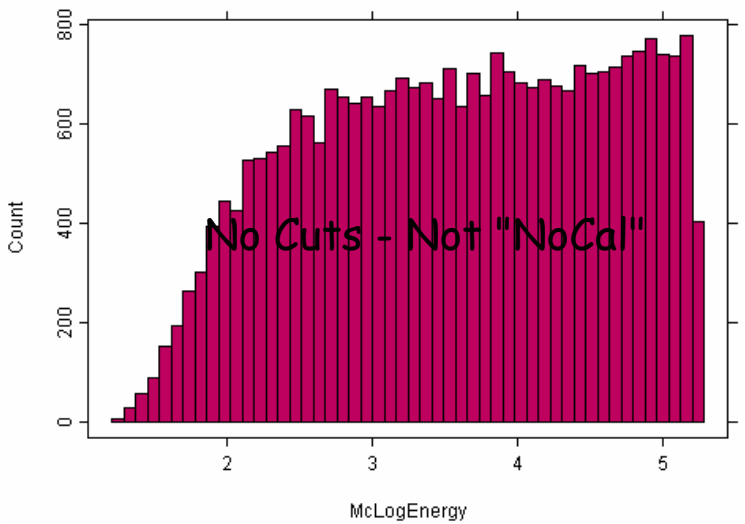
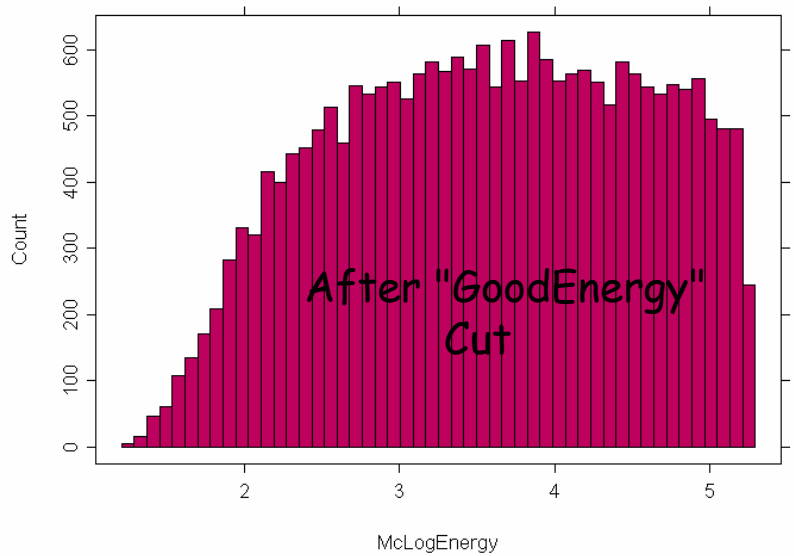
Update on Rome Results

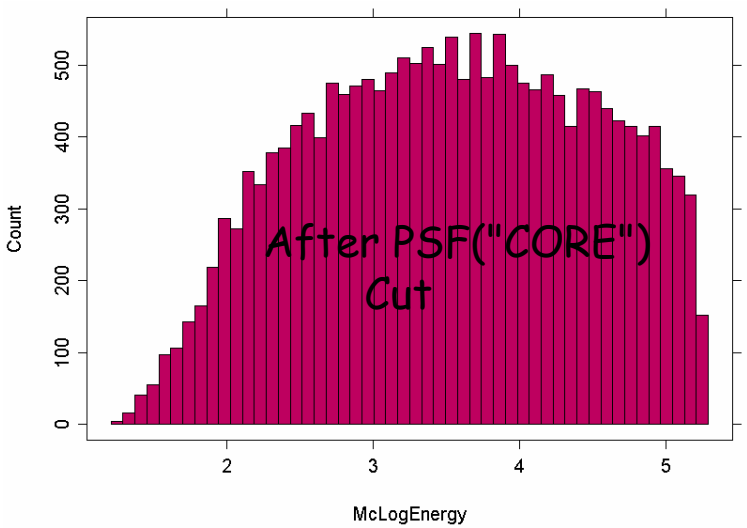
Agenda

- A_{eff} Fall-off past 10 GeV
- V3R3P7 Classification Trees
- Covariance Scaled PSFs
- Pair Energies

