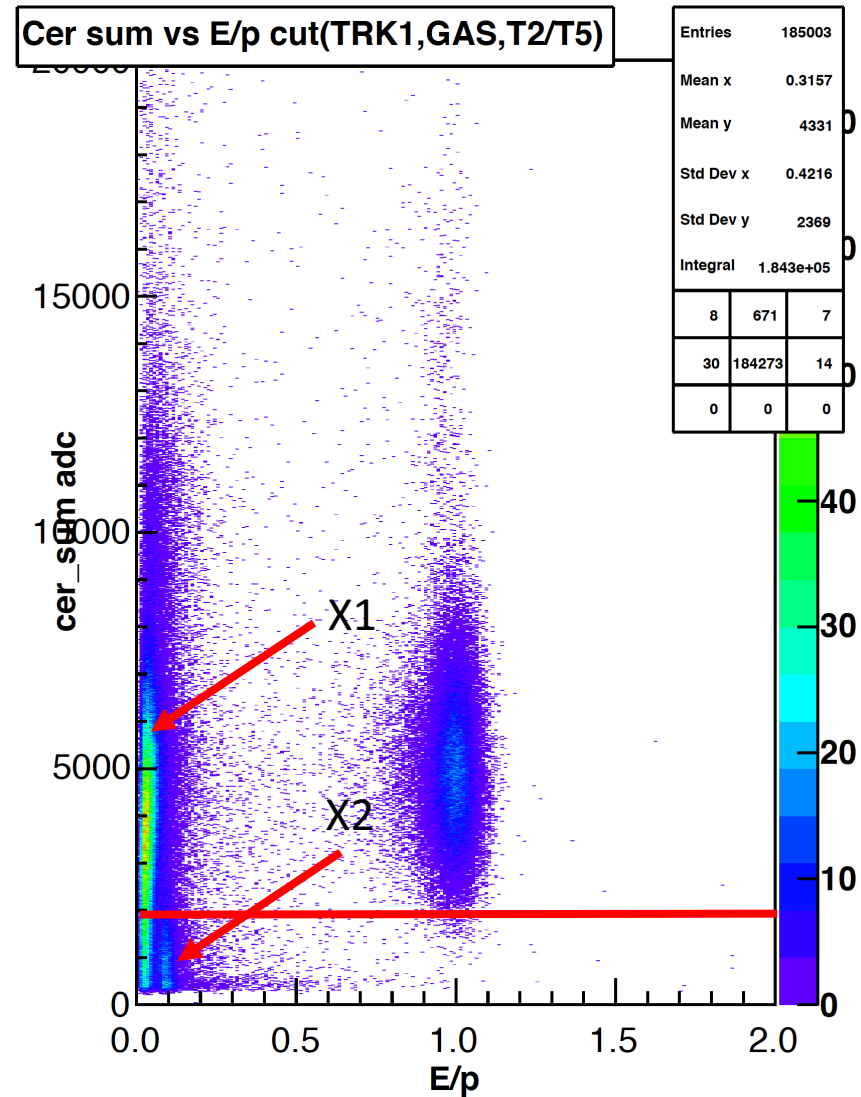
- 2 PID detectors : Cherenkov and Calorimeter
- Both PID detectors should be more sensitive to electron compare with pion
- Select a pure electron /pion sample from one of the detectors and check the performance in the other one

