Spin Analysis Update

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New Implementation

Two new methodologies:

- Fit each category individually
  - Yields in each category float, we lose the extra information from the relative signal between categories
- Fit all spin bin 0(1) at the same time
  - Simultaneous fit of 4 bins
  - Preserves relative yields information
  - Final results are 2 signal strengths

Both cases simple sig+bkg model Pow2+Gaussian

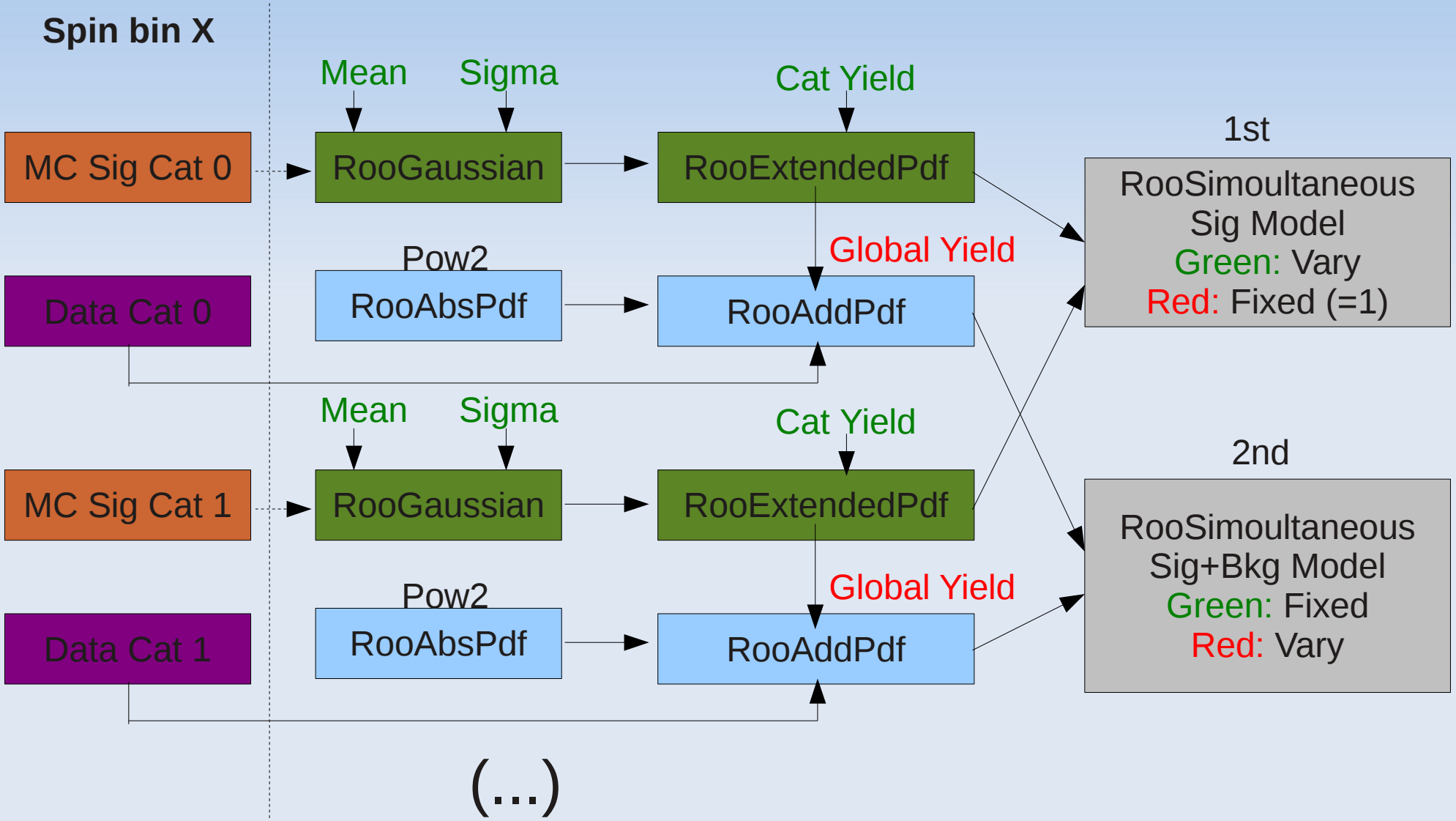
Fitting Individually

	Signal entries: MC Sig SM Higgs			
Spin cat 0	4.995	14.972	19.985	28.995
Spin cat 1	1	7.998	10	20.011
	Signal entries: Data SM Higgs Model			
Spin cat 0	8.63	22.988	22.426	27.321
Spin cat 1	2.214	1.069	0.136	0.029
	Signal entries: MC Sig Graviton			
Spin cat 0	2	6	10	19
Spin cat 1	0	7	9.002	23.005
	Signal entries: Data Graviton Model			
Spin cat 0	9.333	23.378	22.564	26.531
Spin cat 1	2.513	1.11	0	0.259

