Preliminary calculations and fitting results of 2D selections

Min Zhong, Yanxi Gu

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Part 1: Fitting Results

➢ Info.

- ➢ **Same procedure as previous fitting (not "added")**
- ➢ **For example, while analyzing $\mu\mu$ HZZ channels, $\nu\nu$ HZZ events that passed $\mu\mu$ HZZ selections are still regarded as backgrounds**

➢ Fitting precision comparison

Channel	Merely cut-based	2D cut applied
$\mu\mu H\nu\nu jj$	**18.15**	**17.40**
$\mu\mu Hjj\nu\nu$	**65.25**	**63.13**
$\nu\nu H\mu\mu jj$	**13.45**	**13.04**
$\nu\nu Hjj\mu\mu$	**27.83**	**28.41**
$qqH\nu\nu\mu\mu$	**54.26**	**57.26**
$qqH\mu\mu\nu\nu$	**63.93**	**64.04**
Combined	**9.68**	**9.43**

Part 2: Calculations

➢ Info.

- ➢ Add different channels' signals together and use S/sqrt(S+B) to calculate the precision
- ➢ For example, while analyzing $\mu\mu$HZZ channels, $\nu\nu$ HZZ events that passed $\mu\mu$HZZ selections are regarded as signals

➢ Calculation (take $\mu\mu H\nu\nu qq$ channel as an example)

- ➢ Event selection results

	signal	ZH	2f	4f
2D cut applied	52.85	33	0	4

- ➢ Remained backgrounds

	2D cut applied		2D cut applied
e2e2h_e3e3	3	zz_sl0mu_down	1
e2e2h_ww	22	zz_sl0tau_up	1
nnh_zz	6	zz_l0taumu	2

- ➢ $\frac{S}{\sqrt{S+B}} = \frac{52.85+6}{\sqrt{52.85+37}} = 6.21, \quad precision: 16.1\%$

Part 3: Comparisons

➢Precision comparison

Unit: %

Channel	Merely cut-based	2D cut applied (not added)	Calculated (added)
$\mu\mu Hvvjj$	**18.15**	**17.40**	**16.11**
$\mu\mu Hjjvv$	**65.25**	**63.13**	**57.65**
$vvH\mu\mu jj$	**13.45**	**13.04**	**11.63**
$vvHjj\mu\mu$	**27.83**	**28.41**	**24.17**
$qqHvv\mu\mu$	**54.26**	**57.26**	**47.28**
$qqH\mu\mu vv$	**63.93**	**64.04**	**52.36**
Combined	**9.68**	**9.43**	**8.43**