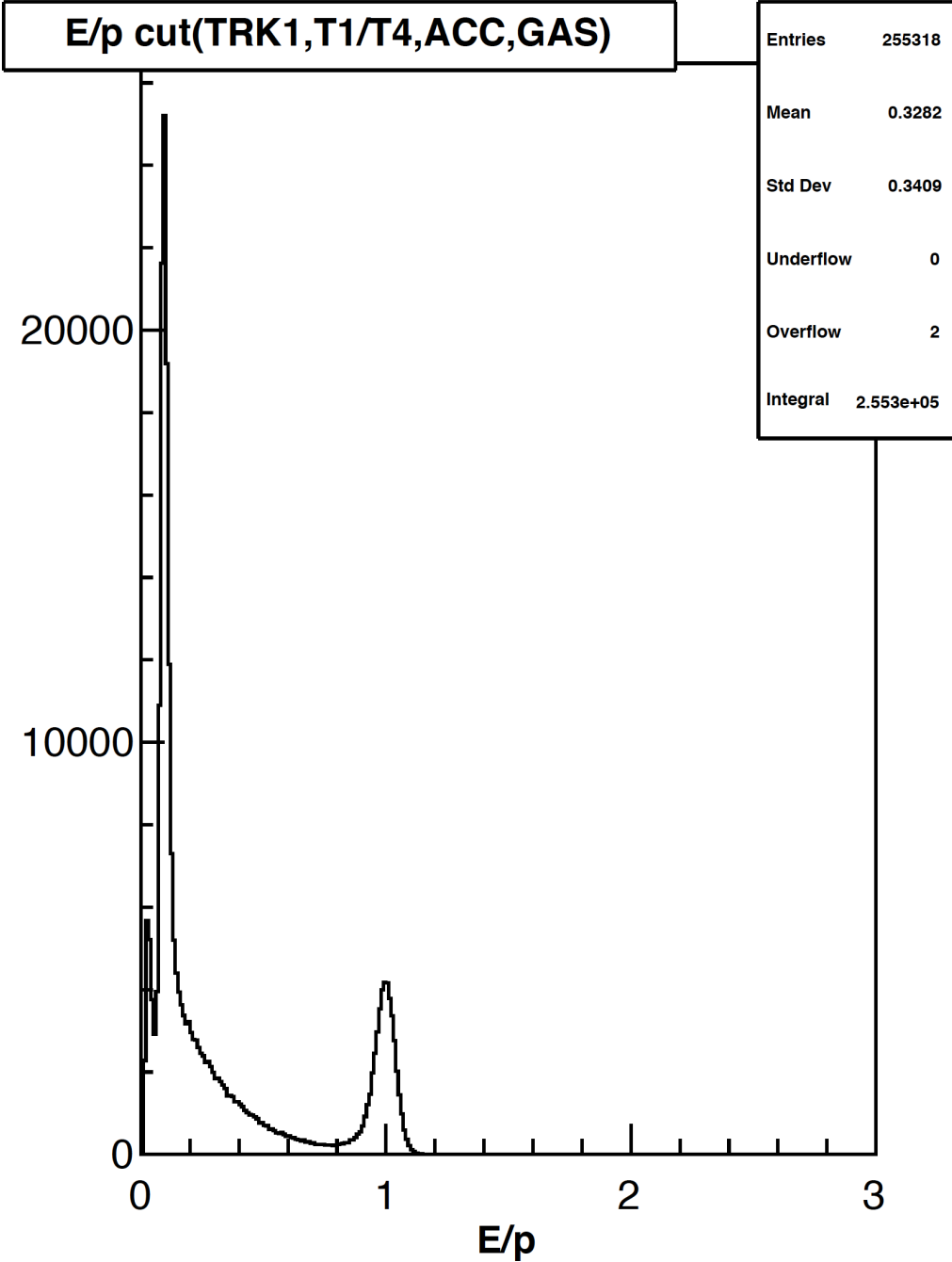
MARATHON PID difficulty

KIN1

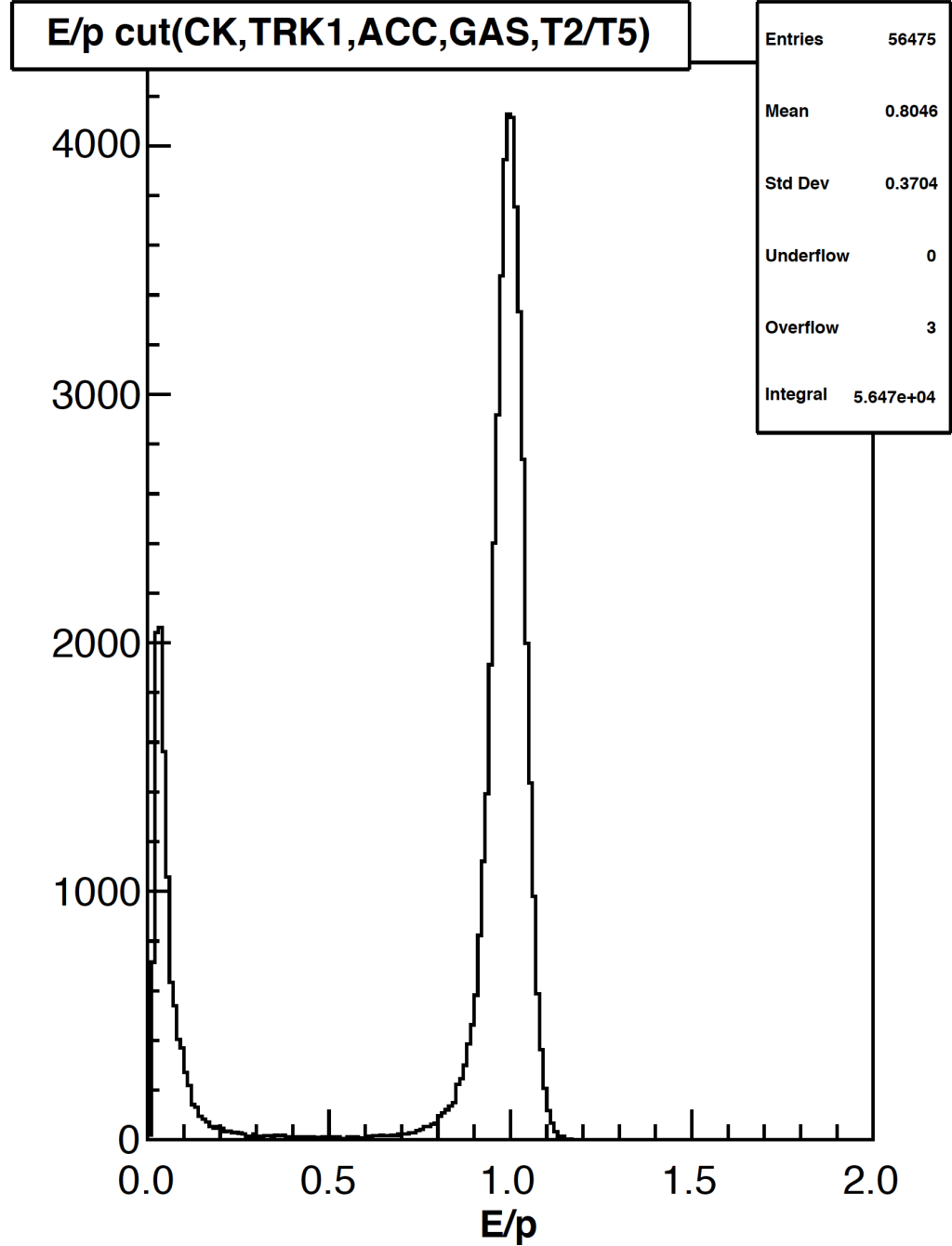


KIN15





3 different Signals can be observed in Calorimeter



Cherenkov cut can suppress on of them

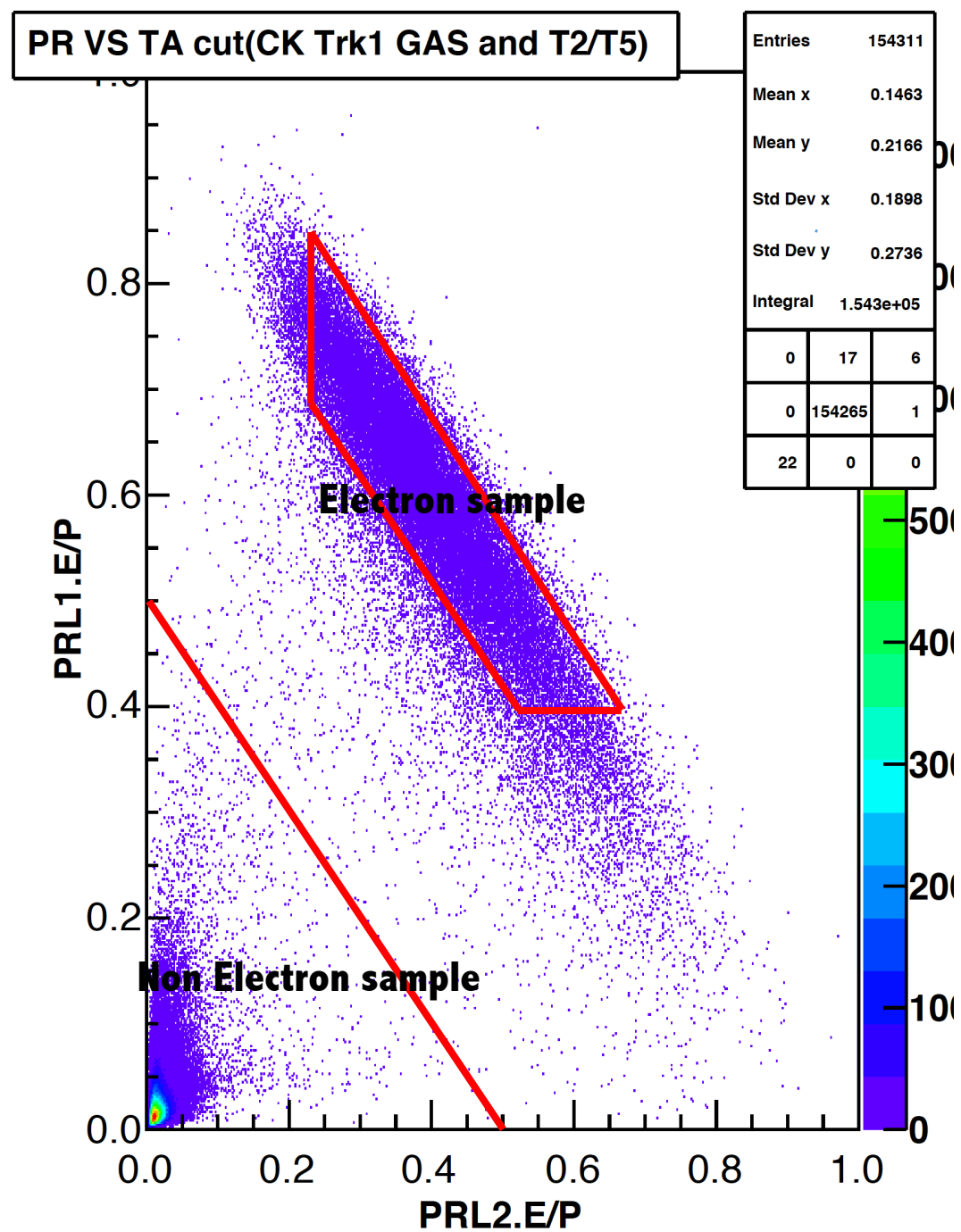
A Compromised Solution

- More than one kind of “particles” can introduce active the Cherenkov

	Cherenkov	Calorimeter
Electron	X	✓
X1	X	difficult
X2	X	difficult

- Treat X1 and X2 as no-electron

	Cherenkov	Calorimeter
electrons	X	✓
Non-electrons	X	✓



A Compromised Solution

- P_x^A : Probability for non – electron pass cer cut
 P_e^A : Probability for electron pass cer cut
 P_x^B : Probability for non – electron pass ep cut
 P_e^B : Probability for electron pass ep cut
- Since clean sample can be selected from Calorimeter, so P_x^A, P_e^A can be calculated
- x : number of non-electrons
- e : number of electrons
- N_i : number of events with different cuts

Cut A	Cut B	Relations *
X	X	$x + e = N_0$
✓	X	$P_x^A x + P_e^A e = N_1$
X	✓	$P_x^B x + P_e^B e = N_2$
✓	✓	$P_x^A P_x^B x + P_e^A P_e^B e = N_4$

← 4 equations to solve 4 Variables

* General Good Electron Cut has been applied

A Compromised Solution

- x : number of non-electrons
- e : number of electrons
- N_i : number of events with different cuts

