Vista@CDF
Broad Search for New Physics in 1 fb^{-1} of Tevatron Data

Pheno 07

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Madison, WI

Georgios Choudalakis, MIT

for the CDF collaboration

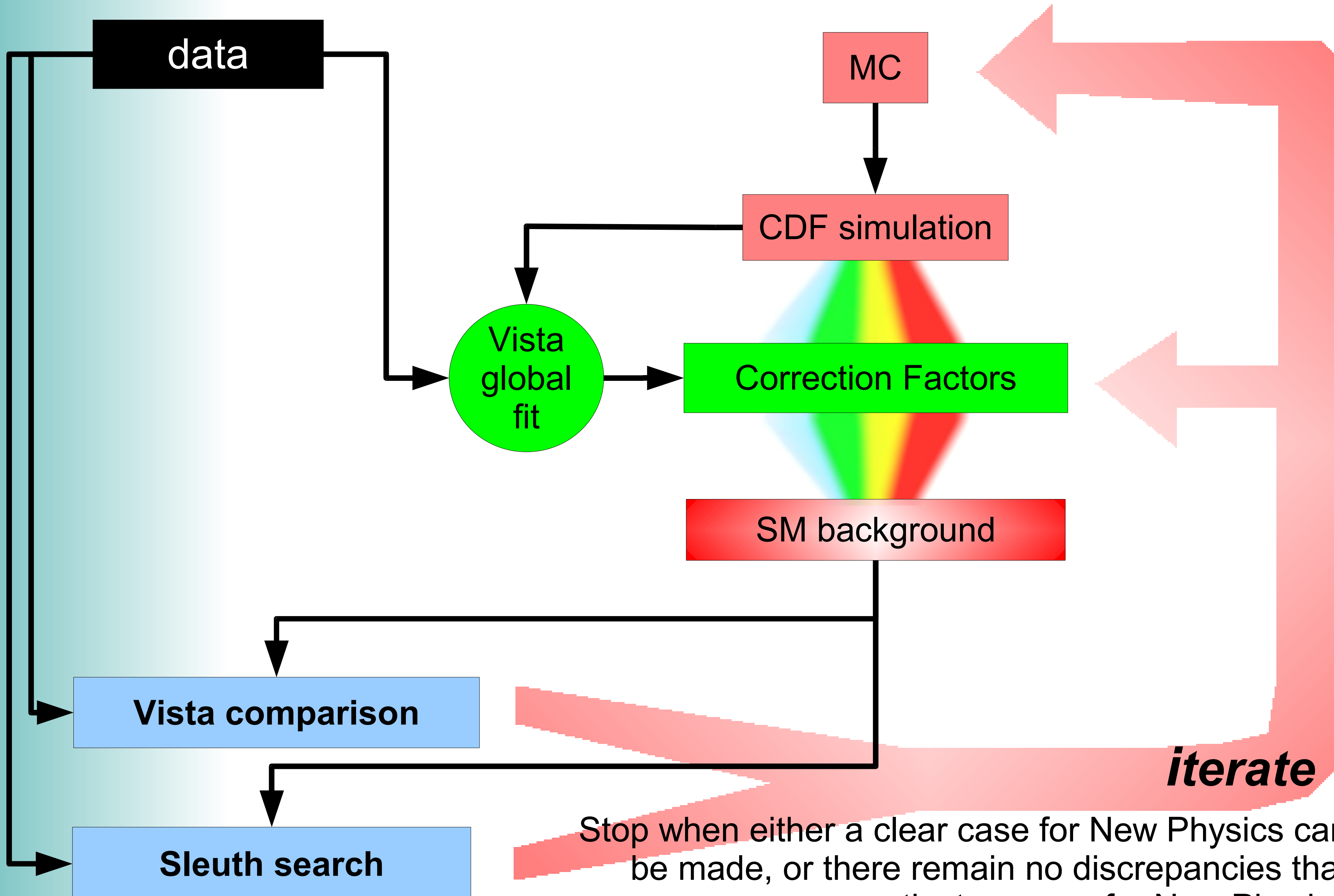
Motivation

- New Physics could appear in unexpected ways
  - Model Independence
  - Try to make sure we are not missing anything

Vista Overview

- Addresses the question:
  - "How well can the Standard Model describe the high-p_T data?"
- Finds the SM background that best fits the data globally.
  - No distinction between "control" and "signal" regions.
- Examines the gross features of all final states where high-p_T data are observed. Checks for discrepancies in
  - final state **populations**
  - distribution **shapes**

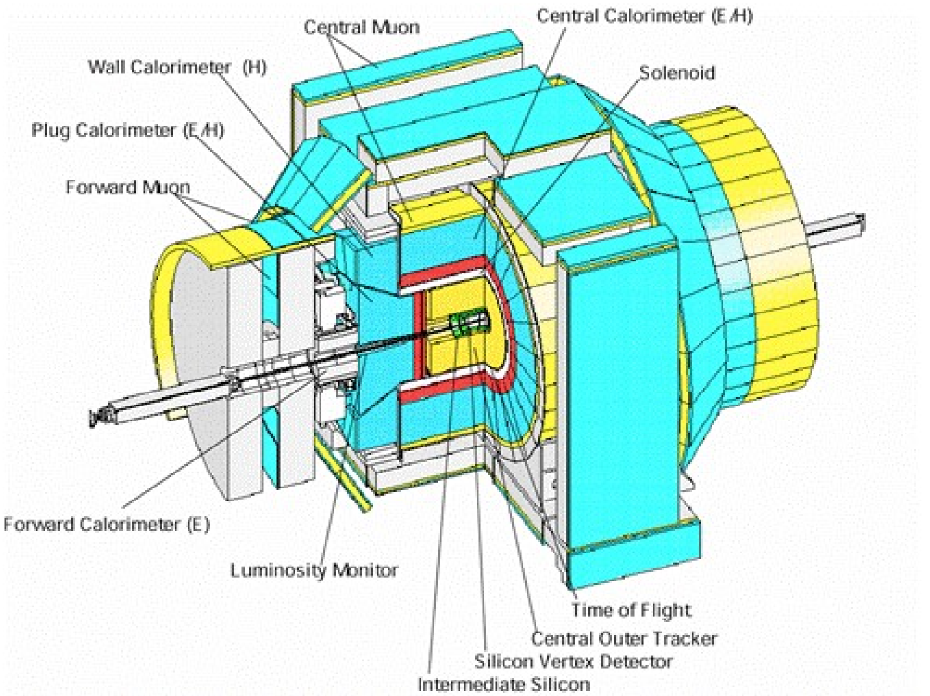
Method

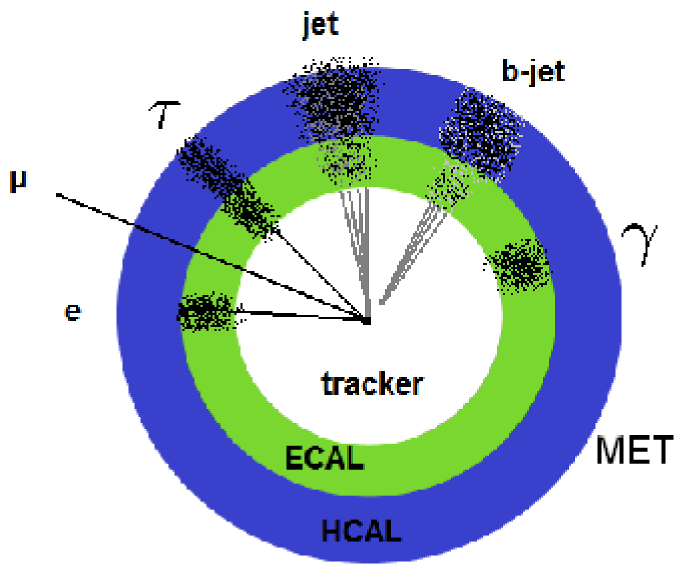


Stop when either a clear case for New Physics can be made, or there remain no discrepancies that motivate a case for New Physics