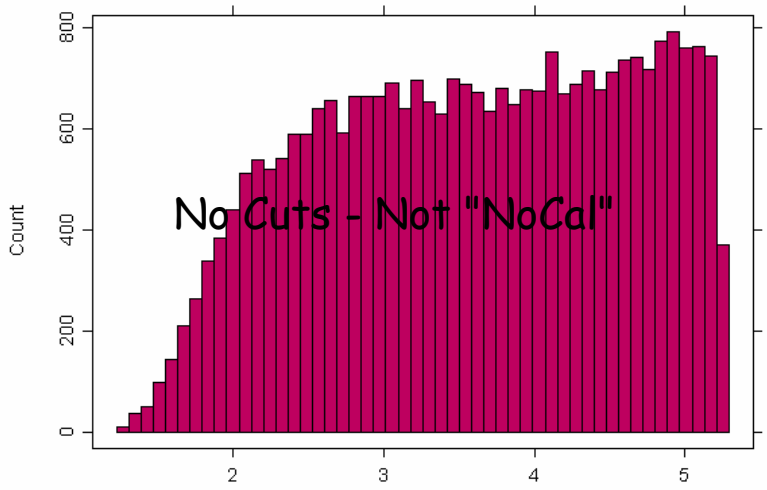
A_{eff} Fall-off

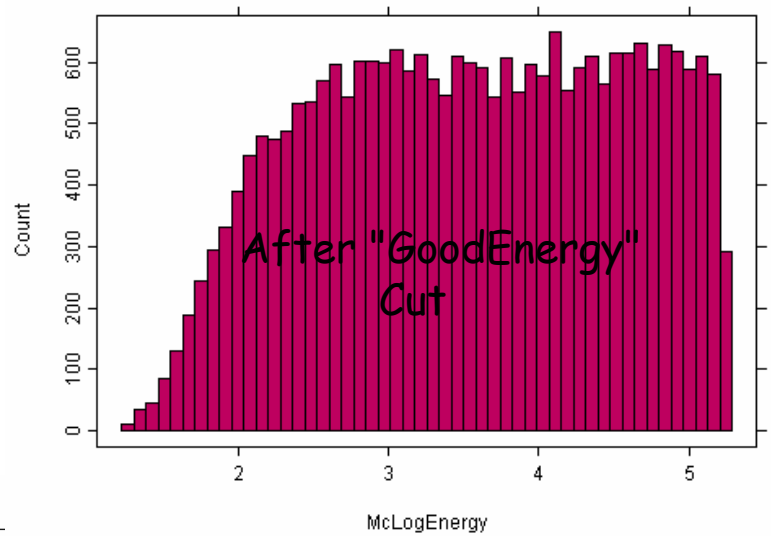




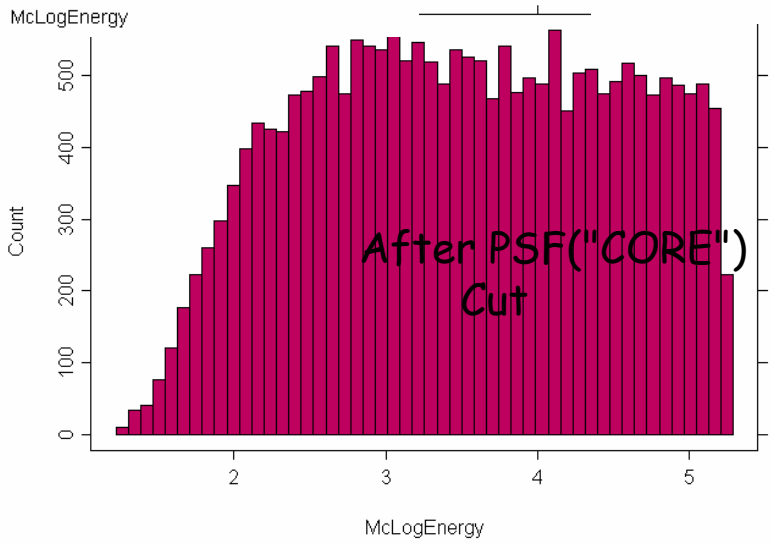


A_{eff} Post New Cts



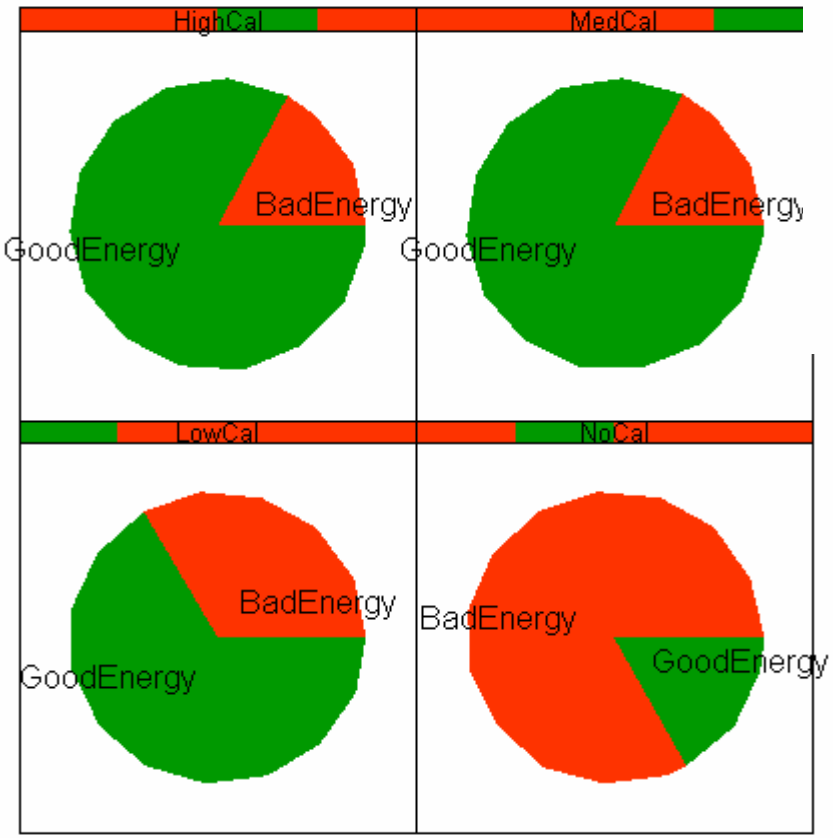


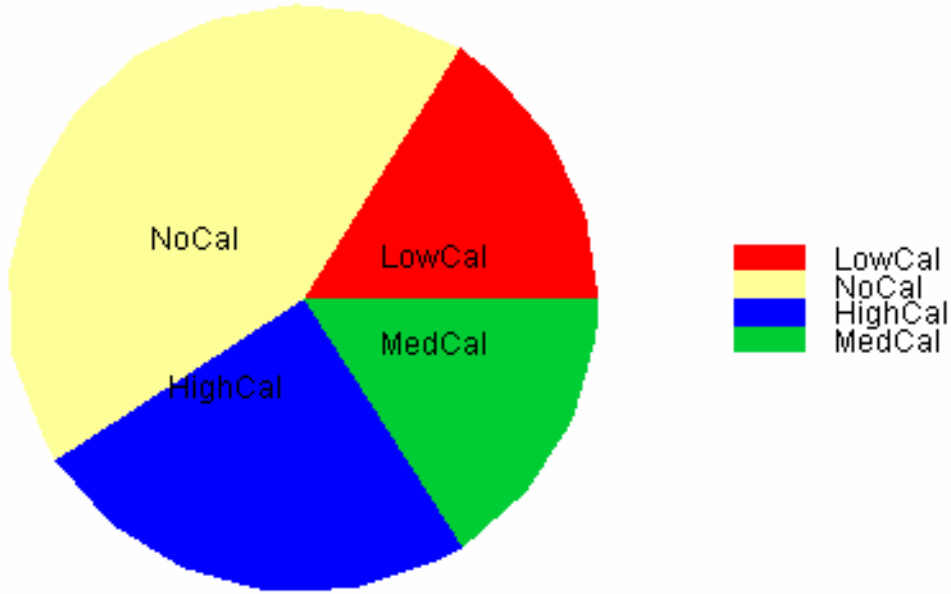
ea - SR Cuts



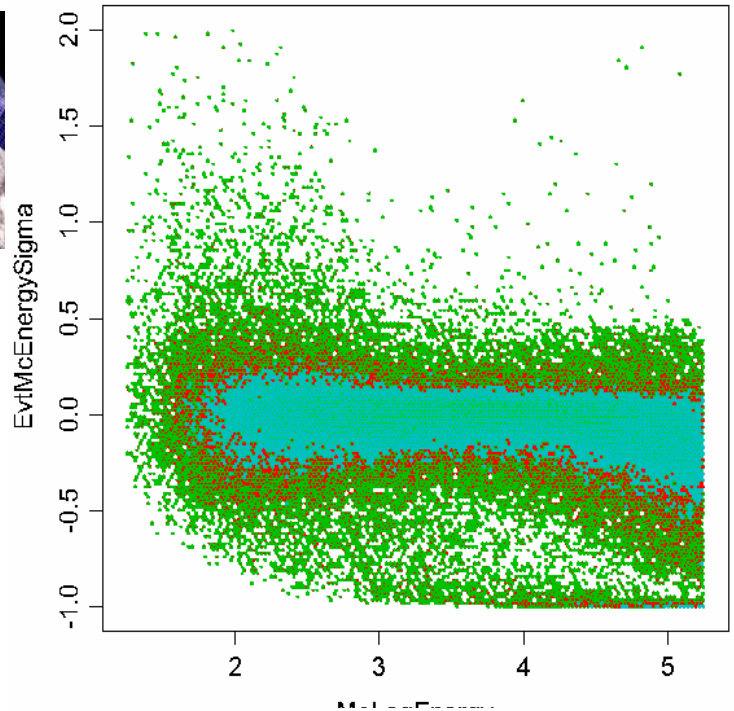
Energy Cts

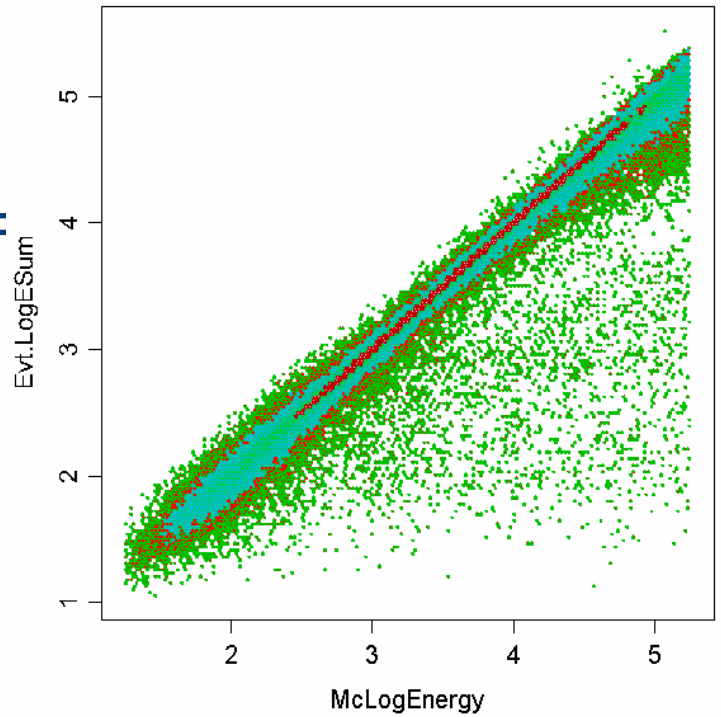
NoCal: < 2 r.l. or < 5 MeV
LowCal: < 350 MeV
MedCal: < 3500 MeV
HighCal: > 3500 MeV