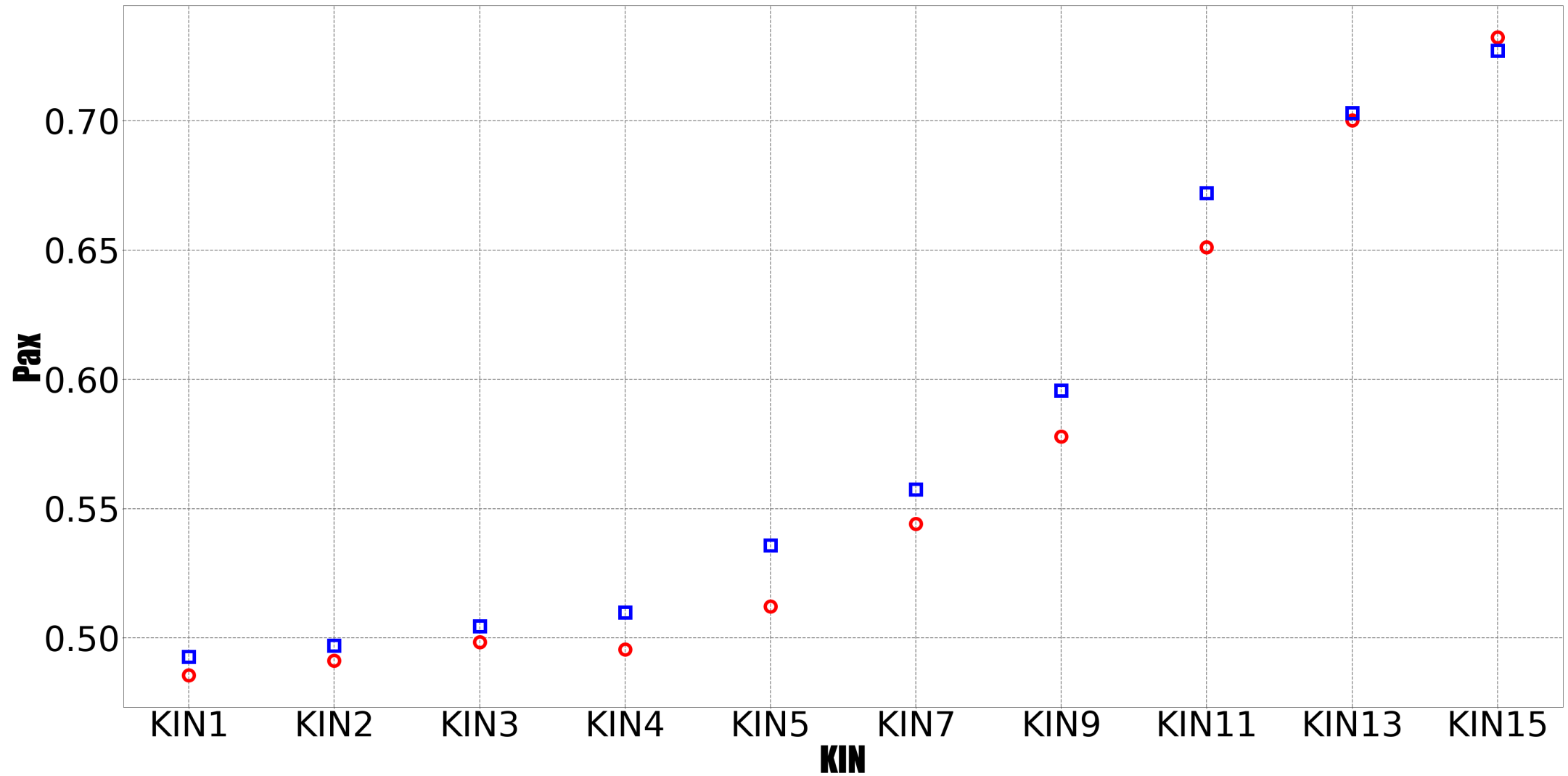
Cut A	Cut B	Relations *
X	X	$x + e = N_0$
✓	X	$P_x^A x + P_e^A e = N_1$
X	✓	$P_x^B x + P_e^B e = N_2$
✓	✓	$P_x^A P_x^B x + P_e^A P_e^B e = N_4$