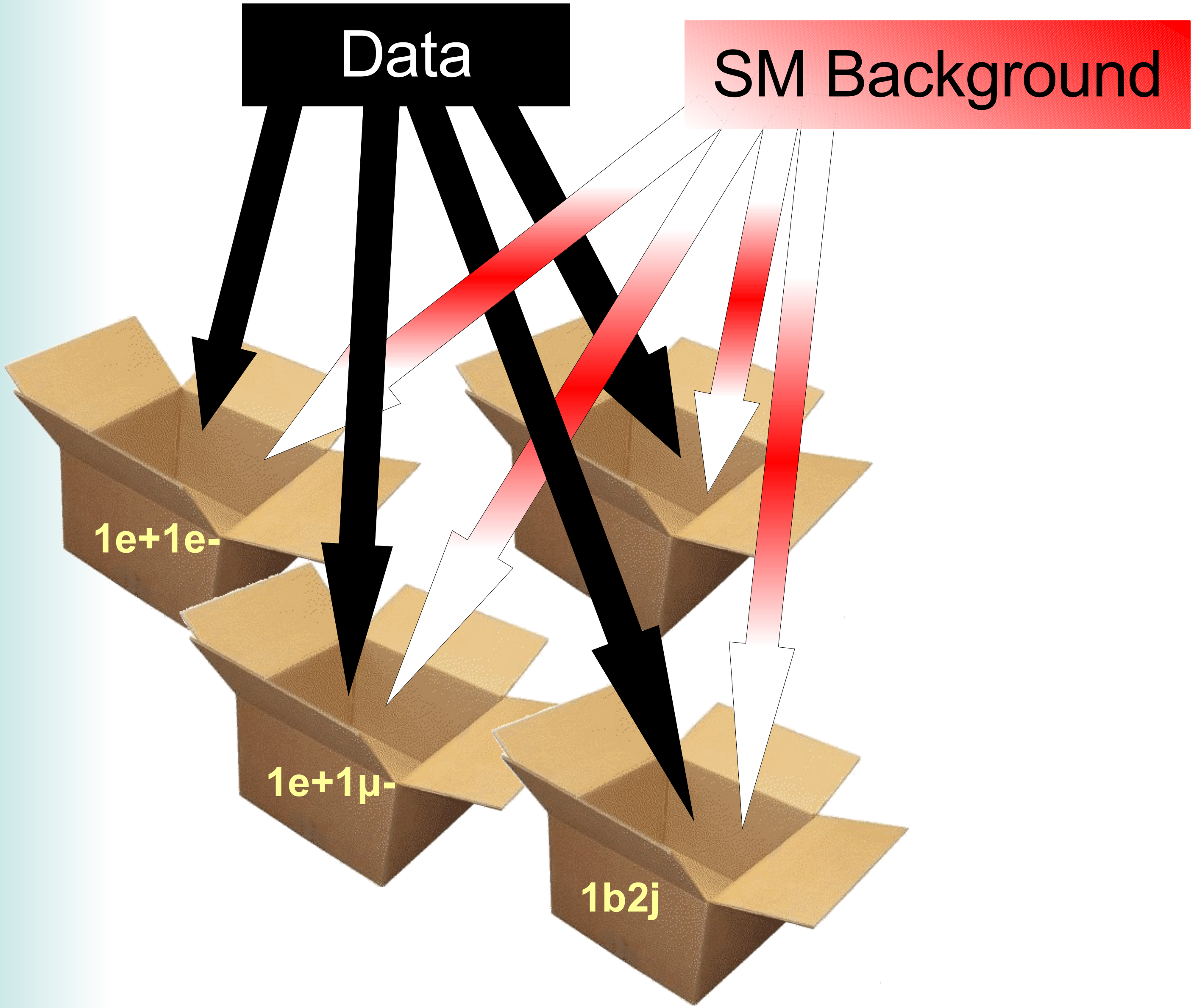
Event Selection

- Objects identified:
  - e, μ, τ, jet, b-jet, γ, Missing E_T
- Consider objects of p_T > 17 GeV
- Consider events with any of the following:
  - e, p_T > 25 GeV
  - μ, p_T > 25 GeV
  - γ, p_T > 60 GeV
  - jet, p_T > 40 GeV
  - additional diobject triggers





Partition in Final States



Correction Model

- What does it do?
  - It reweights the SM background events, to globally bring the background closer to what the SM@CDF is believed to be.
- What does it involve?
  - A minimal set of correction factors:
    - Integrated luminosity
    - k-factors (= $\sigma_{SM} / \sigma_{LO}$)
    - Particle misidentification probabilities
    - Particle identification efficiency scale factors*
    - Trigger efficiency scale factors*
  - External constraints + other details

* definition: *scale factor* = multiplicative factor that corrects the output of CDF simulation

The Global Fit

- The globally best fitting SM background is found by minimizing:

$$\chi^2(\vec{s}) = \left(\sum_{k \in \text{bins}} \chi_k^2(\vec{s}) \right) + \chi^2_{\text{constraints}}(\vec{s})$$

e.g. theoretical estimation of k-factors

$\vec{s}$ = set of correction factors

$$\chi_k^2(\vec{s}) = \frac{(\text{Data}[k] - \text{SM}[k])^2}{\delta\text{SM}[k]^2 + \sqrt{\text{SM}[k]}^2}$$

SM = Integrated Luminosity × Acceptance ×
{σ_{LO} × k-factors} ×
{ID and misID probabilities} ×
{Trigger Efficiencies}

- All the data are used during the fit, and all the correction factors are found simultaneously.

And now, time for the Results

344 final states contain a lot of information

- Table including all Vista final states with at least 10 data events observed
- The background uncertainties are only statistical.

CDF Run II preliminary (927 pb^{-1})

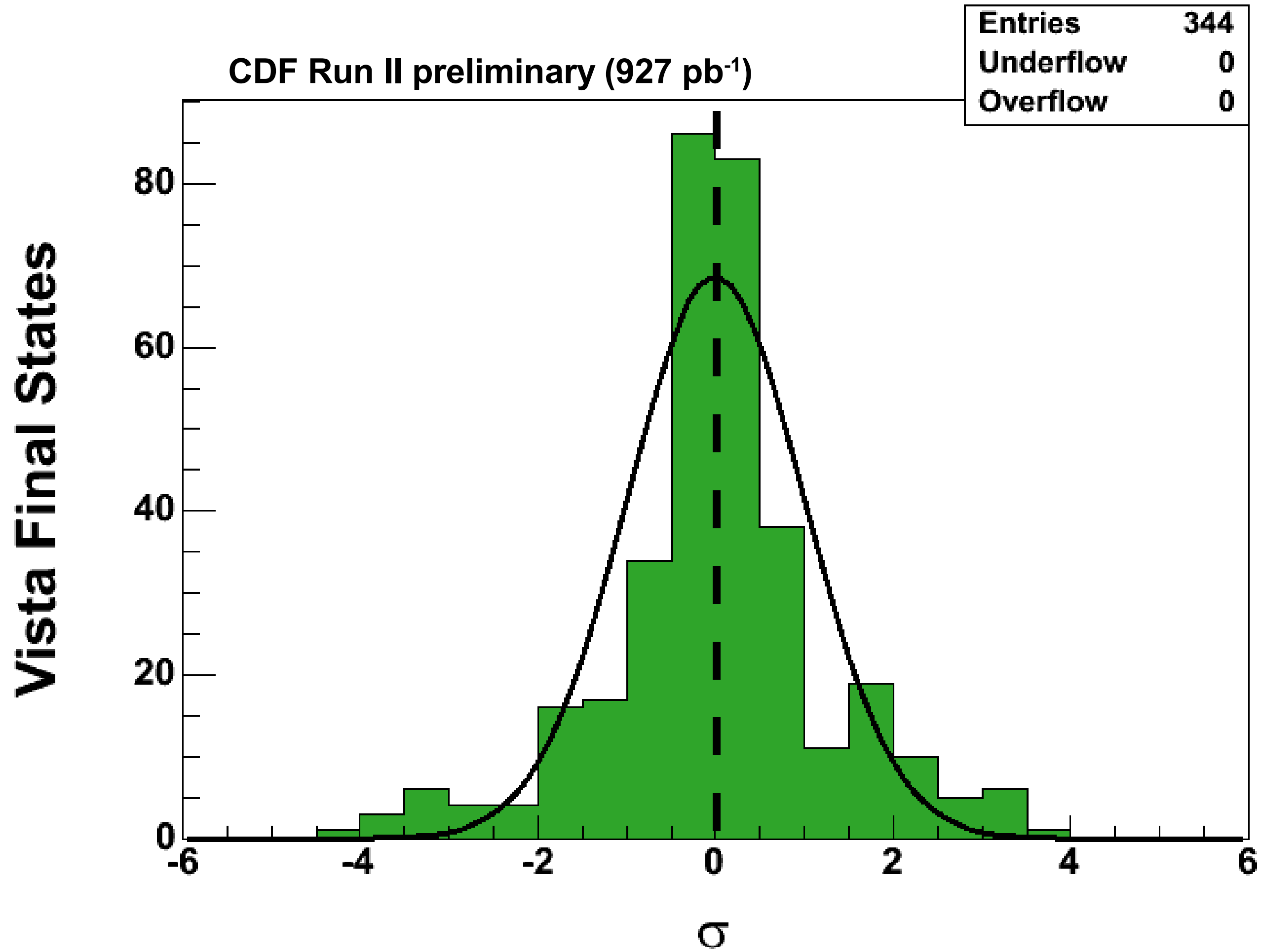
Final State	Data	Background
3jτ+	71	113.7 $\pm$ 3.6
5j	1661	1902.9 $\pm$ 50.8
2jτ+	233	296.5 $\pm$ 5.6
be+j	2207	2015.4 $\pm$ 28.7
3j $\Sigma p_T < 400$ GeV	35436	37294.6 $\pm$ 524.3
e+3j$\not{p}$	1954	1751.6 $\pm$ 42
be+2j	798	695.3 $\pm$ 13.3
3j$\not{p}$ $\Sigma p_T > 400$ GeV	811	967.5 $\pm$ 38.4
e+μ+	26	11.6 $\pm$ 1.5
e+γ	636	551.2 $\pm$ 11.2
e+3j	28656	27281.5 $\pm$ 405.2
b5j	131	95 $\pm$ 4.7
j2τ+	50	85.6 $\pm$ 8.2
jτ+τ-	74	125 $\pm$ 13.6
b$\not{p}$ $\Sigma p_T > 400$ GeV	10	29.5 $\pm$ 4.6
e+jγ	286	369.4 $\pm$ 21.1
e+j$\not{p}\tau$-	29	14.2 $\pm$ 1.8
2j $\Sigma p_T < 400$ GeV	96502	92437.3 $\pm$ 1354.5
be+3j	356	298.6 $\pm$ 7.7
8j	11	6.1 $\pm$ 2.5
7j	57	35.6 $\pm$ 4.9
6j	335	298.4 $\pm$ 14.7
4j $\Sigma p_T > 400$ GeV	39665	40898.8 $\pm$ 649.2
4j $\Sigma p_T < 400$ GeV	8241	8403.7 $\pm$ 144.7
4j2γ	38	57.5 $\pm$ 11
4jτ+	20	36.9 $\pm$ 2.4
4j$\not{p}$ $\Sigma p_T > 400$ GeV	516	525.2 $\pm$ 34.5
4j$\gamma\not{p}$	28	53.8 $\pm$ 11
4jγ	3693	3827.2 $\pm$ 112.1
4jμ+	576	568.2 $\pm$ 26.1
4jμ+$\not{p}$	232	224.7 $\pm$ 8.5
4jμ+μ-	17	20.1 $\pm$ 2.5
3γ	13	24.2 $\pm$ 3
3j $\Sigma p_T > 400$ GeV	75894	75939.2 $\pm$ 1043.9
3j2γ	145	178.1 $\pm$ 7.4
3j$\not{p}$ $\Sigma p_T < 400$ GeV	20	30.9 $\pm$ 14.4
3j$\gamma\tau$+	13	11 $\pm$ 2
3j$\gamma\not{p}$	83	102.9 $\pm$ 11.1
3jγ	11424	11506.4 $\pm$ 190.6
3jμ+$\not{p}$	1114	1118.7 $\pm$ 27.1
3jμ+μ-	61	84.5 $\pm$ 9.2
3jμ+	2132	2168.7 $\pm$ 64.2
3bj $\Sigma p_T > 400$ GeV	14	9.3 $\pm$ 1.9
2τ+	316	290.8 $\pm$ 24.2
2$\gamma\not{p}$	161	176 $\pm$ 9.1
2γ	8482	8349.1 $\pm$ 84.1
2j $\Sigma p_T > 400$ GeV	93408	92789.5 $\pm$ 1138.2
2j2γ	645	612.6 $\pm$ 18.8
2jτ+τ-	15	25 $\pm$ 3.5
2j$\not{p}$ $\Sigma p_T > 400$ GeV	74	106 $\pm$ 7.8
2j$\not{p}$ $\Sigma p_T < 400$ GeV	43	37.7 $\pm$ 100.2
2jγ	33684	33259.9 $\pm$ 397.6
2j$\gamma\tau$+	48	41.4 $\pm$ 3.4
2j$\gamma\not{p}$	403	425.2 $\pm$ 29.7
2jμ+$\not{p}$	7287	7320.5 $\pm$ 118.9
2jμ+$\gamma\not{p}$	13	12.6 $\pm$ 2.7
2jμ+γ	41	35.7 $\pm$ 6.1
2jμ+μ-	374	394.2 $\pm$ 24.8
2jμ+	9513	9362.3 $\pm$ 166.8