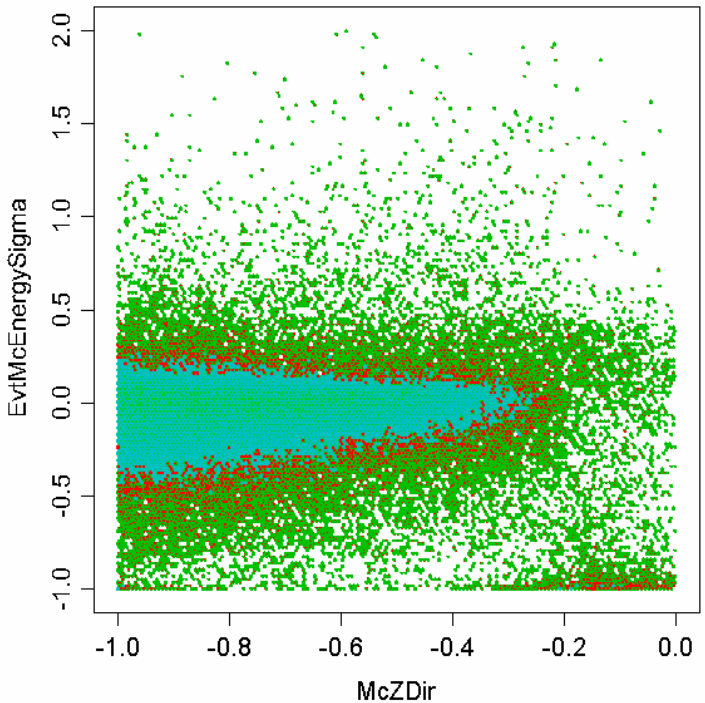


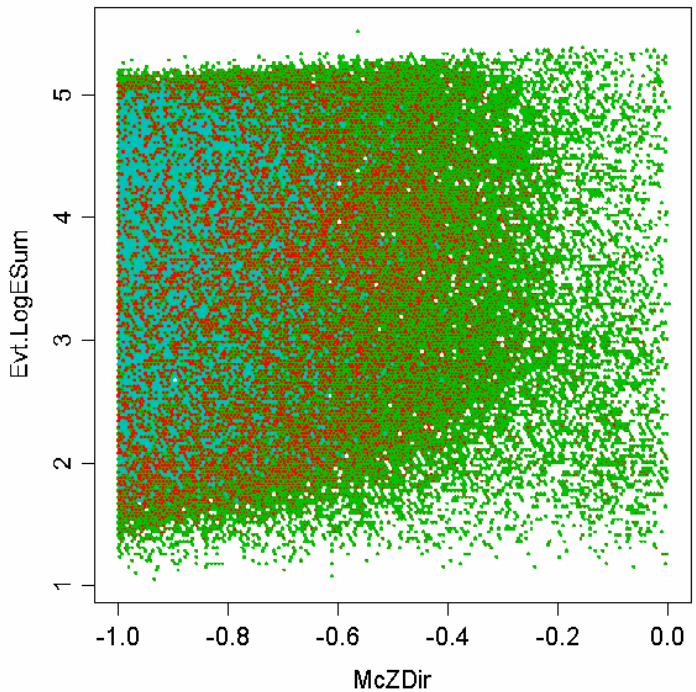


CAL Energy Def's and Good/Bad Breakdown

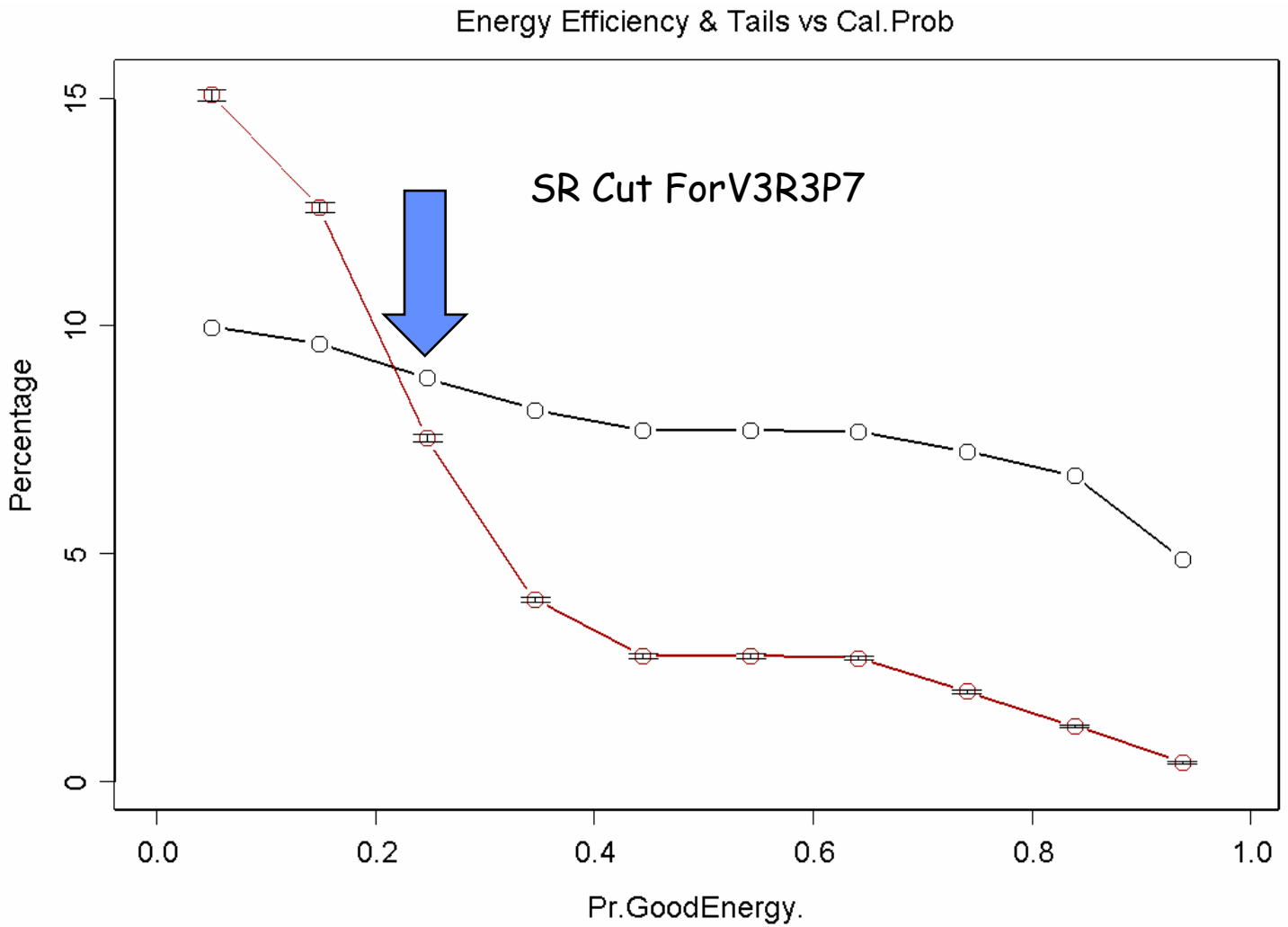

EvtMcEnergySigma
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
2
3
4
5


Evt.LogESum
5
4
3
2
1
2
3
4
5
McLogEnergy


EvtMcEnergySigma
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.0
-0.8
-0.6
-0.4
-0.2
0.0
McZDir

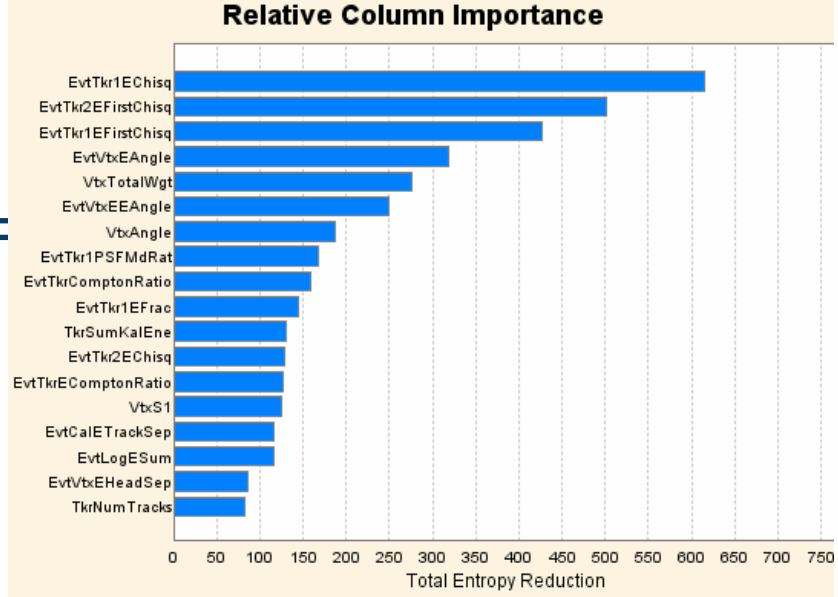

Evt.LogESum
5
4
3
2
1
-1.0
-0.8
-0.6
-0.4
-0.2
0.0
McZDir

Energy Cts Summary Plot



Thin VTX/1Tkr Tree

Energy Selection:
GoodE.Prob > .20
+ Standard Cleaning
(See Rome Talk)