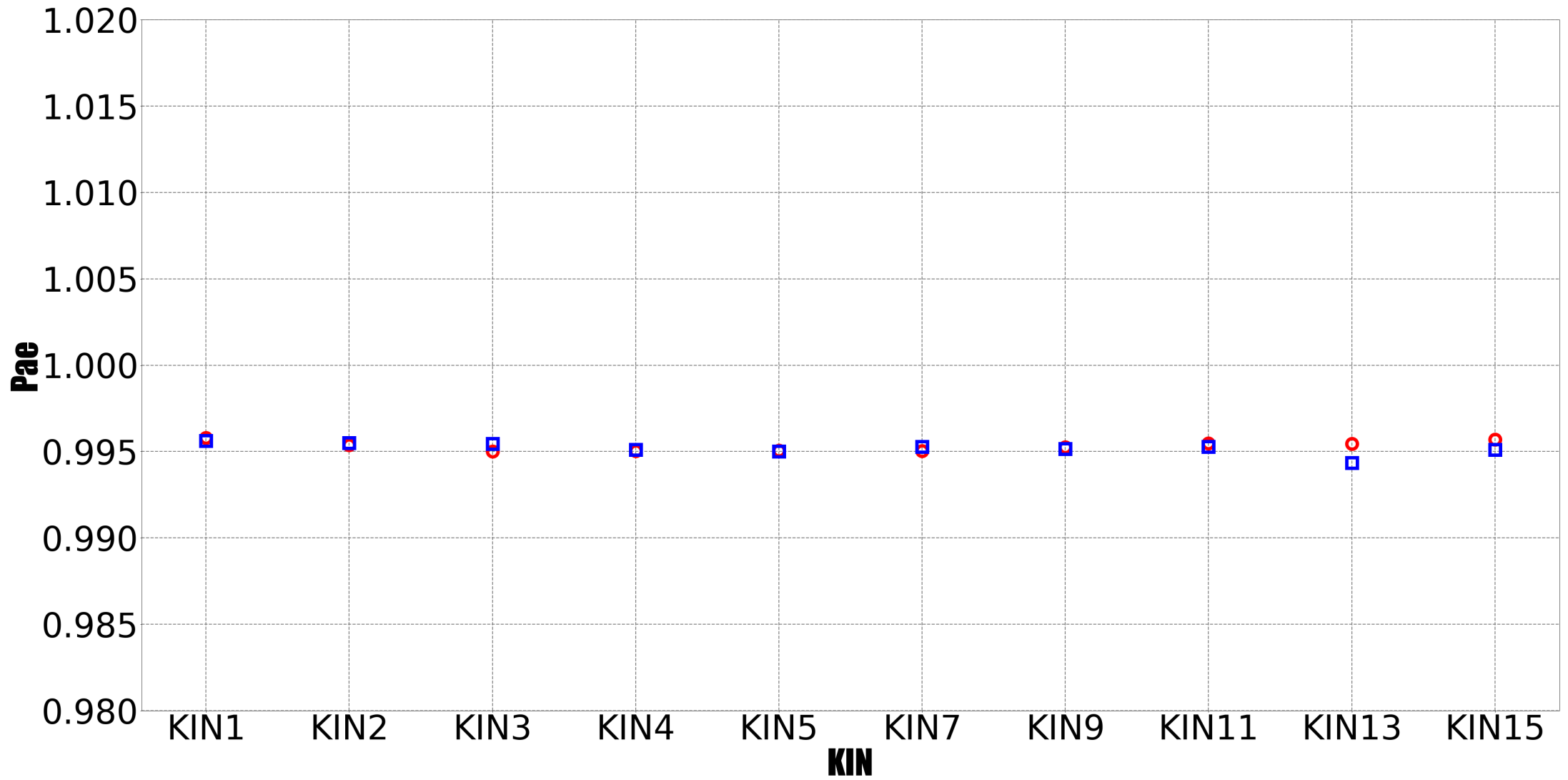
← 4 equations to solve 4 Variables

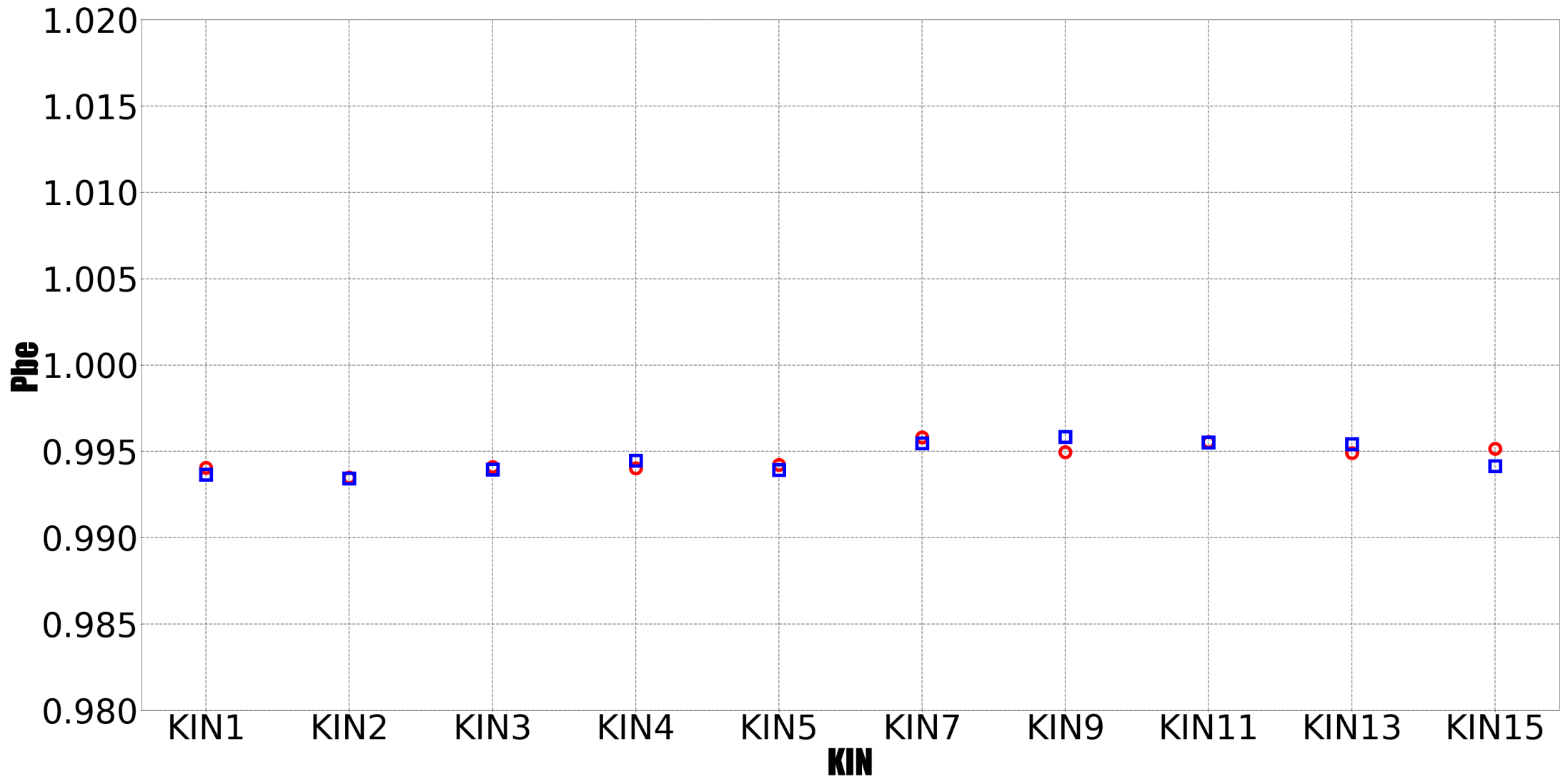
* General Good Electron Cut has been applied