Final State	Data	Background
2e+j	13	9.8 $\pm$ 2.2
2e+e-	12	4.8 $\pm$ 1.2
2e+	23	36.1 $\pm$ 3.8
2b $\Sigma p_T > 400$ GeV	327	335.8 $\pm$ 7
2b $\Sigma p_T < 400$ GeV	187	173.1 $\pm$ 7.1
2b3j $\Sigma p_T < 400$ GeV	28	33.5 $\pm$ 5.5
2b2j $\Sigma p_T > 400$ GeV	355	326.3 $\pm$ 8.4
2b2j $\Sigma p_T < 400$ GeV	56	80.2 $\pm$ 5
2b2jγ	16	15.4 $\pm$ 3.6
2bγ	37	31.7 $\pm$ 4.8
2bj $\Sigma p_T > 400$ GeV	415	393.8 $\pm$ 9.1
2bj $\Sigma p_T < 400$ GeV	161	195.8 $\pm$ 8.3
2bj$\not{p}$ $\Sigma p_T > 400$ GeV	28	23.2 $\pm$ 2.6
2bjγ	25	24.7 $\pm$ 4.3
2be+2j$\not{p}$	15	12.3 $\pm$ 1.6
2be+2j	30	30.5 $\pm$ 2.5
2be+j	28	29.1 $\pm$ 2.8
2be+	48	45.2 $\pm$ 3.7
τ+τ-	498	428.5 $\pm$ 22.7
$\gamma\tau$+	177	204.4 $\pm$ 5.4
$\gamma\not{p}$	1952	1945.8 $\pm$ 77.1
μ+τ+	18	19.8 $\pm$ 2.3
μ+τ-	151	179.1 $\pm$ 4.7
μ+$\not{p}$	321351	320500 $\pm$ 3475.5
μ+$\not{p}\tau$-	22	25.8 $\pm$ 2.7
μ+γ	269	285.5 $\pm$ 5.9
μ+$\gamma\not{p}$	269	282.2 $\pm$ 6.6
μ+μ-$\not{p}$	49	61.4 $\pm$ 3.5
μ+μ-γ	32	29.9 $\pm$ 2.6
μ+μ-	10648	10845.6 $\pm$ 96
j2γ	2196	2200.3 $\pm$ 35.2
j2$\gamma\not{p}$	38	27.3 $\pm$ 3.2
jτ+	563	585.7 $\pm$ 10.2
j$\not{p}$ $\Sigma p_T > 400$ GeV	4183	4209.1 $\pm$ 56.1
jγ	49052	48743 $\pm$ 546.3
j$\gamma\tau$+	106	104 $\pm$ 4.1
j$\gamma\not{p}$	913	965.2 $\pm$ 41.5
jμ+	33462	34026.7 $\pm$ 510.1
jμ+τ-	29	37.5 $\pm$ 4.5
jμ+$\not{p}\tau$-	10	9.6 $\pm$ 2.1
jμ+$\not{p}$	45728	46316.4 $\pm$ 568.2
jμ+$\gamma\not{p}$	78	69.8 $\pm$ 9.9
jμ+γ	70	98.4 $\pm$ 12.1
jμ+μ-	1977	2093.3 $\pm$ 74.7
e+4j	7144	6661.9 $\pm$ 147.2
e+4j$\not{p}$	403	363 $\pm$ 9.9
e+3jτ-	11	7.6 $\pm$ 1.6
e+3jγ	27	21.7 $\pm$ 3.4
e+2γ	47	74.5 $\pm$ 5
e+2j	126665	122457 $\pm$ 1672.6
e+2jτ-	53	37.3 $\pm$ 3.9
e+2jτ+	20	24.7 $\pm$ 2.3
e+2j$\not{p}$	12451	12130.1 $\pm$ 159.4
e+2jγ	101	88.9 $\pm$ 6.1
e+τ-	609	555.9 $\pm$ 10.2
e+τ+	225	211.2 $\pm$ 4.7
e+$\not{p}$	476424	479572 $\pm$ 5361.2
e+$\not{p}\tau$-	48	35 $\pm$ 2.7
e+$\not{p}\tau$+	20	18.7 $\pm$ 1.9

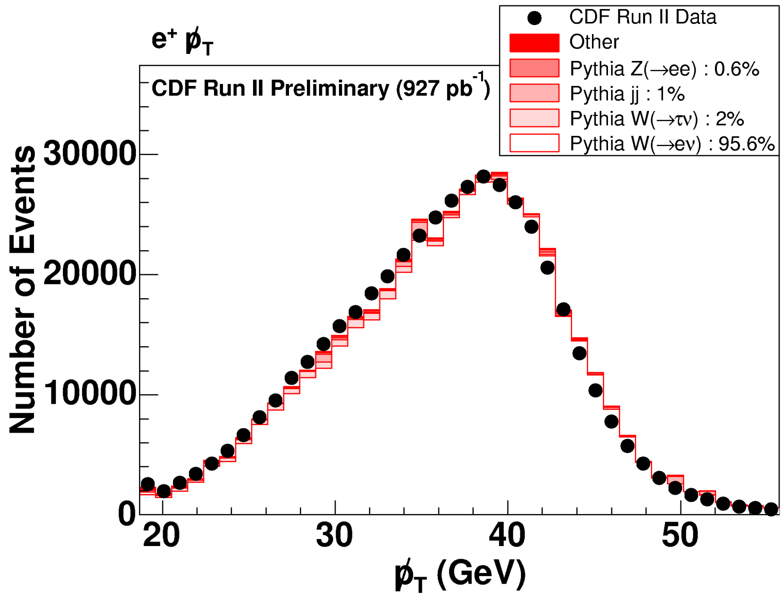
Final State	Data	Background
e+$\gamma\not{p}$	141	144.2 $\pm$ 6
e+μ-$\not{p}$	54	42.6 $\pm$ 2.7
e+μ+$\not{p}$	13	10.9 $\pm$ 1.3
e+μ-	153	127.6 $\pm$ 4.2
e+j	386880	392614 $\pm$ 5031.8
e+j2γ	14	15.9 $\pm$ 2.9
e+jτ+	79	79.3 $\pm$ 2.9
e+jτ-	162	148.8 $\pm$ 7.6
e+j$\not{p}$	58648	57391.7 $\pm$ 661.6
e+j$\gamma\not{p}$	52	76.2 $\pm$ 9
e+jμ-$\not{p}$	22	13.1 $\pm$ 1.7
e+jμ-	28	26.8 $\pm$ 2.3
e+e-4j	103	113.5 $\pm$ 5.9
e+e-3j	456	473 $\pm$ 14.6
e+e-2j$\not{p}$	30	39 $\pm$ 4.6
e+e-2j	2149	2152 $\pm$ 40.1
e+e-τ+	14	11.1 $\pm$ 2
e+e-$\not{p}$	491	487.9 $\pm$ 12
e+e-γ	127	132.3 $\pm$ 4.2
e+e-j	10726	10669.3 $\pm$ 123.5
e+e-j$\not{p}$	157	144 $\pm$ 11.2
e+e-jγ	26	45.6 $\pm$ 4.7
e+e-	58344	58575.6 $\pm$ 603.9
b6j	24	15.5 $\pm$ 2.3
b4j $\Sigma p_T > 400$ GeV	13	9.2 $\pm$ 1.8
b4j $\Sigma p_T < 400$ GeV	464	499.2 $\pm$ 12.4
b3j $\Sigma p_T > 400$ GeV	5354	5285 $\pm$ 72.4
b3j $\Sigma p_T < 400$ GeV	1639	1558.9 $\pm$ 24.1
b3j$\not{p}$ $\Sigma p_T > 400$ GeV	111	116.8 $\pm$ 11.2
b3jγ	182	194.1 $\pm$ 8.8
b3jμ+$\not{p}$	37	34.1 $\pm$ 2
b3jμ+	47	52.2 $\pm$ 3
b2γ	15	14.6 $\pm$ 2.1
b2j $\Sigma p_T > 400$ GeV	8812	8576.2 $\pm$ 97.9
b2j $\Sigma p_T < 400$ GeV	4691	4646.2 $\pm$ 57.7
b2j$\not{p}$ $\Sigma p_T > 400$ GeV	198	209.2 $\pm$ 8.3
b2jγ	429	425.1 $\pm$ 13.1
b2jμ+$\not{p}$	46	40.1 $\pm$ 2.7
b2jμ+	56	60.6 $\pm$ 3.4
bτ+	19	19.9 $\pm$ 2.2
bγ	976	1034.8 $\pm$ 15.6
b$\gamma\not{p}$	18	16.7 $\pm$ 3.1
bμ+	303	263.5 $\pm$ 7.9
bμ+$\not{p}$	204	218.1 $\pm$ 6.4
bj $\Sigma p_T > 400$ GeV	9060	9275.7 $\pm$ 87.8
bj $\Sigma p_T < 400$ GeV	7236	7030.8 $\pm$ 74
bj2γ	13	17.6 $\pm$ 3.3
bjτ+	13	12.9 $\pm$ 1.8
bj$\not{p}$ $\Sigma p_T > 400$ GeV	53	60.4 $\pm$ 19.9
bjγ	937	989.4 $\pm$ 20.6
bj$\gamma\not{p}$	34	30.5 $\pm$ 4
bjμ+$\not{p}$	104	112.6 $\pm$ 4.4
bjμ+	173	141.4 $\pm$ 4.8
be+3j$\not{p}$	68	52.2 $\pm$ 2.2
be+2j$\not{p}$	87	65 $\pm$ 3.3
be+$\not{p}$	330	347.2 $\pm$ 6.9
be+j$\not{p}$	211	176.6 $\pm$ 5
be+e-j	22	34.6 $\pm$ 2.6
be+e-	62	55 $\pm$ 3.1