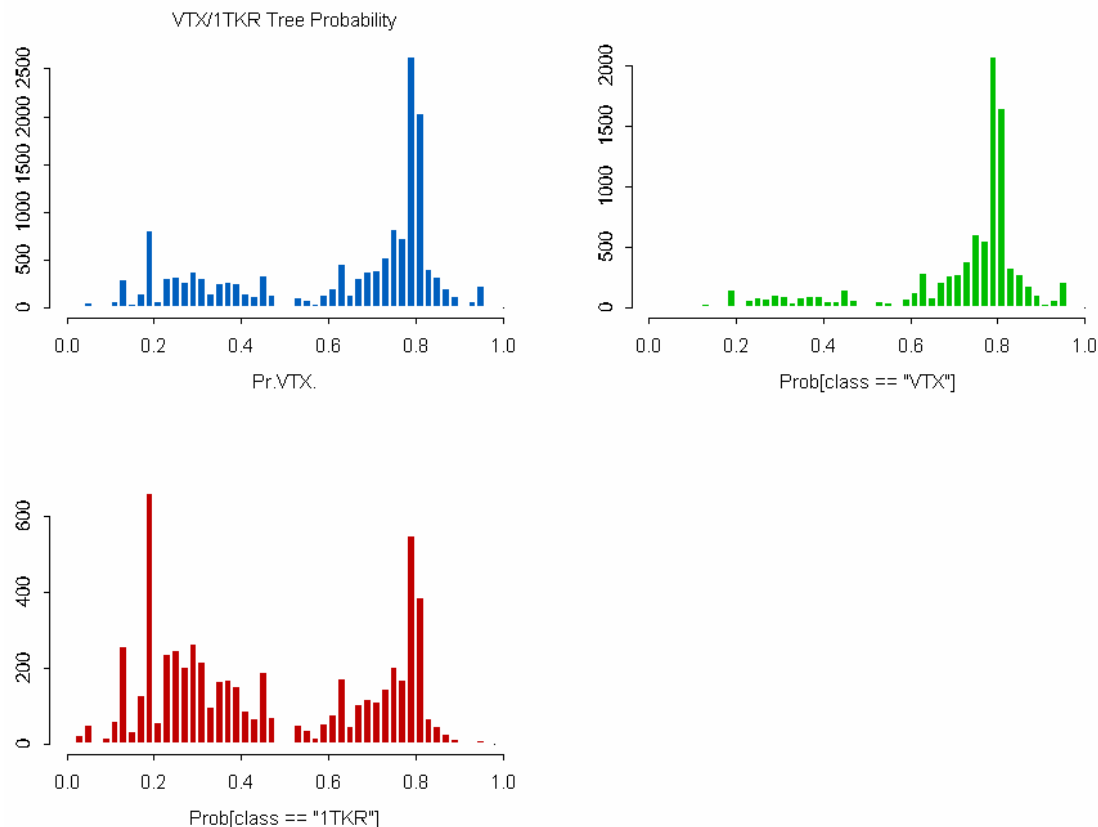
Input Node - VTX/1Tkr

		Predicted		Totals
		1TKR	*VTX*	
Observed	*1TKR*	3474	2429	5903
	VTX	1360	8017	9377
Totals		4834	10446	15280

	Observed		Overall
	1TKR	*VTX*	
% Agree	*58.9%*	*85.5%*	*75.2%*

Positive Category - VTX

Recall	Precision	F-Measure
85.5%	*76.7%*	*80.9%*



Thin VTX Core

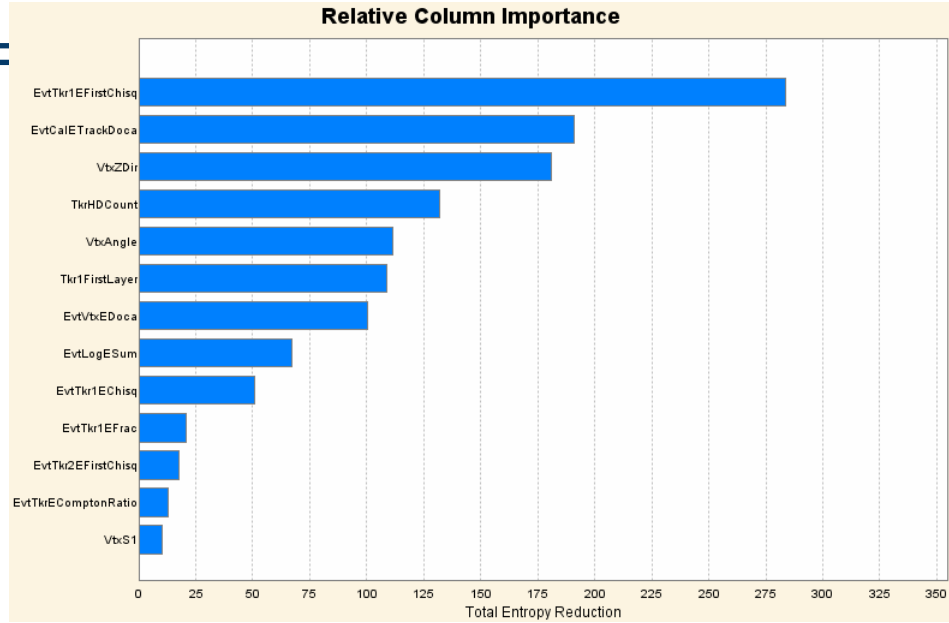
Input Node -

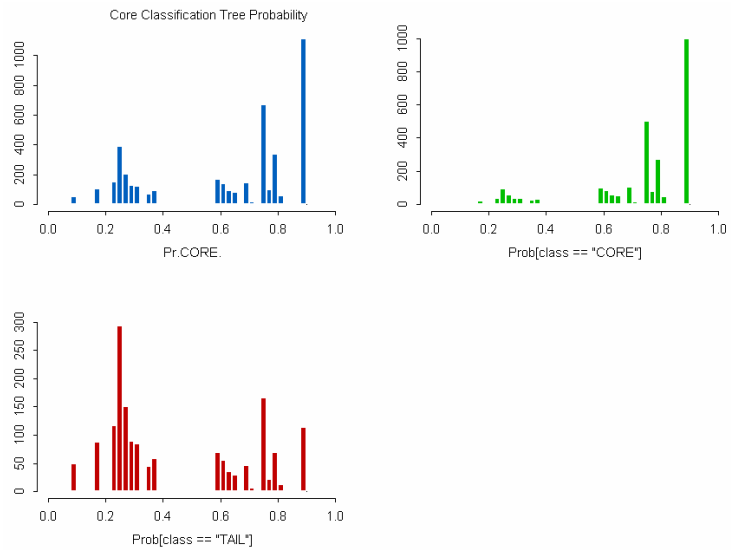
		Predicted		Totals
		TAIL	CORE	
Observed	TAIL	973	626	1599
	CORE	344	2311	2655
Totals		1317	2937	4254