Consistent with what was expected but:

- Some categories read zero signal events
- Would imply infinite fractions
- Possible solution... Simultaneous Fit of Spin Bins

Simultaneous Fit



Results

- **SM Higgs**

Signal Strength (Spin bin 0): 11.3426 +/- 6.14177

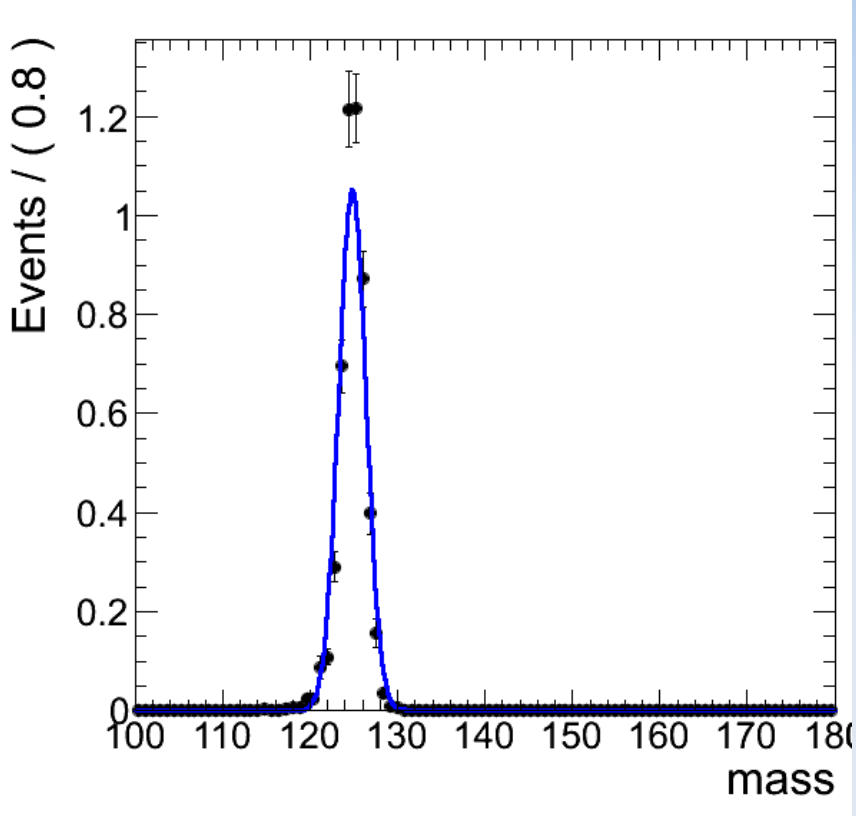
Signal Strength (Spin bin 1): 1.91316 +/- 0.214445

- **Graviton**

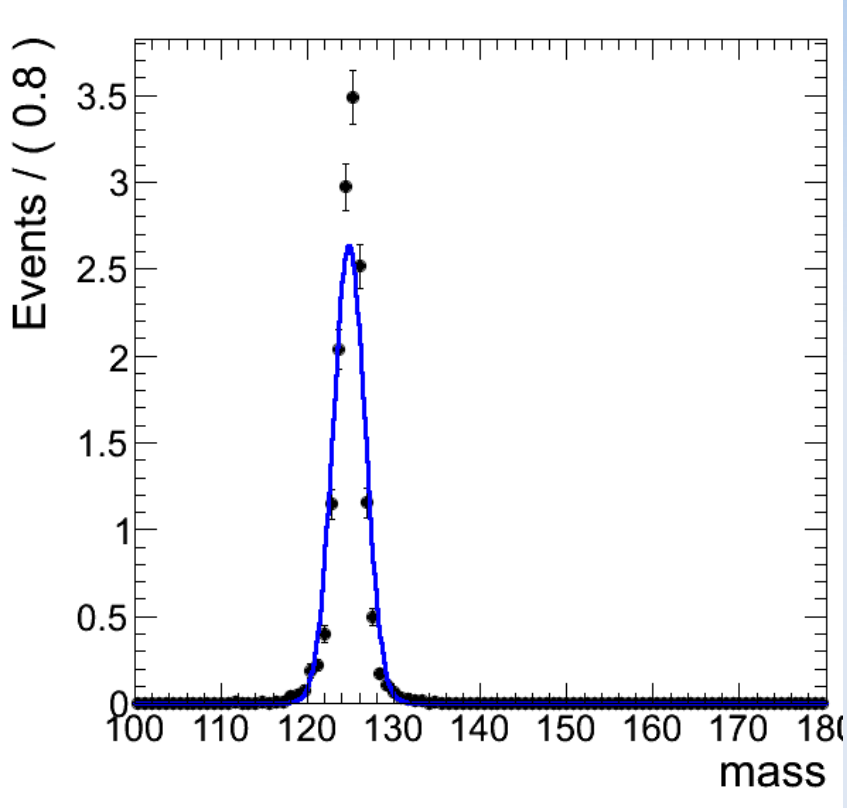
Signal Strength (Spin bin 0): 14.8998 +/- 7.1576