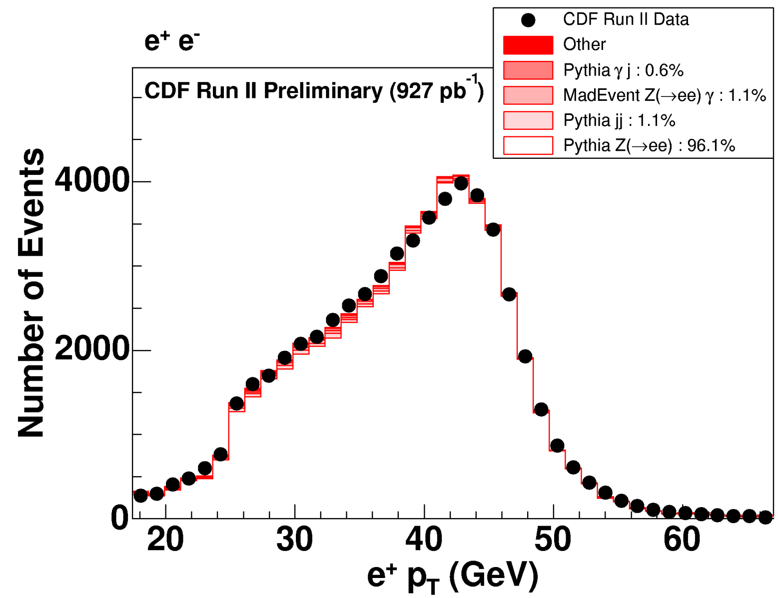
Result of Comparing Populations

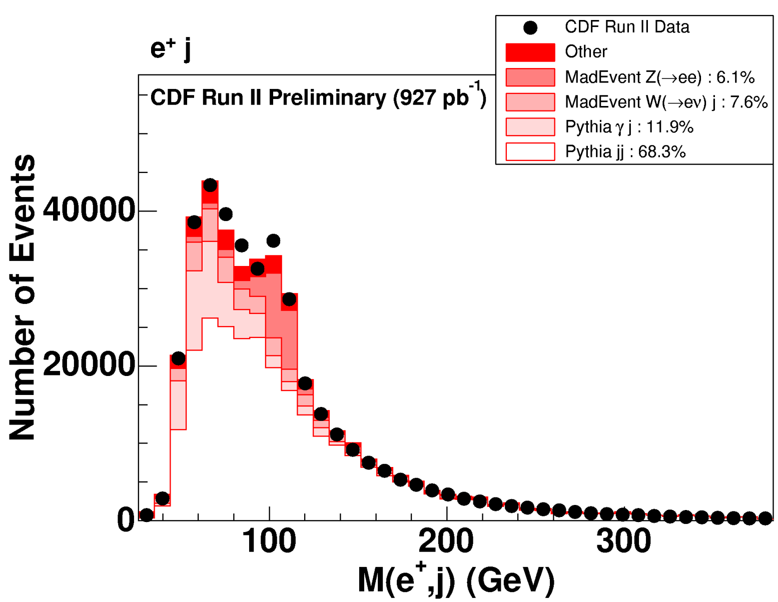
- The Poisson probability that the SM population in a final state would fluctuate above (or below) the observed population in the data.
- This probability is expressed in units of standard deviation (σ).
- These probabilities plotted do not yet take into account the **trials factor**: We examined 344 final states. Accounting for this reduces the significance of every observed discrepancy.
- After taking into account the trials factor, the greatest population discrepancy is only a **2.3σ** deficit of data.

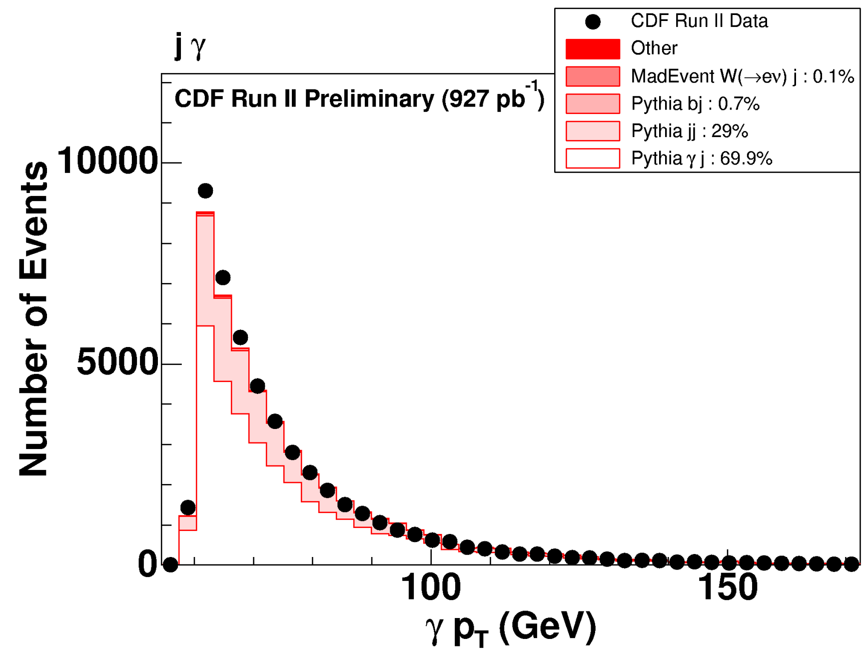


Examples of Vista Distributions



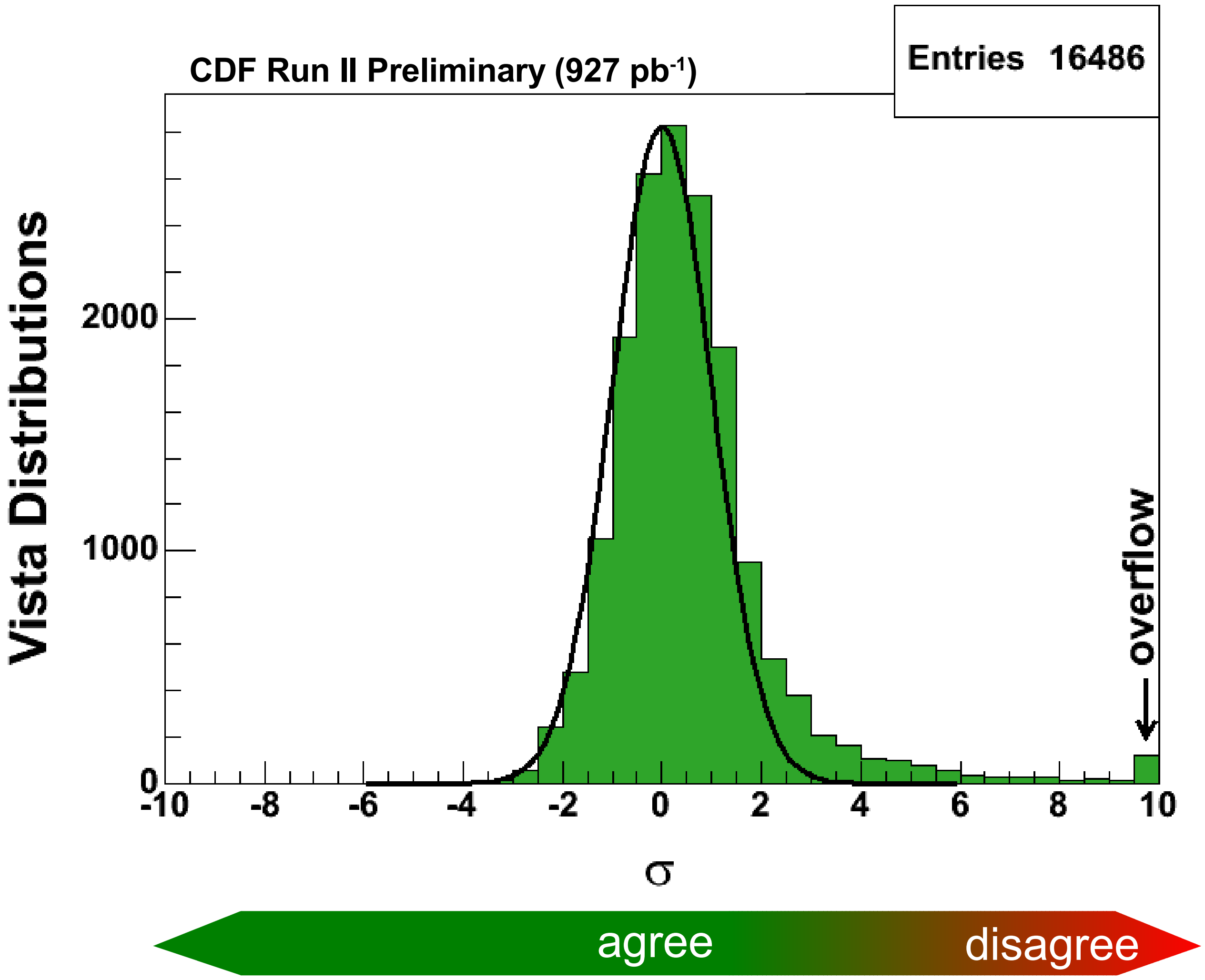






Result of comparing Shapes

- Vista automatically produces and examines ~17,000 distributions of kinematic variables.
- Their consistency with the background is tested using Kolmogorov-Smirnov test.
- The KS probability P (that two distributions are consistent) is expressed in units of standard deviation (σ).
- In the probabilities plotted here, the trials factor due to examining thousands of distributions has not yet been accounted for.