	Observed		Overall
	TAIL	CORE	
% Agree	60.9%	87.0%	77.2%

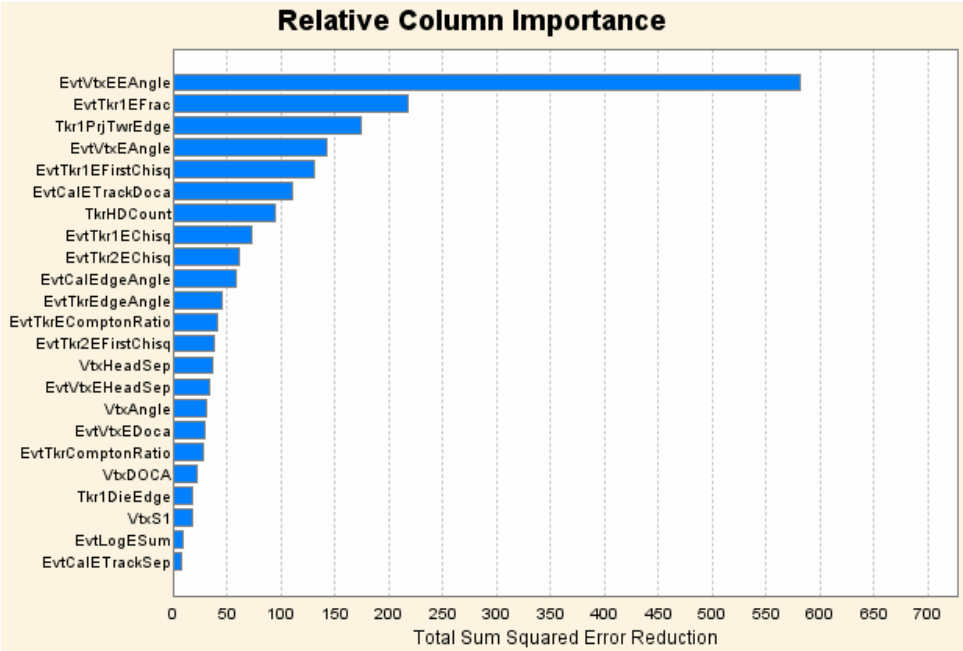
Positive Category - CORE

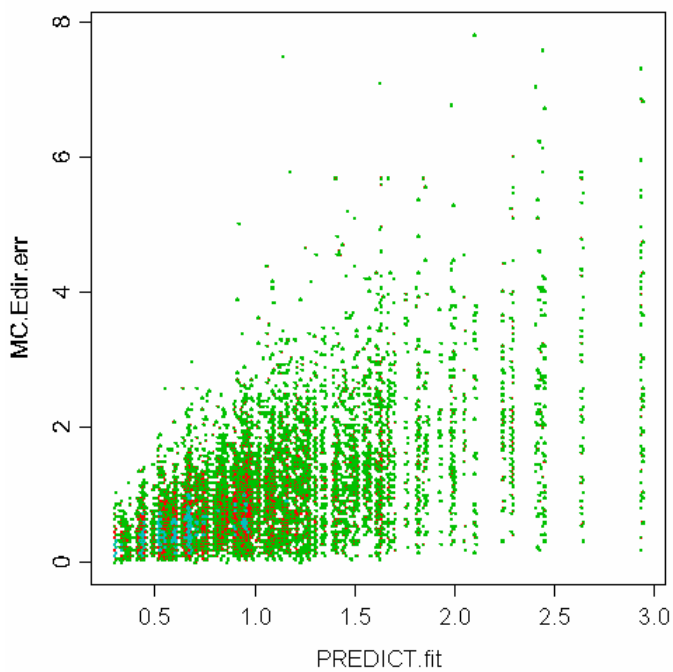
Recall	Precision	F-Measure
87.0%	78.7%	82.7%