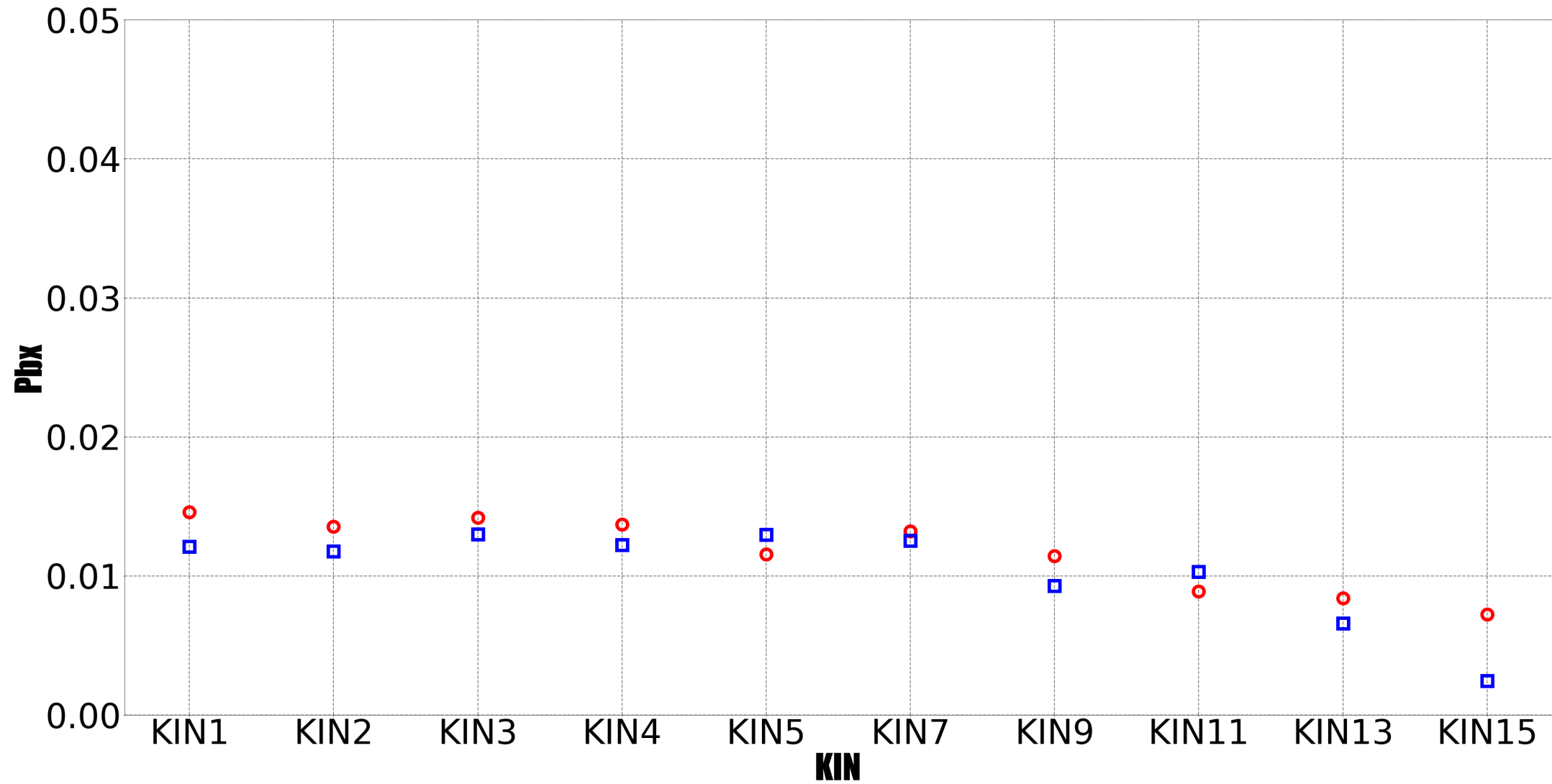
Blue Marker: Helium-3

Red Marker: Tritium





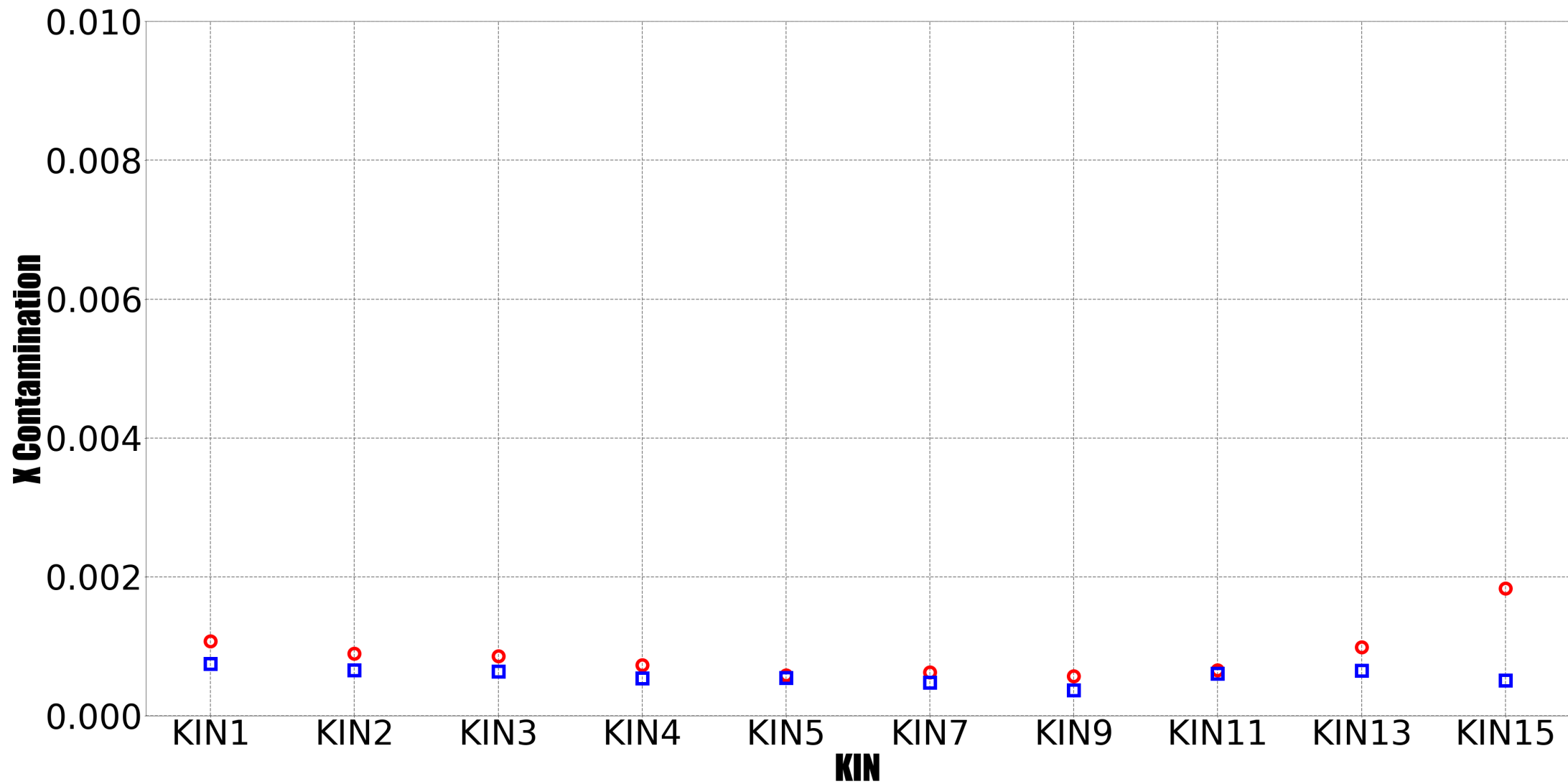




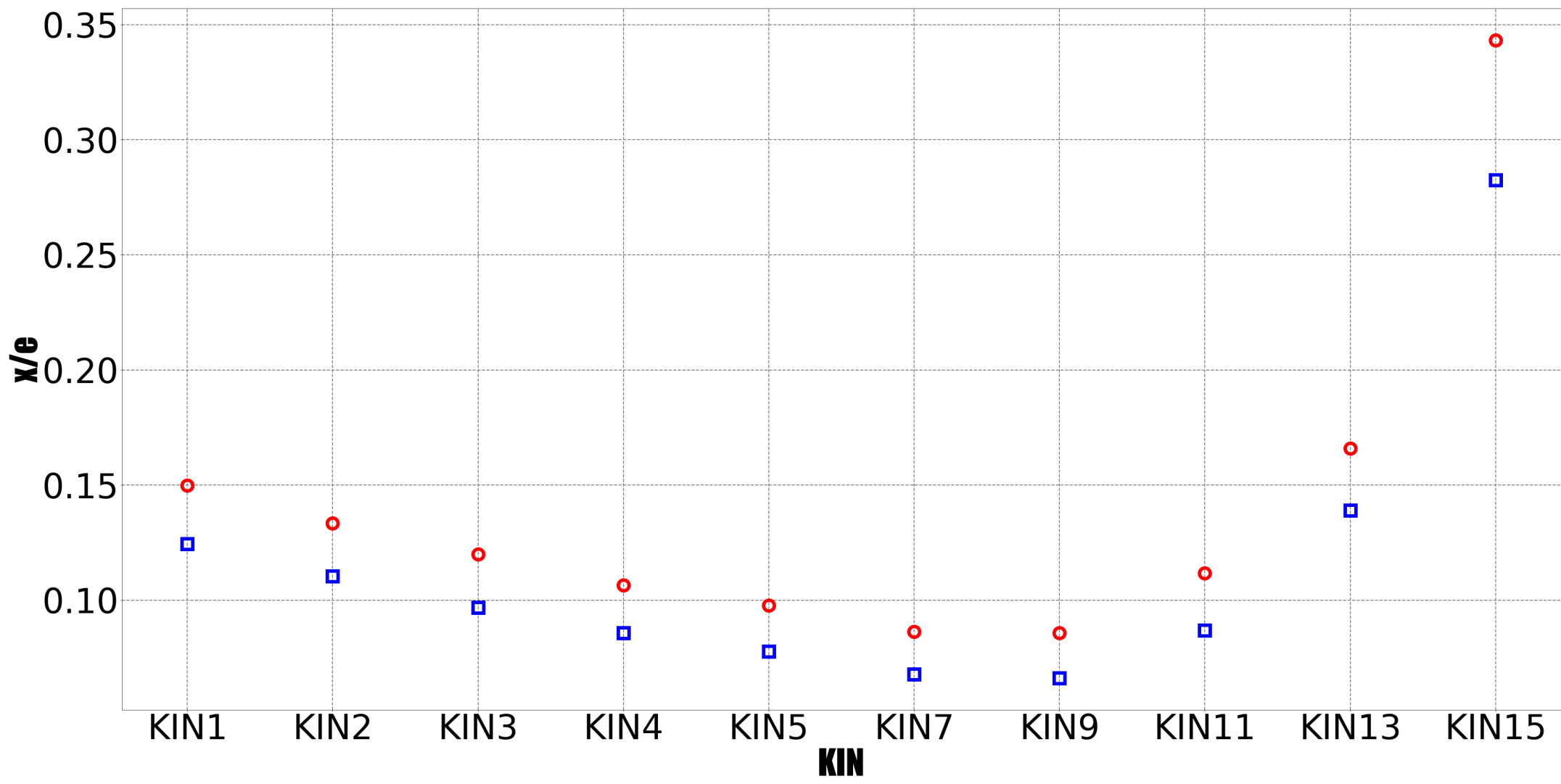
True_electron=e*Pae*Pbe

False_electron=x*Pax*Pbx