- Interest is focused on outliers : kinematic variables showing significant disagreement

Characteristic Shape Discrepancies

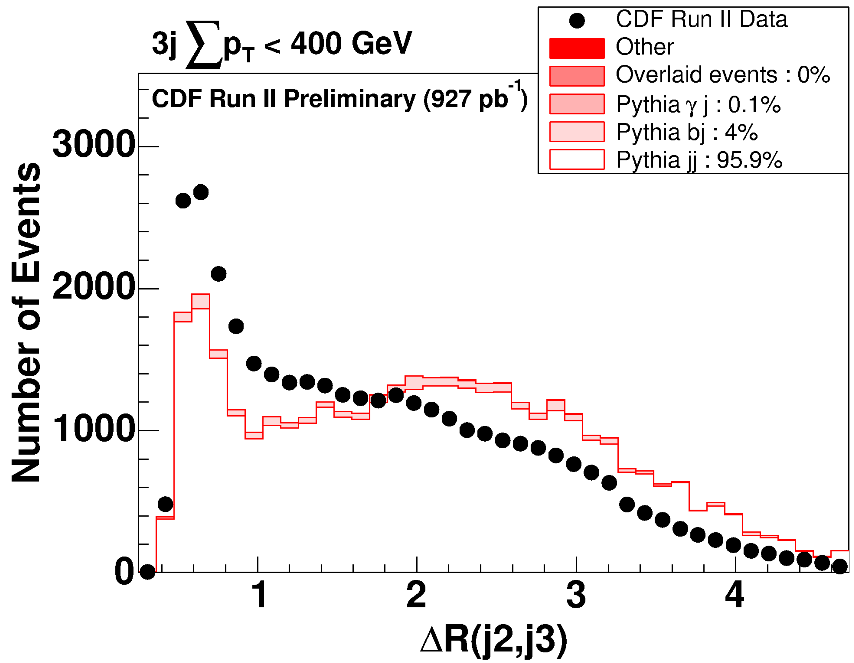
Even after accounting for the trials factor due to examining ~17,000 distributions, there are a few hundred distributions with shape inconsistent with the Standard Model implementation.

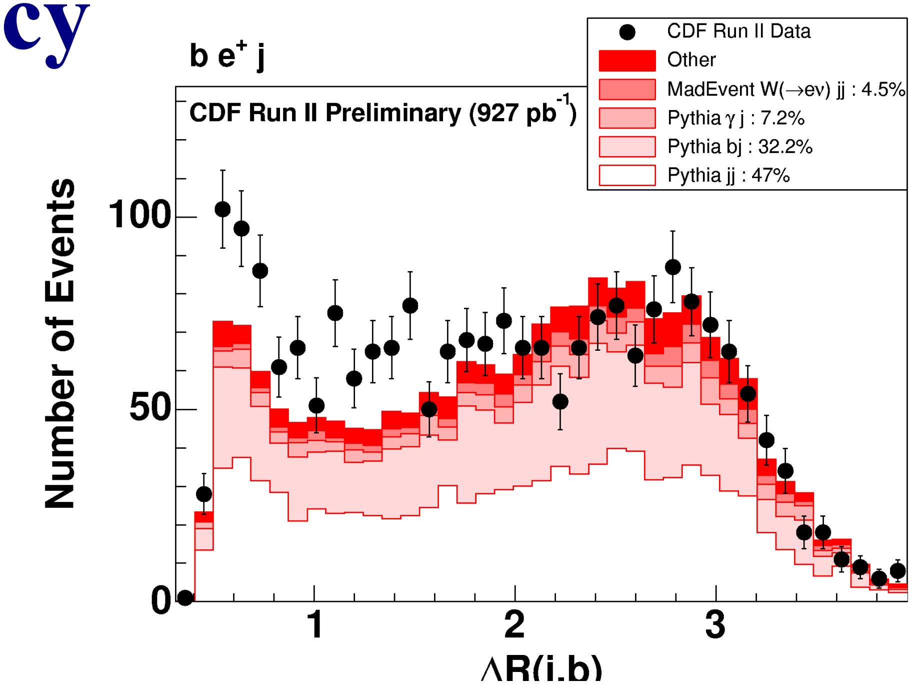
They are mostly of two kinds:

1. Related to the "3-jet" effect

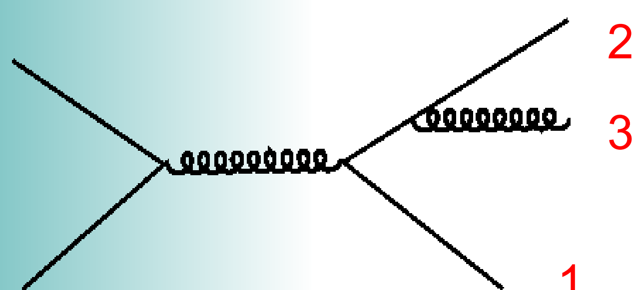
2. Related to the modeling of intrinsic transverse momentum