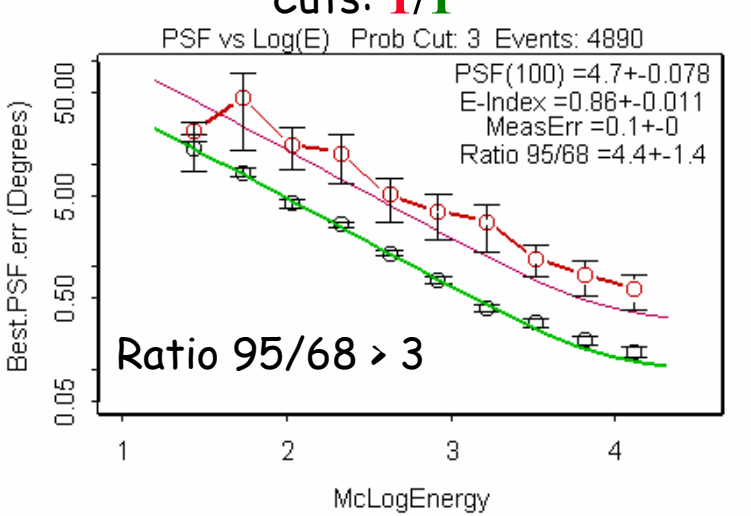
Thin VTX Regression - Prediction



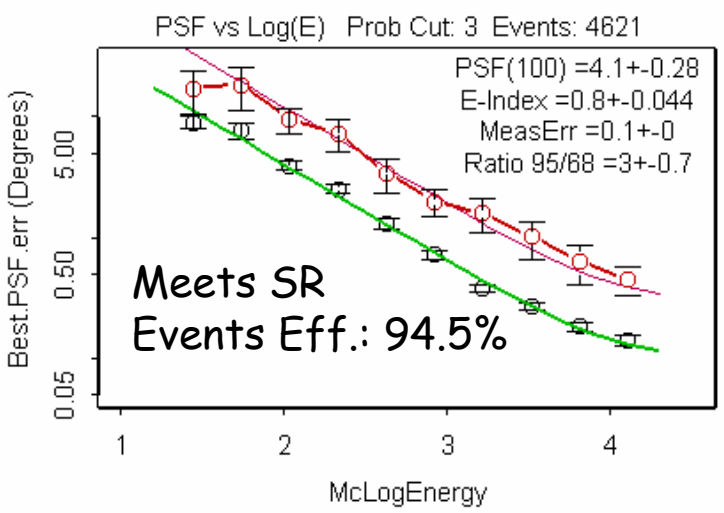


Rome: Thin PSF's - Integrated over FoV
4 Combinations of Cuts *(CORE/Pred)*

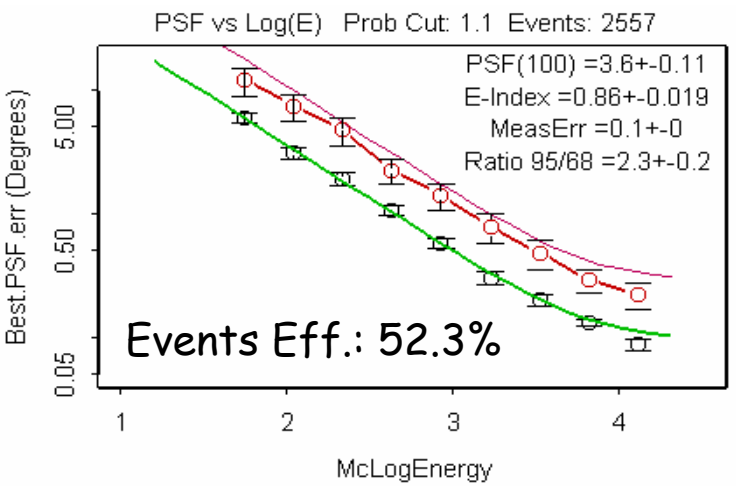
Cuts: 1/1



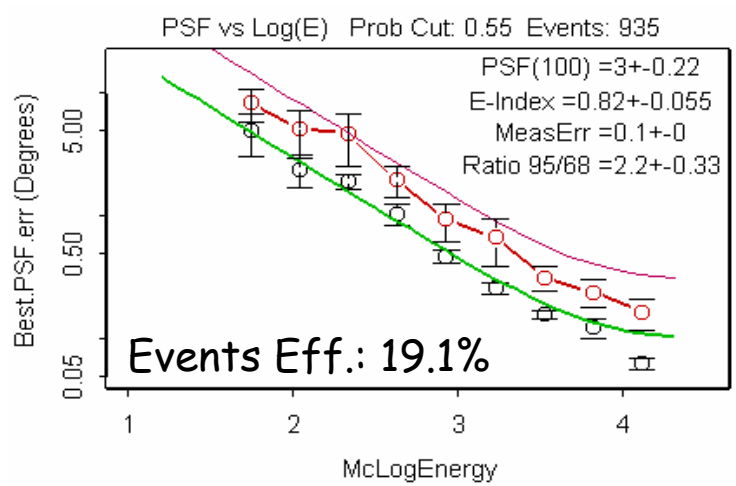
Cuts: 2/1



Cuts: 3/2

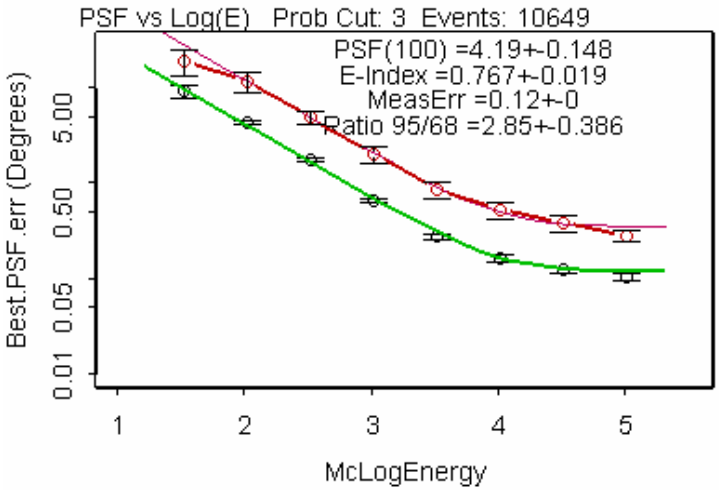


Cuts: 3/4

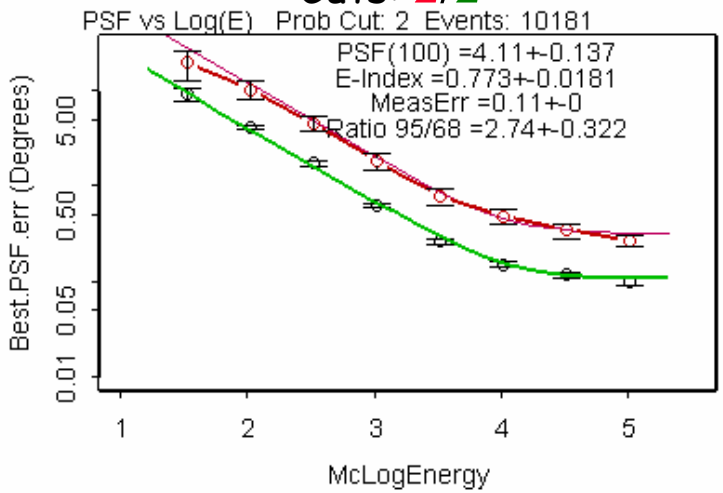


Post-Rome: Thin PSF's - Integrated over FoV
4 Combinations of Cuts *(1-CORE/4-Pred)*

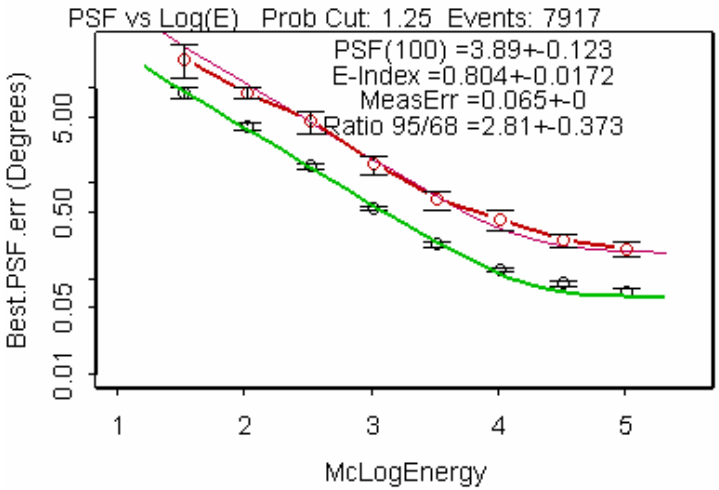
Cuts: 2/1



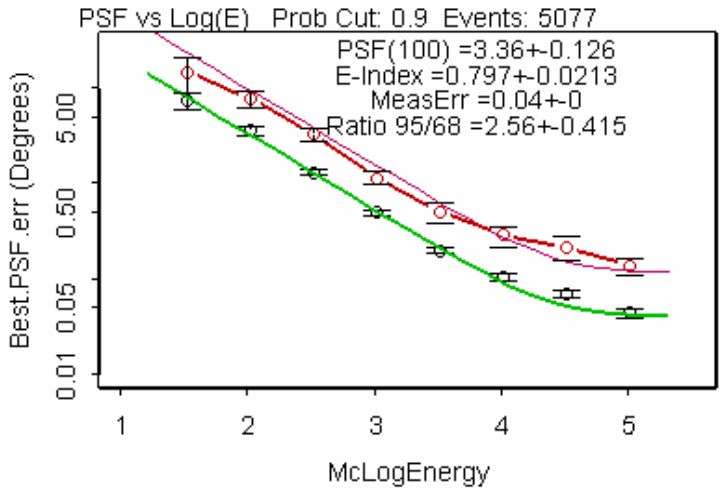
Cuts: 2/2



Cuts: 2/3



Cuts: 2/4



Covariance Scaled PSF's

(from Covariance.ppt presentation to Analysis Group, July, 2003)

A bit of math then shows that:

$$\sigma_\theta^2 = \cos^4(\theta)\left(\cos^2(\phi)C_{xx} + 2\sin(\phi)\cos(\phi)C_{xy} + \sin^2(\phi)C_{yy}\right)$$

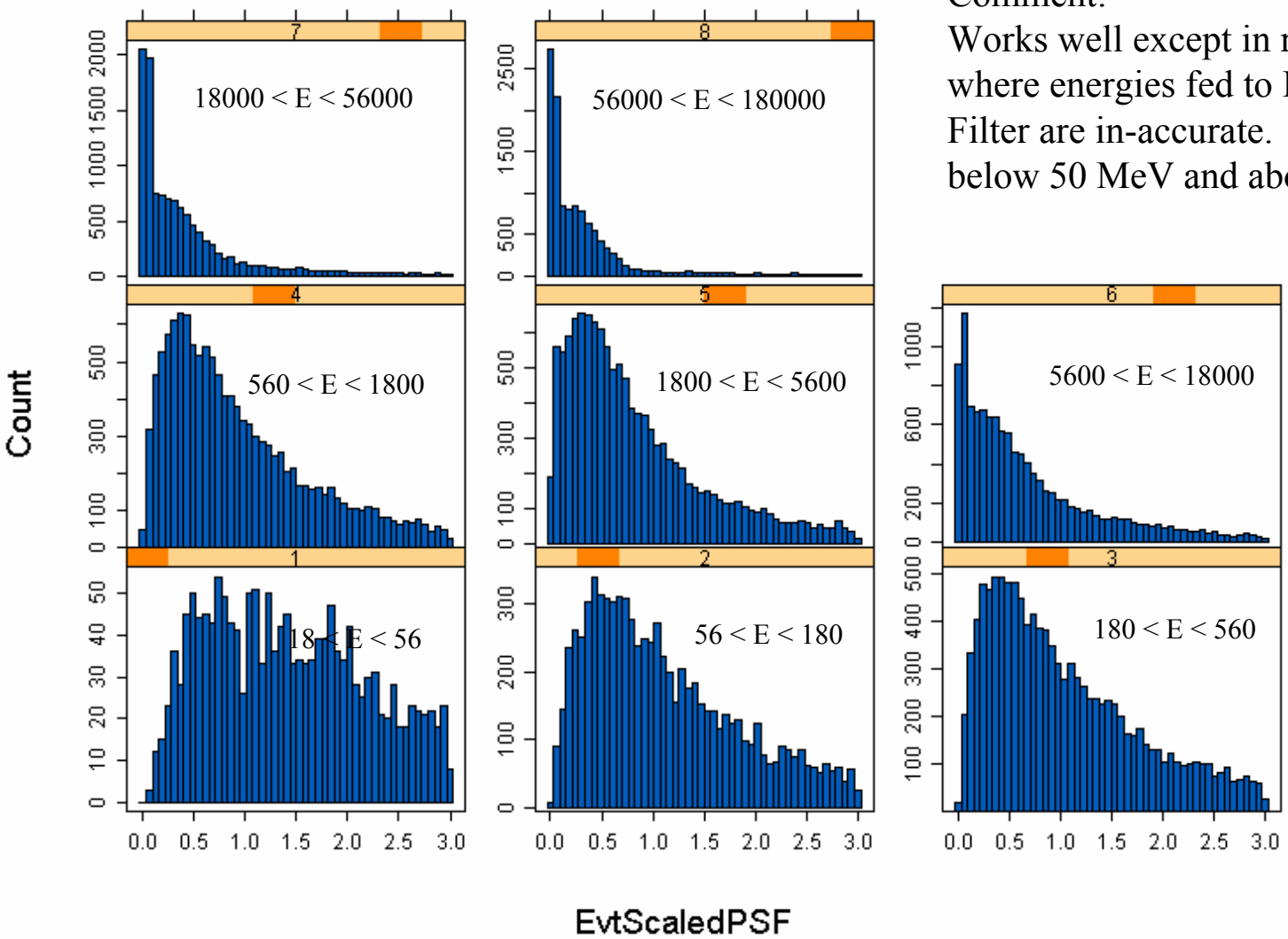
and

$$\sigma_\phi^2 = \frac{1}{\tan^2(\theta)}\left(\sin^2(\phi)C_{xx} + 2\sin(\phi)\cos(\phi)C_{xy} + \cos^2(\phi)C_{yy}\right)$$

Definitions: $$\text{EvtScaledPSF} \equiv \frac{\text{McDirErr}}{\sqrt{\text{Tkr1ThetaErr}^2 + \text{Tkr1PhiErr}^2}}$$