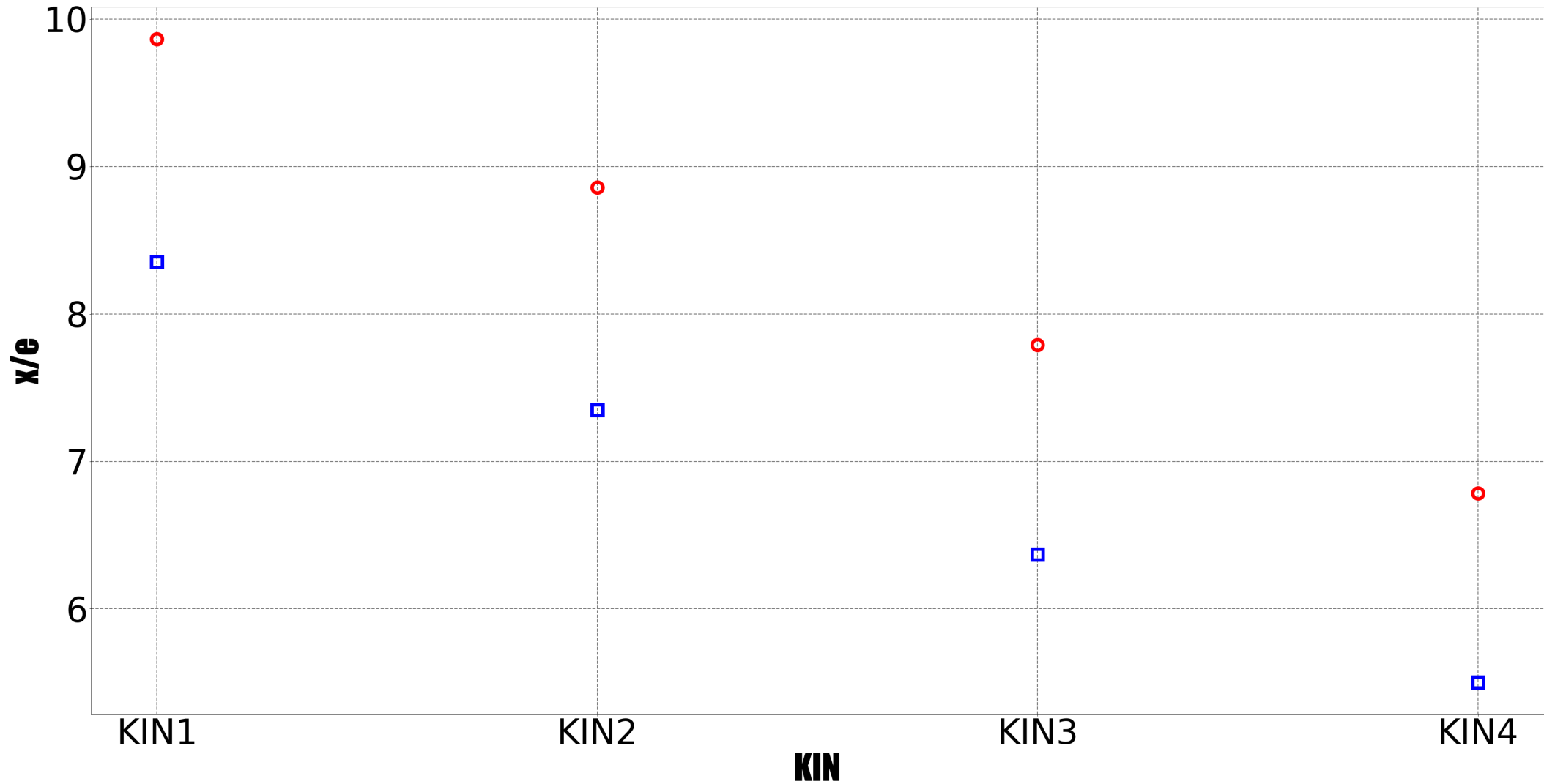
X Contamination=False_electron/True_electron



x/e under T2 trigger



x/e under T1 trigger



Some other **update** for pass2

- Pass2 update:
 - LHRS Optics (Jason)
 - Raster/ Eloss (Tyler & Rey)
 - New PRL calibration (Mike)
- All the pass1 analysis repeated to the pass2 data
 - Positron/ECC
 - Cross section ratio
- Statistic increase around 2% for LHRS data and literally nothing else change so far