VBF MVA Updates and Status

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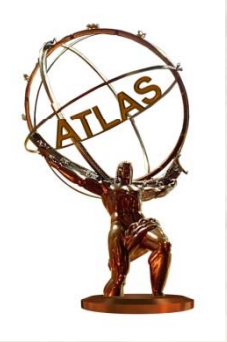

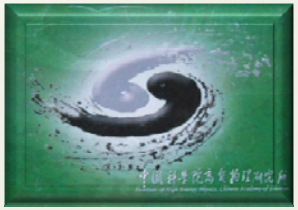

Current Baseline Results

Results (5GeV wind)	Cut-based loose	Cut-based tight	MVA loose	MVA tight
VBF signal	2.9	4.5	4.7	4.1
ggF	1.9	1.5	3.9	1.0
bk model	35.1	9.7	43.7	6.7
Purity	59.5%	74.7%	53.7%	79.6%
Significance	0.48	1.26	0.67	1.36
$\Delta\mu_{VBF}$ (statistic)	87.6%		78.8%	
Data	369	99	451	69

- Use Sherpa MC (74.9%) + RevISO (25.1%) as background model
  - half for training, half for test
- MVA VBF categories v.s cut-based ones
  - 12% better on expected VBF significance
  - 9% better on measured μ_{VBF} uncertainty (statistic only)
- Current MVA VBF comparing to Moriond VBF:
  - 2% improvement on VBF significance and $\Delta\mu_{VBF}$
  - 4% improvement on VBF purity

More Tests with Data Sidebands

Significance	Loose	Tight	Combined	VBF Purity
Sherpa	0.63	1.40	1.54	79.0%
RevISO	0.57	1.40	1.51	76.1%
RevID	0.49	1.25	1.35	71.1%
Sherpa+RevISO	0.65	1.43	1.57	79.5%
Sherpa+RevID	0.62	1.40	1.53	77.8%
RevISO+RevID	0.55	1.32	1.43	73.4%
All 3	0.66	1.42	1.57	79.3%

- RevID does not help
- Best results from Sherpa MC + full RevISO
  - 3% better than baseline MVA
  - part of the improvement from fluctuation
    - won't update the baseline for now
    - retrain MVA / test stability with new data in future