Where all the variables come from the Merit-ntuple.
(See my covariance ppt for details on Tkr1ThetaErr and Tkr1PhiErr - these are derived from the covariance matrix elements event-by-event)

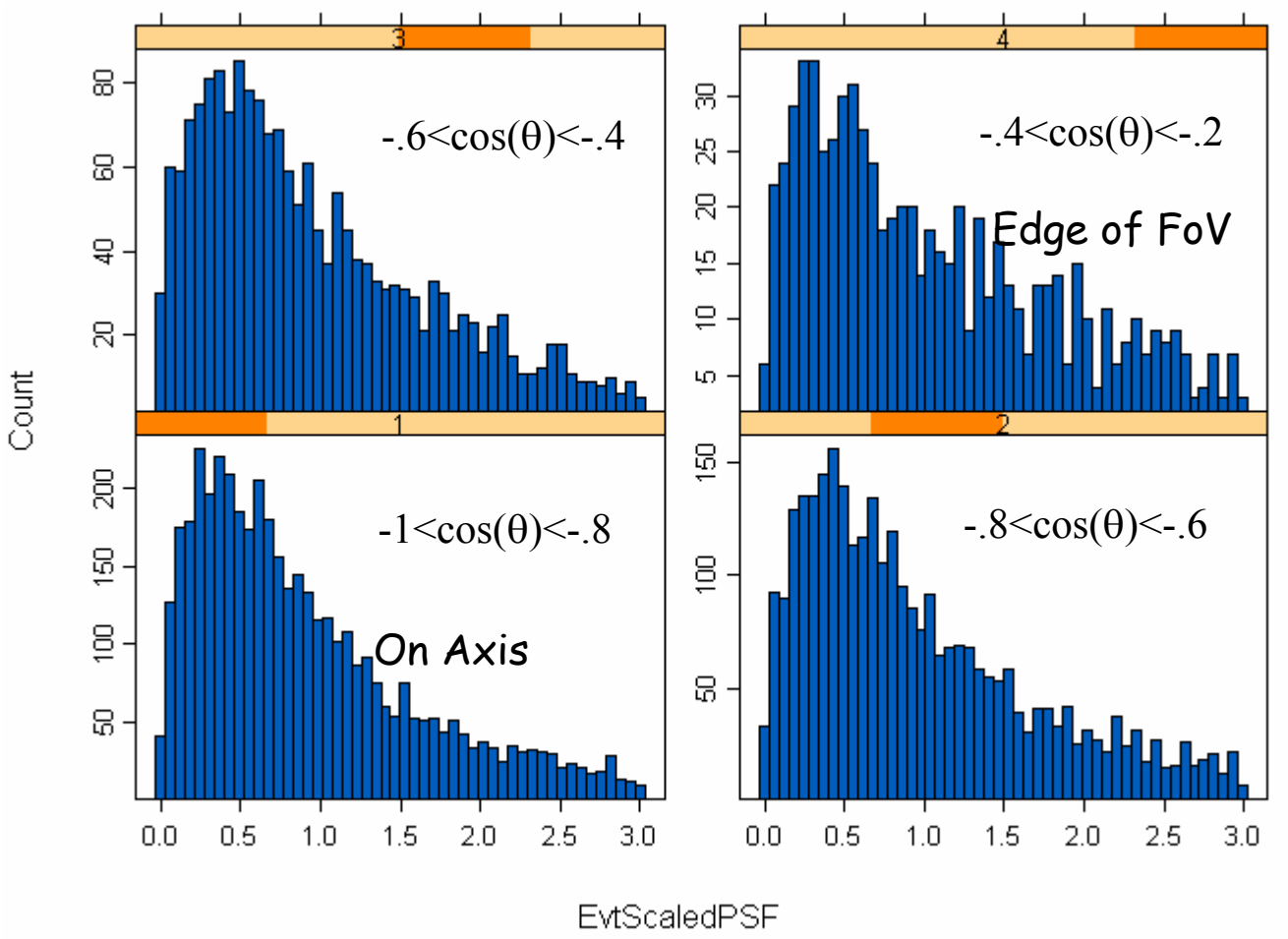
Scaled PSFs: Energy Dependence



Comment:
Works well except in regions where energies fed to Kalman Filter are in-accurate. Specifically below 50 MeV and above 10 GeV

Scaled PSFs: Angle Dependence

McEnergy < 10000 MeV



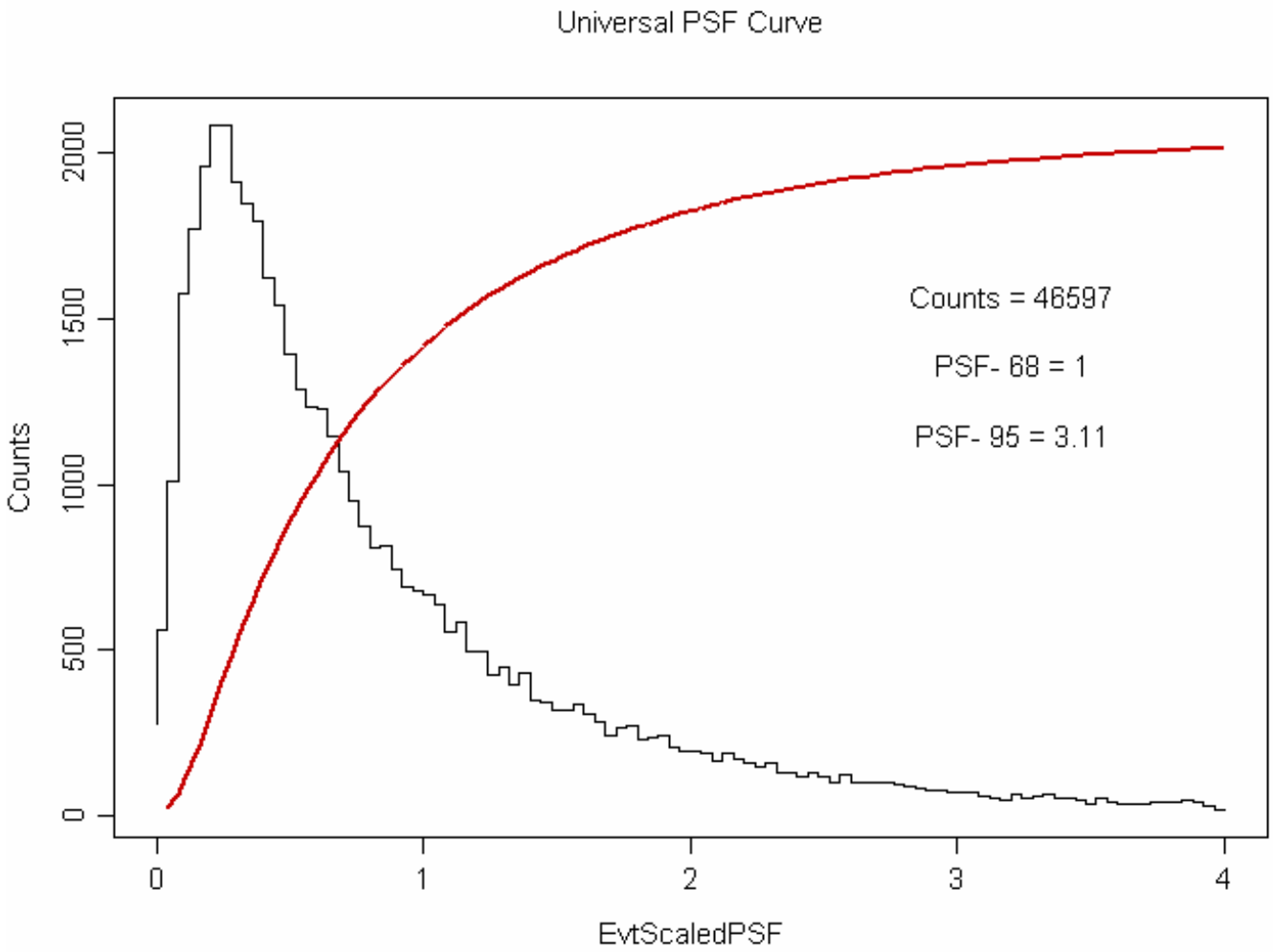
Universal PSF Curve???

1) Scale Factors adjusted to 2.38 & 3.36 Thin / Thick respectively

2) IMcoreProb > .2 &
IMpsfErrPred < 3.
(SR cuts)

3) Energy cut:
.5 <Tkr1ConEne/EvtEnergySumOpt < 1.