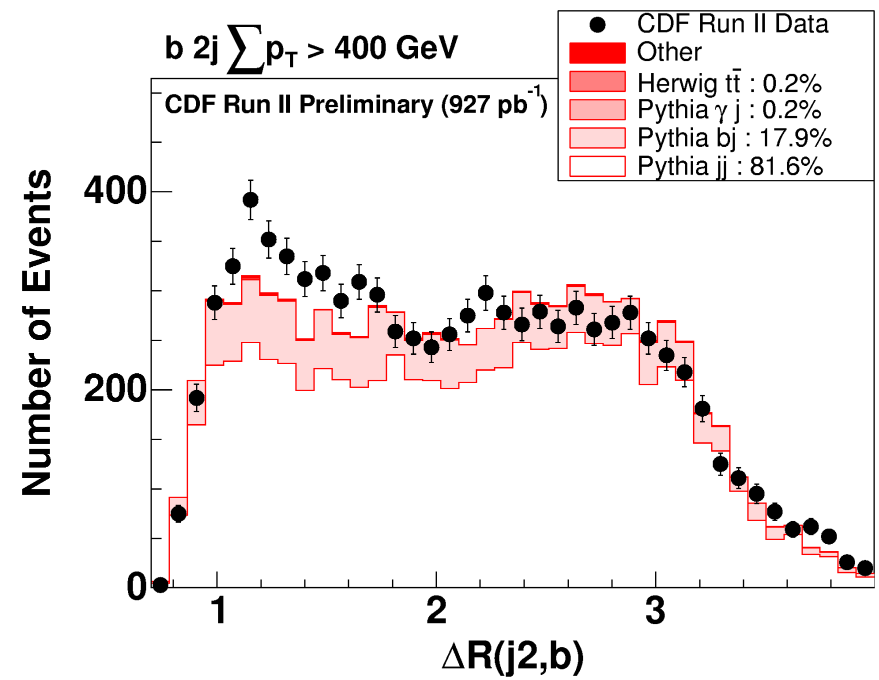
The “3-jet” discrepancy





Parameters for parton showering are being investigated



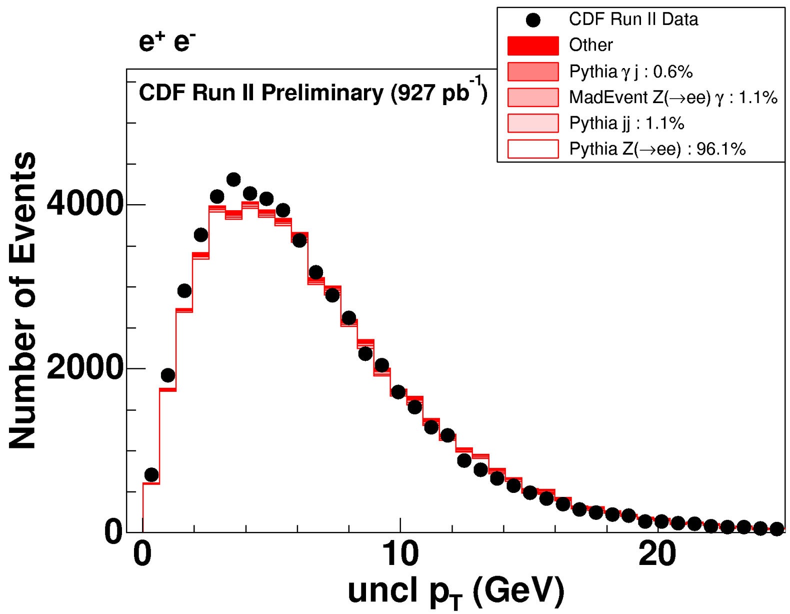


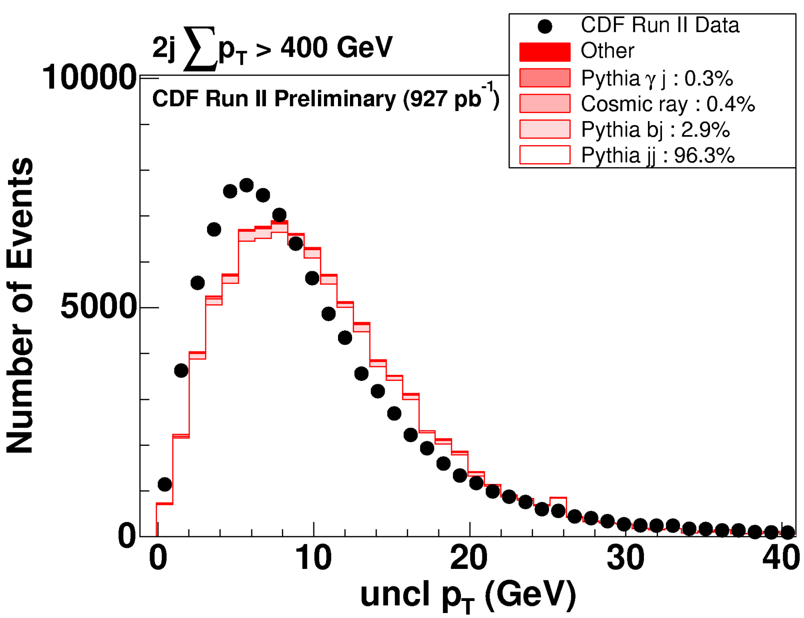
Summary & Conclusion

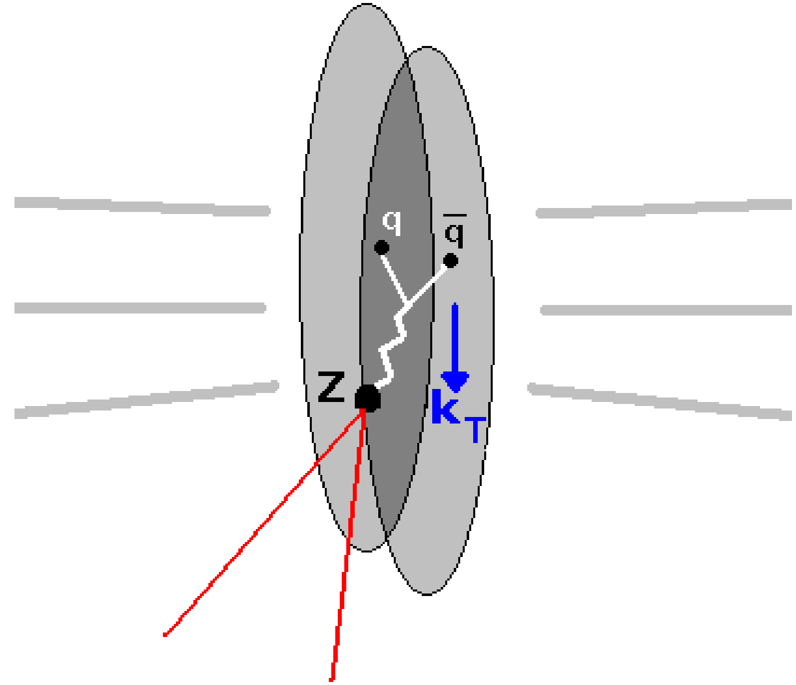
- **What is Vista@CDF?**
  - A model independent analysis searching for New Physics in the bulk features of the high-p_T data.
- **What is the result, from the first 1 fb^{-1} of CDF Run II?**
  - With Vista@CDF, we have not been able to support a New Physics claim.
- **Disclaimer:**
  - The Vista@CDF null result does not necessarily mean that there is no New Physics present in the data:
    - Vista does not exploit variables optimal to detect specific signals, therefore may not be the best method to search for something *specific*.
    - Vista does not examine low-p_T physics, such as B-physics.
    - If the New Physics is of low cross-section and appears at high p_T, *Sleuth* will be more likely to find it. Stay tuned for Conor Henderson's talk on Sleuth.
- **Why is this an important result?**
  - No such broad, encompassing analysis was available before.
  - Studying the data globally allows for a deeper understanding of the experiment and of the physics coming into it. That applies also to LHC. Stay tuned for Bruce Knutson's talk.

Backup slides

Intrinsic k_T







uncl p_T = Energy visible in the detector but not clustered into any object

The need for intrinsic k_T correction appeared in 2-object final states, in *Δφ*, *uncl p_T* and *missing p_T* distributions.

Simultaneously describing intrinsic k_T in all final states is difficult

Is This A Blind Analysis?

- No. We started with a crude correction model, and refined it after looking to see where it failed to describe the data
- The development of the correction model and associated improvements is not an automated process
- Refining the correction model requires judgement, and all adjustments must be physically motivated
- This process ends when either:
  - a clear case for new physics can be made
  - or there remain no discrepancies that motivate a case for new physics

The Correction Factors

- These are the 44 parameters determined by the global fit.
- Their meaning is intimate to Vista@CDF, and are only applicable within it.
- Their values are compared to available external sources, to verify they are reasonable.
- The uncertainties come from the global fit, and do not include additional sources of systematic uncertainty.

CDF Run II Preliminary (927 pb^{-1})

Category	Explanation	Value	Error	Error(%)
luminosity	CDF integrated luminosity	927.1	20	2.2
k-factor	cosmic_ph	0.686	0.05	7.3
k-factor	cosmic_j	0.4464	0.014	3.1
k-factor	1γ1j photon+jet(s)	0.9492	0.04	4.2
k-factor	1γ2j	1.205	0.05	4.1
k-factor	1γ3j	1.483	0.07	4.7
k-factor	1γ4j+	1.968	0.16	8.1
k-factor	2γ0j diphoton(+jets)	1.809	0.08	4.4
k-factor	2γ1j	3.417	0.24	7.0
k-factor	2γ2j+	1.305	0.16	12.3
k-factor	W0j W (+jets)	1.453	0.027	1.9
k-factor	W1j	1.059	0.03	2.8
k-factor	W2j	1.021	0.03	2.9
k-factor	W3j+	0.7582	0.05	6.6
k-factor	Z0j Z (+jets)	1.419	0.024	1.7
k-factor	Z1j	1.177	0.04	3.4
k-factor	Z2j+	1.035	0.05	4.8
k-factor	2j $\hat{p}_T<150$ dijet	0.9599	0.022	2.3
k-factor	2j $150<\hat{p}_T$	1.256	0.028	2.2
k-factor	3j $\hat{p}_T<150$ multijet	0.9206	0.021	2.3
k-factor	3j $150<\hat{p}_T$	1.36	0.032	2.4
k-factor	4j $\hat{p}_T<150$	0.9893	0.025	2.5
k-factor	4j $150<\hat{p}_T$	1.705	0.04	2.3
k-factor	5j+ low	1.252	0.05	4.0
misId	p(e$\to$e) central	0.9864	0.006	0.6
misId	p(e$\to$e) plug	0.9334	0.009	1.0
misId	p($\mu\to\mu$) CMUP	0.8451	0.008	0.9
misId	p($\mu\to\mu$) CMX	0.915	0.011	1.2
misId	p($\gamma\to\gamma$) central	0.9738	0.018	1.8
misId	p($\gamma\to\gamma$) plug	0.9131	0.018	2.0
misId	p(b$\to$b) central	0.9969	0.04	4.0
misId	p(e$\to\gamma$) plug	0.04452	0.012	27.0
misId	p(q$\to$e) central	9.71×10^{-5}	1.9×10^{-6}	2.0
misId	p(q$\to$e) plug	0.0008761	1.8×10^{-5}	2.1
misId	p(q$\to\mu$)	1.157×10^{-5}	2.7×10^{-7}	2.3
misId	p(j$\to$b) $25<\hat{p}_T$	0.01684	0.00027	1.6
misId	p(q$\to\tau$) $15<\hat{p}_T<60$	0.003414	0.00012	3.5
misId	p(q$\to\tau$) $60<\hat{p}_T<200$	0.000381	4×10^{-5}	10.5
misId	p(q$\to\gamma$) central	0.0002651	1.5×10^{-5}	5.7
misId	p(q$\to\gamma$) plug	0.001591	0.00013	8.2
trigger	p(e$\to$trig) central, $\hat{p}_T>25$	0.9758	0.007	0.7
trigger	p(e$\to$trig) plug, $\hat{p}_T>25$	0.835	0.015	1.8
trigger	p($\mu\to$trig) CMUP, $\hat{p}_T>25$	0.9166	0.007	0.8
trigger	p($\mu\to$trig) CMX, $\hat{p}_T>25$	0.9613	0.01	1.0