Signal Strength (Spin bin 1): 2.23636 +/- 0.194562

Strange Behaviour I



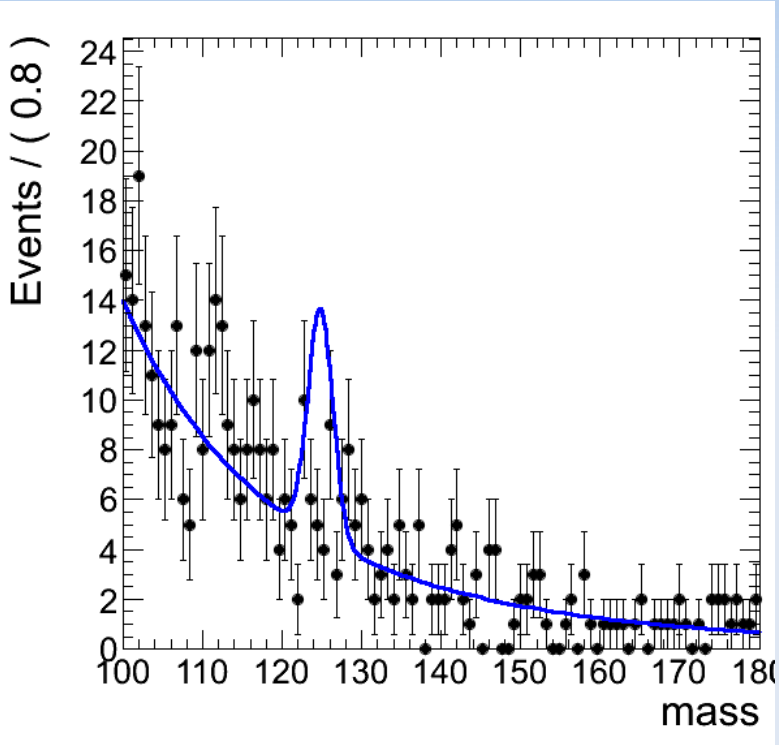
MC SM Higgs Cat 0 Spin 0



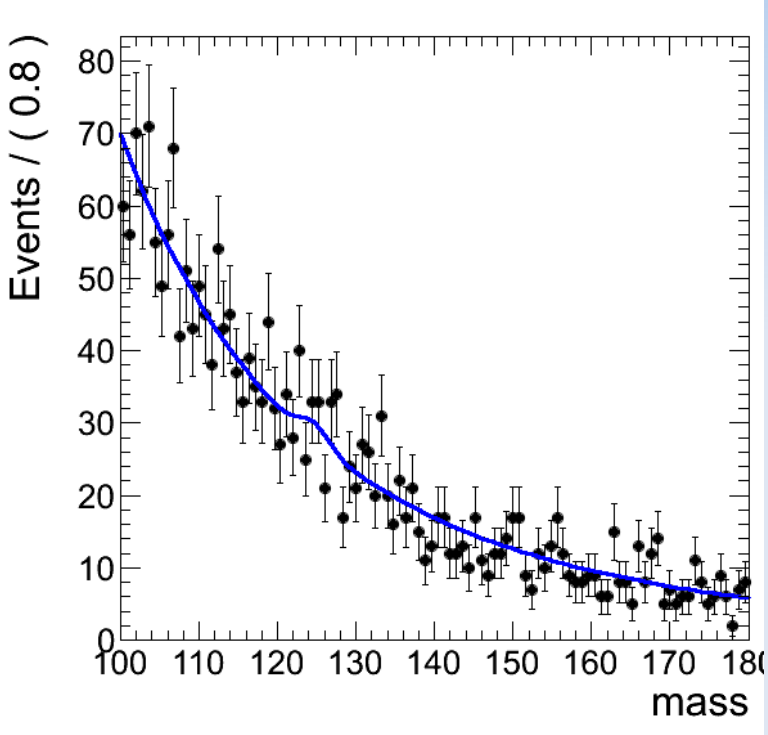
MC SM Higgs Cat 1 Spin 0

MC plots look resonable (for a single Gaussian fit...)

Strange Behavior I



Data Cat 0 Spin 0



Data Cat 1 Spin 0

Good fit on Data Cat 1 Spin 0 forcing signal strength up?

Next

- Run cross checks on all code
- Try to find reason for disagreement