Note: This cuts out almost 1/2 the data !!!! (44.4%)

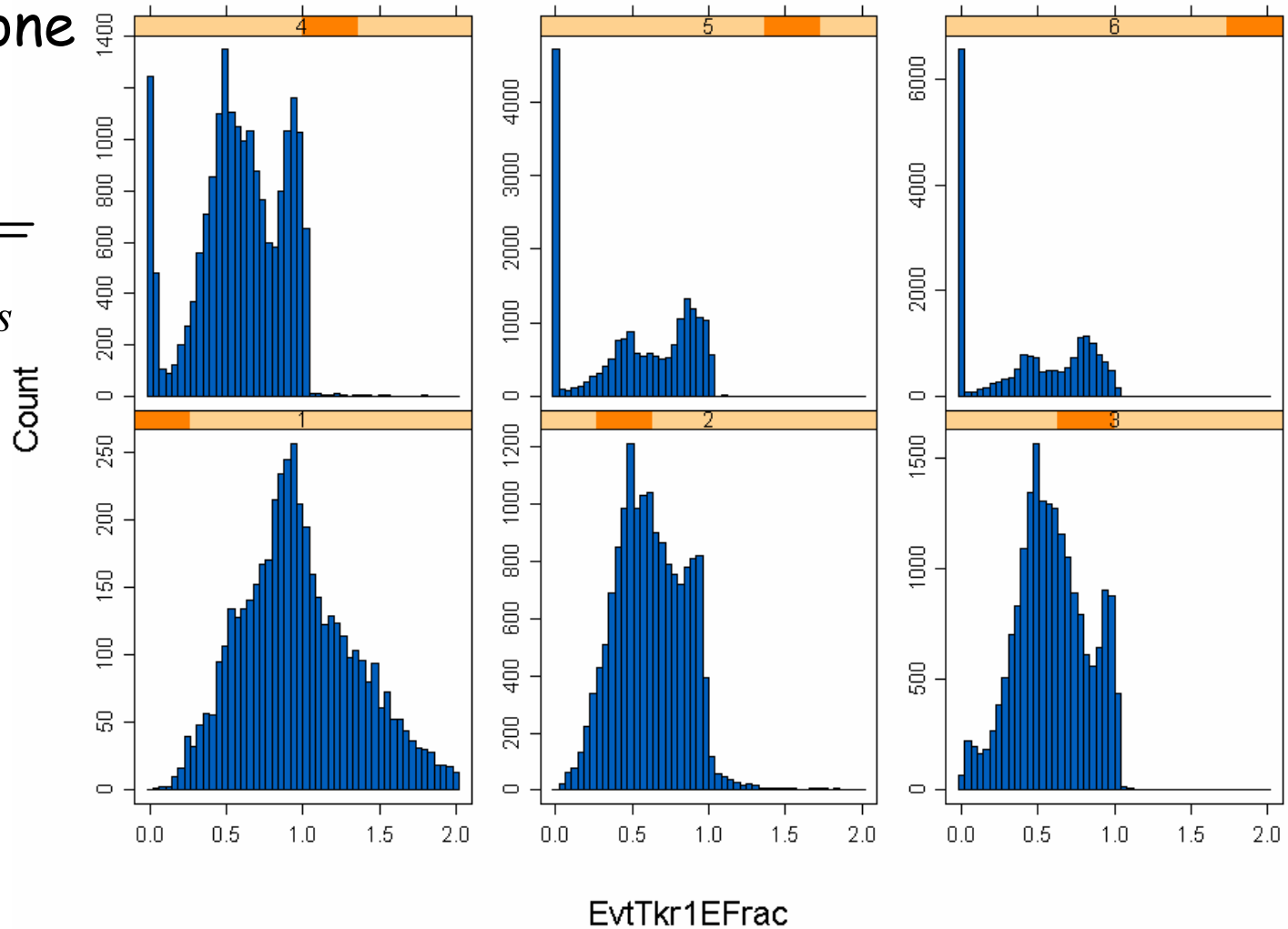


Pair Energies: The Missing Half

Optimization done in

$$\sigma_E \approx \frac{1}{\sqrt{N_{Kinks}}}$$

Only Valid Region: [.5, 1.)



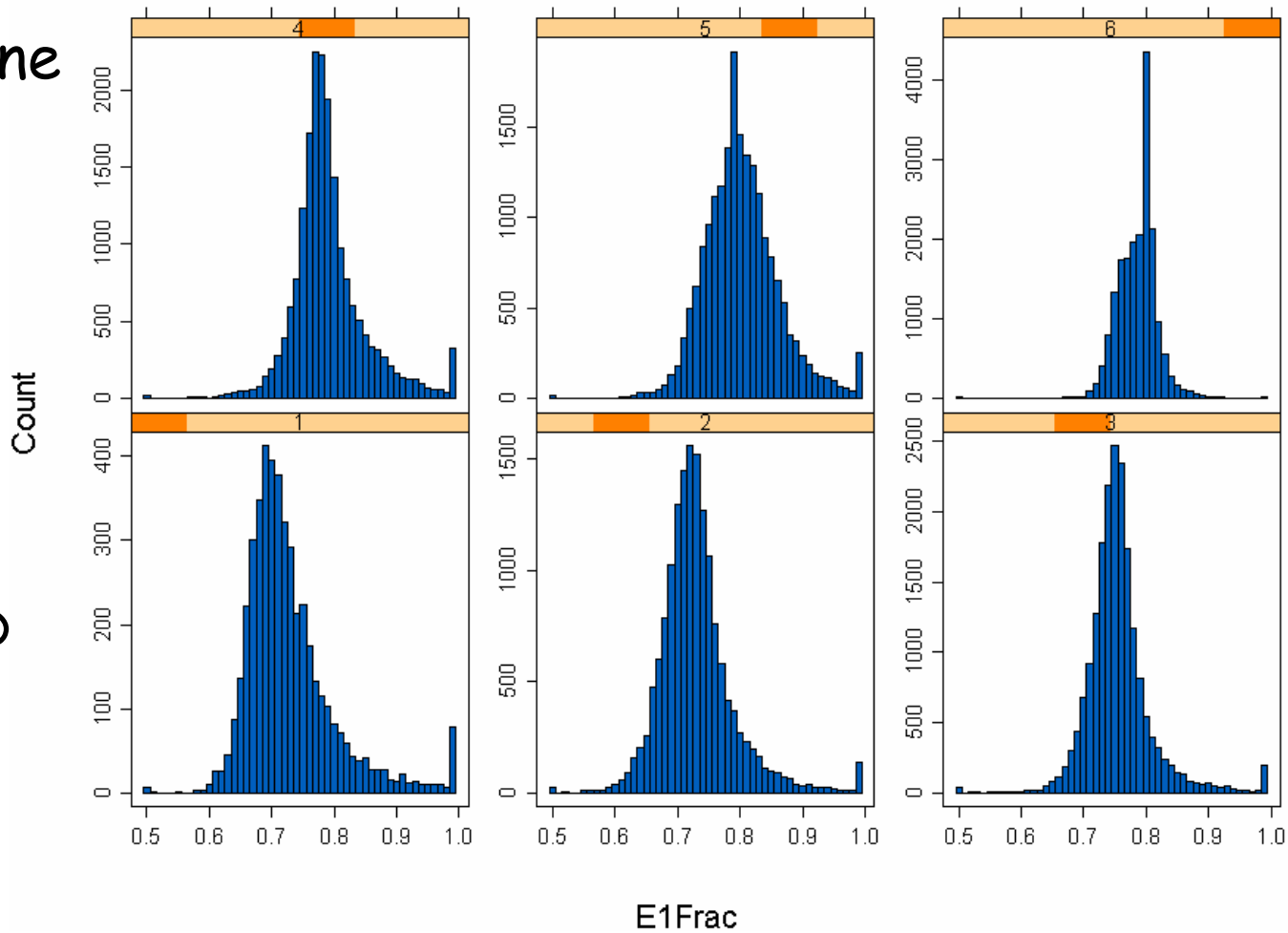
Pair Energies: The Missing Half (2)

Optimization done in

$$\sigma_{1/E} \approx \frac{1}{\sqrt{N_{Kinks}}}$$

&

Consraint to QED



Post Rome: Next Steps

1) Use EvtEnergySumOpt for constraint energy

2) Try 1/E optimization - shouldn't be worse then the present situation.

3) Fit Shower Model Leakage parameters out past 180 GeV.