Result of Comparing Populations

Hyperlink to kinematic distributions

Statistical Errors

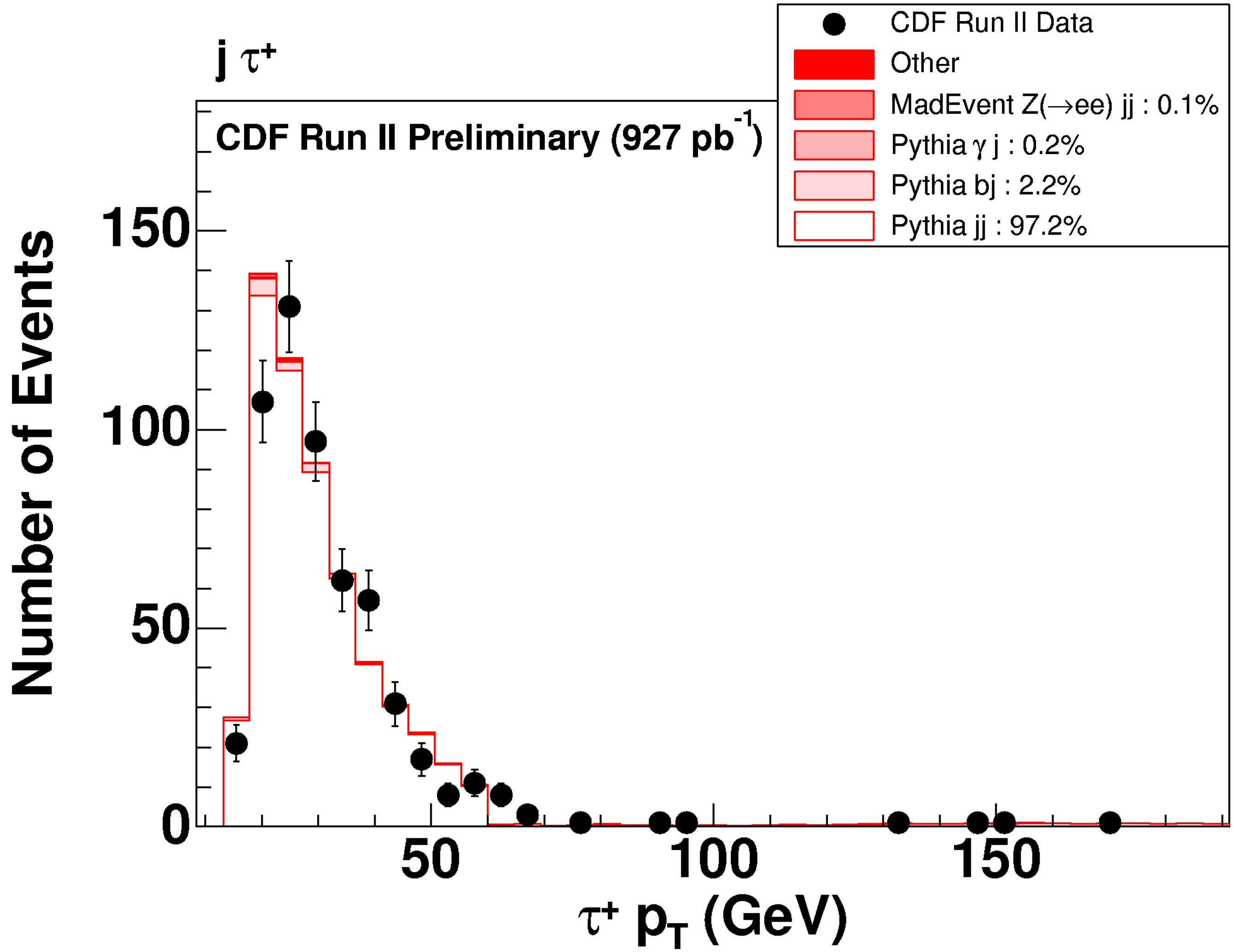
Includes trials factor

CDF Run II preliminary (927 pb^{-1})

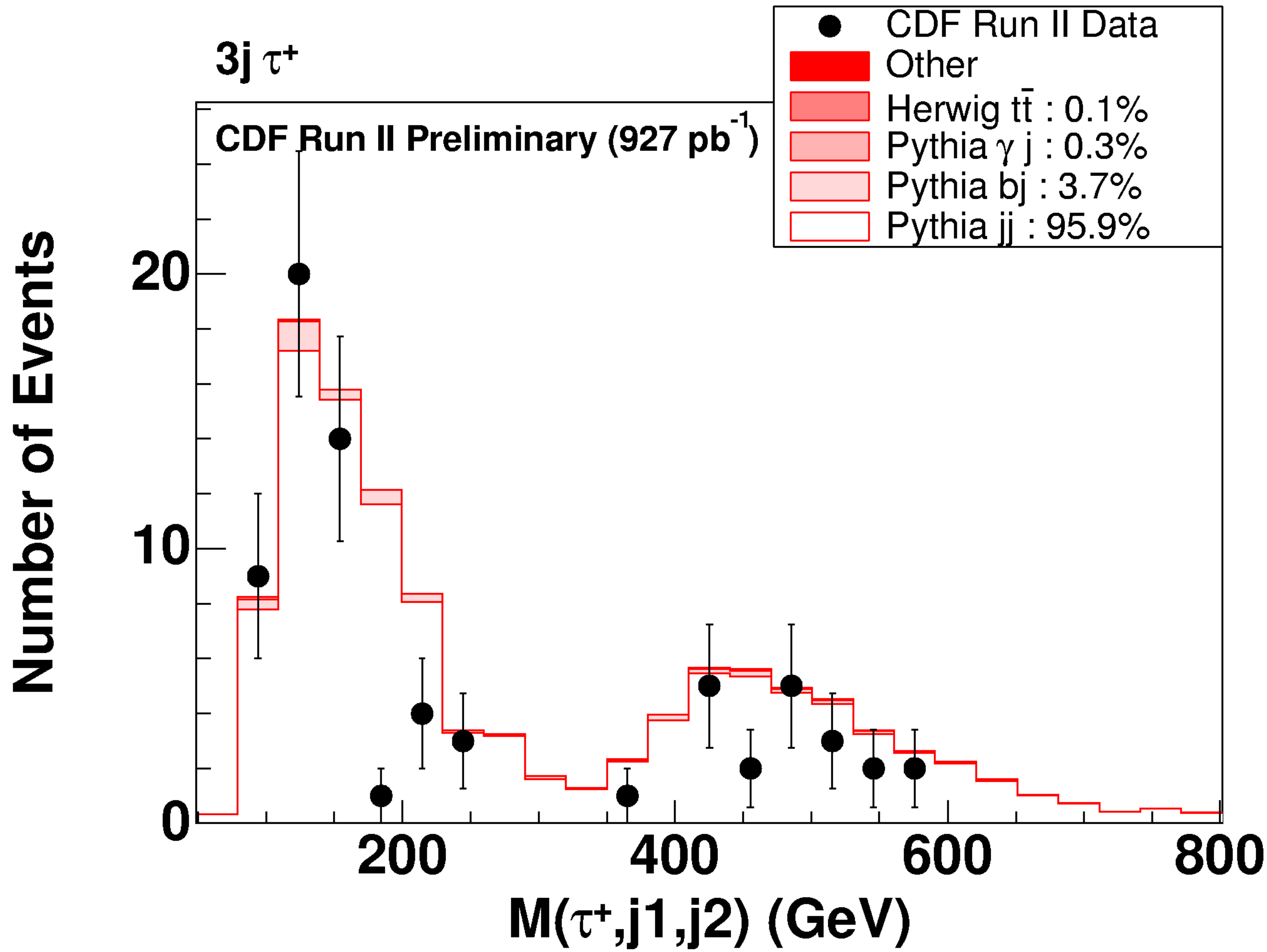
Final State	Plots	Observed	Expected	Discrepancy (σ)
3j1tau+	[plots]	71	113.7 +- 3.6	-2.3
5j	[plots]	1661	1902.9 +- 50.8	-1.7
2j1tau+	[plots]	233	296.5 +- 5.6	-1.6
2j2tau+	[plots]	6	27 +- 4.6	-1.4
1b1e+1j	[plots]	2207	2015.4 +- 28.7	+1.4
3j_sumPt0-400	[plots]	35436	37294.6 +- 524.3	-1.1
1e+3j1pmiss	[plots]	1954	1751.6 +- 42	+1.1

- All final states are sorted in order of decreasing discrepancy.
- The above table is only the head of the whole list of final states.
- The greatest population discrepancy is only a 2.3σ deficit of data, after taking into account the trials factor.

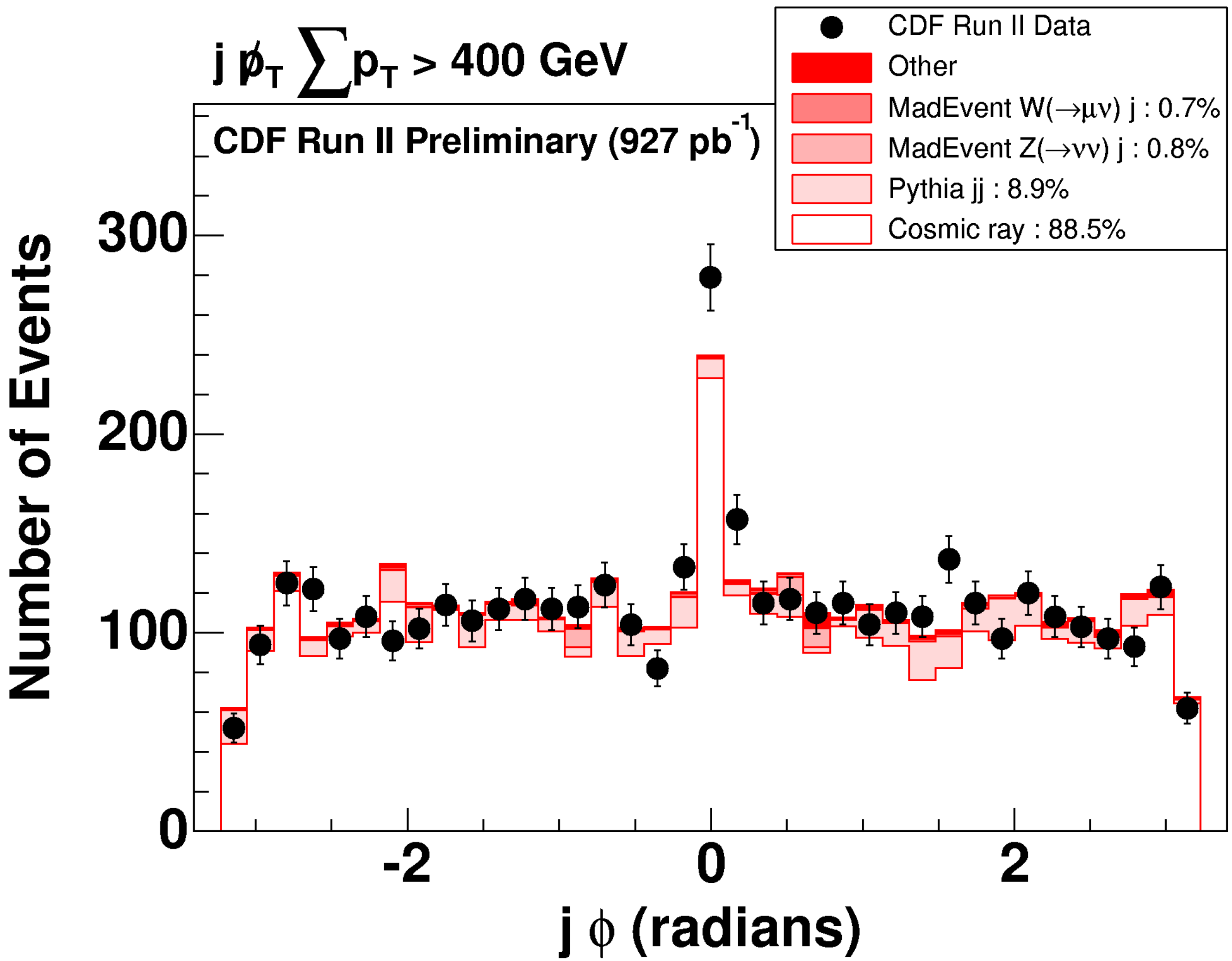
Example of final state dominated by jets faking τ.



The most discrepant distribution from the final state with the greatest population discrepancy



Non-collision Events



Identification efficiency scale factors and misidentification probabilities across p_T and η

CDF Run II preliminary (927 pb^{-1})

$\lvert\eta\rvert$	0 – 0.6					0.6 – 1.0					> 1.0		
p_T	15 – 25	25 – 40	40 – 60	60 – 200	> 200	15 – 25	25 – 40	40 – 60	60 – 200	> 200	15 – 25	25 – 40	> 40
$e\to e$	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.93	0.93	0.93
$e\to\mu$	0	0	0	0	0	0	0	0	0	0	0	0	0
$e\to\tau$	0	0	0	0	0	0	0	0	0	0	0	0	0
$e\to\gamma$	4×10^{-3}	4×10^{-3}	4×10^{-3}	4×10^{-3}	4×10^{-3}	4×10^{-3}	4×10^{-3}	4×10^{-3}	4×10^{-3}	4×10^{-3}	0.045	0.045	0.045
$e\to j$	0	0	0	0	0	0	0	0	0	0	0	0	0
$e\to b$	0	0	0	0	0	0	0	0	0	0	0	0	0
$\mu\to e$	0	0	0	0	0	0	0	0	0	0	0	0	0
$\mu\to\mu$	0.85	0.85	0.85	0.85	0.85	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
$\mu\to\tau$	0	0	0	0	0	0	0	0	0	0	0	0	0
$\mu\to\gamma$	0	0	0	0	0	0	0	0	0	0	0	0	0
$\mu\to j$	0	0	0	0	0	0	0	0	0	0	0	0	0
$\mu\to b$	0	0	0	0	0	0	0	0	0	0	0	0	0
$\tau\to e$	0	0	0	0	0	0	0	0	0	0	0	0	0
$\tau\to\mu$	0	0	0	0	0	0	0	0	0	0	0	0	0
$\tau\to\tau$	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0	0	0
$\tau\to\gamma$	0	0	0	0	0	0	0	0	0	0	0	0	0
$\tau\to j$	0	0	0	0	0	0	0	0	0	0	1	1	1
$\tau\to b$	0	0	0	0	0	0	0	0	0	0	0	0	0
$\gamma\to e$	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.005	0.005	0.005
$\gamma\to\mu$	0	0	0	0	0	0	0	0	0	0	0	0	0
$\gamma\to\tau$	0	0	0	0	0	0	0	0	0	0	0	0	0
$\gamma\to\gamma$	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.91	0.91	0.91
$\gamma\to j$	0	0	0	0	0	0	0	0	0	0	0	0	0
$\gamma\to b$	0	0	0	0	0	0	0	0	0	0	0	0	0
$j\to e$	9.7×10^{-5}	9.7×10^{-5}	9.7×10^{-5}	9.7×10^{-5}	9.7×10^{-5}	9.7×10^{-5}	9.7×10^{-5}	9.7×10^{-5}	9.7×10^{-5}	9.7×10^{-5}	0.00088	0.00088	0.00088
$j\to\mu$	1.5×10^{-5}	1.2×10^{-5}	1.2×10^{-5}	1.2×10^{-5}	1.2×10^{-5}	1.5×10^{-5}	1.2×10^{-5}	1.2×10^{-5}	1.2×10^{-5}	1.2×10^{-5}	0	0	0
$j\to\tau$	0.0034	0.0034	0.0034	0.00038	0.00015	0.0034	0.0034	0.0034	0.00038	0.00015	0	0	0
$j\to\gamma$	0.00027	0.00027	0.00027	0.00027	0.00027	0.00027	0.00027	0.00027	0.00027	0.00027	0.0016	0.0016	0.0016
$j\to j$	1	1	1	1	1	1	1	1	1	1	1	1	1
$j\to b$	0	0.017	0.017	0.017	0.017	0	0.017	0.017	0.017	0.017	0	0	0
$b\to e$	0	0	0	0	0	0	0	0	0	0	0	0	0
$b\to\mu$	0	0	0	0	0	0	0	0	0	0	0	0	0
$b\to\tau$	0	0	0	0	0	0	0	0	0	0	0	0	0
$b\to\gamma$	0	0	0	0	0	0	0	0	0	0	0	0	0
$b\to j$	0	0	0	0	0	0	0	0	0	0	1	1	1
$b\to b$	1	1	1	1	1	1	1	1	1	1	0	0	0

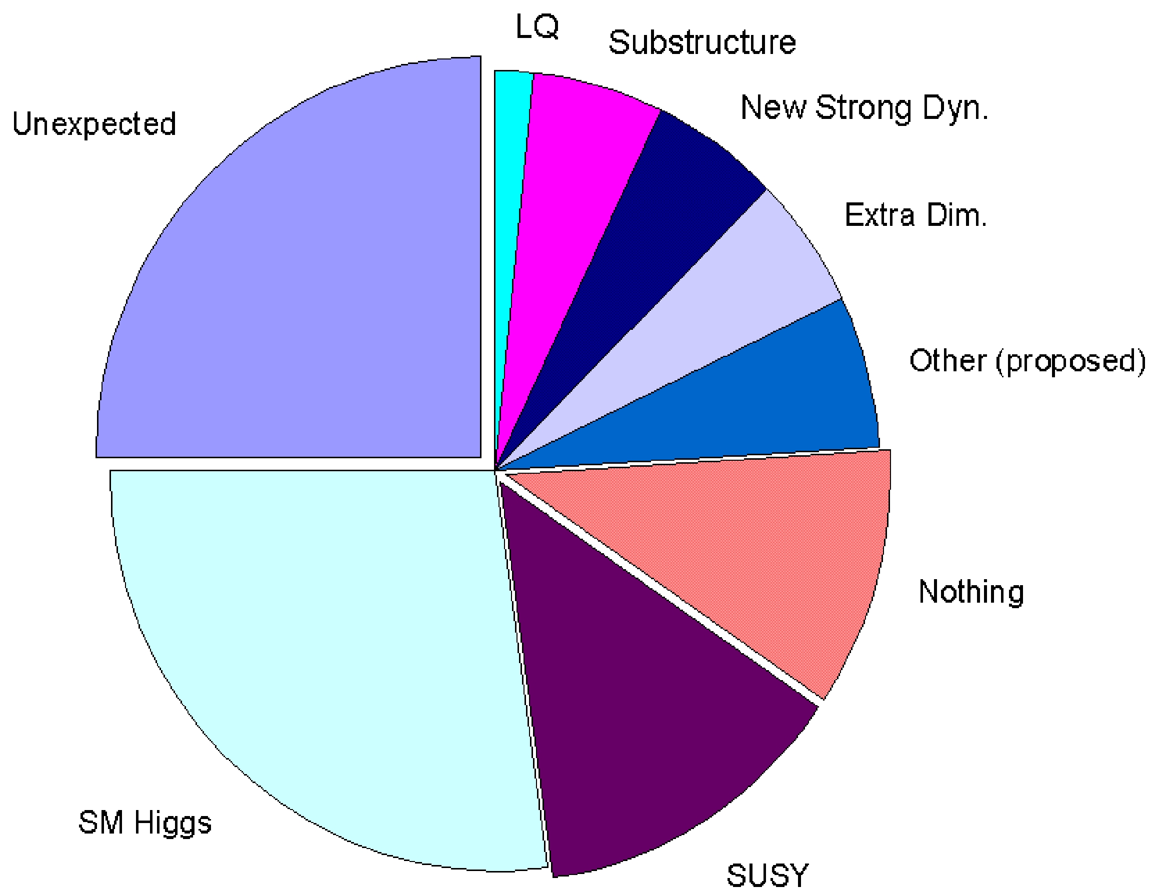
External Constraints

CDF Run II preliminary (927 pb^{-1})

Code	Description	Value	σ_{fit}	$\mu_{constraint}$	$\sigma_{constraint}$	$\frac{value-\mu}{\sigma_{constraint}}$
5001	luminosity	927.1	20	901.9	53.11	0.47
5161	k-factor, 2j $\hat{p}_T < 150$	0.96	0.02	1.100	0.050	-2.8
5162	k-factor, 2j $150 < \hat{p}_T$	1.26	0.03	1.330	0.050	-1.4
5211	misId, $p(e \to e)$ central	0.99	0.01	0.981	0.007	1.29
5212	misId, $p(e \to e)$ plug	0.93	0.01	0.940	0.010	-1
5216	misId, $p(\gamma \to \gamma)$ central	0.97	0.02	0.990	0.020	-1
5217	misId, $p(\gamma \to \gamma)$ plug	0.91	0.02	0.910	0.020	0
5219	misId, $p(b \to b)$ central	1	0.04	0.874	0.080	1.58
5285	misId, $p(q \to \tau) 15 < \hat{p}_T < 60$	3.4×10^{-3}	1.0×10^{-4}	0.004	0.0004	-1.5
5401	trigger, $p(e \to trig)$ central, $\hat{p}_T > 25$	0.98	0.01	0.970	0.010	1
5403	trigger , $p(\mu \to trig)$ CMUP, $\hat{p}_T > 25$	0.92	0.01	0.908	0.010	1.2
5404	trigger , $p(\mu \to trig)$ CMX, $\hat{p}_T > 25$	0.96	0.01	0.954	0.015	0.4

What do you expect the next discovery to be in the field?

- A big part of the votes indicates it is a good idea to try to find New Physics we may not expect.



Poll of ~300 people at Fermilab.
Appeared in Symmetry magazine.