Weekly Report

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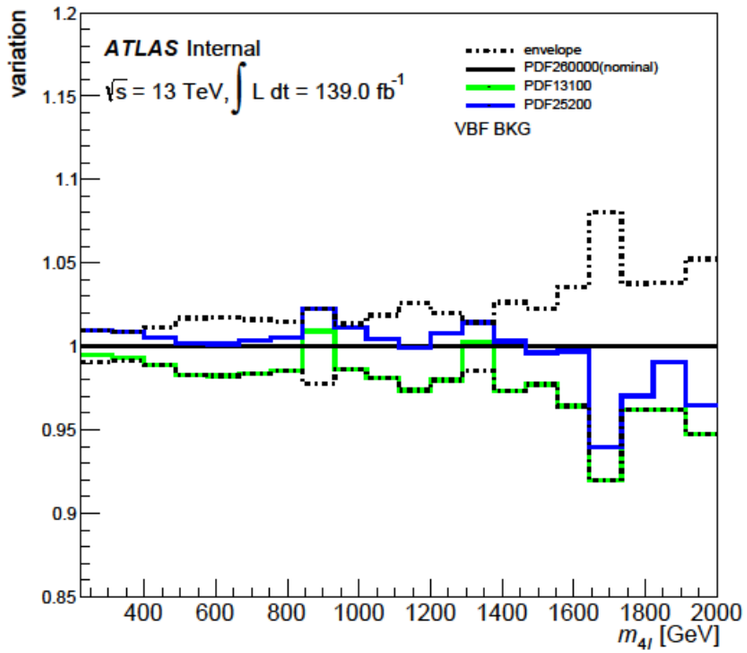
11/23/2020

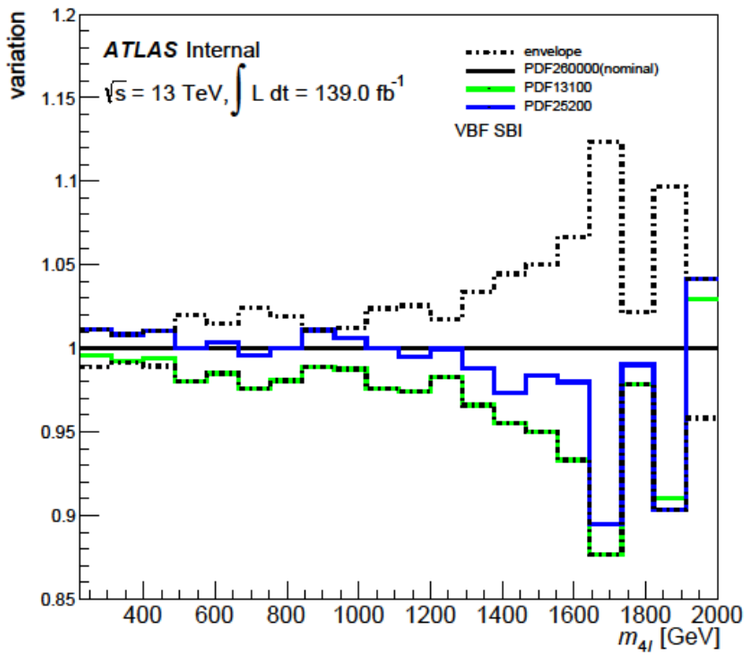
Alternative PDF systematic uncertainty on VBF signal region

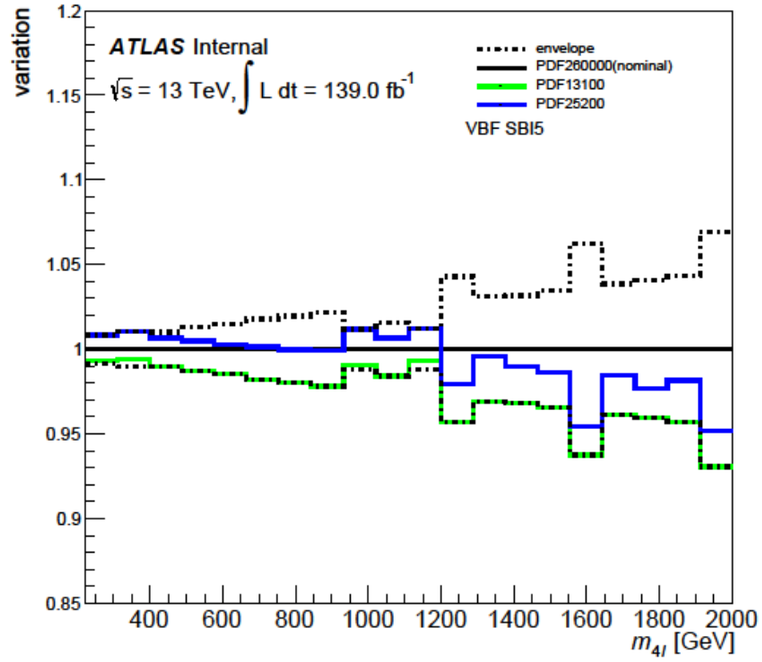
- Alternative PDF sets: MUR1.0_MUF1.0_PDF260000 (nominal), MUR1.0_MUF1.0_PDF13100, MUR1.0_MUF1.0_PDF25200
- Taken as an envelope of all variations as a function of m4l and MELA
- Compare for SIG, SBI, SBI5, SBI10, BKG

Alternative PDF systematic uncertainty on VBF signal region

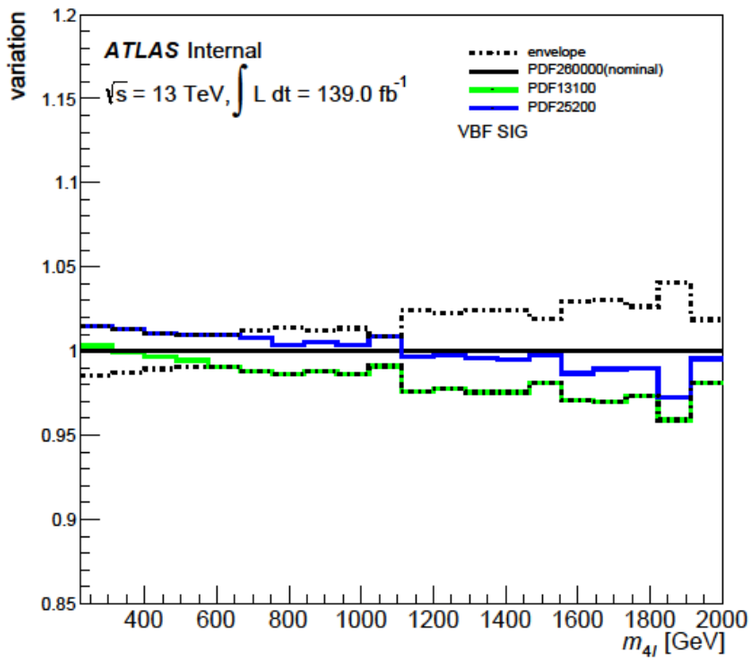
- As a function of m4l

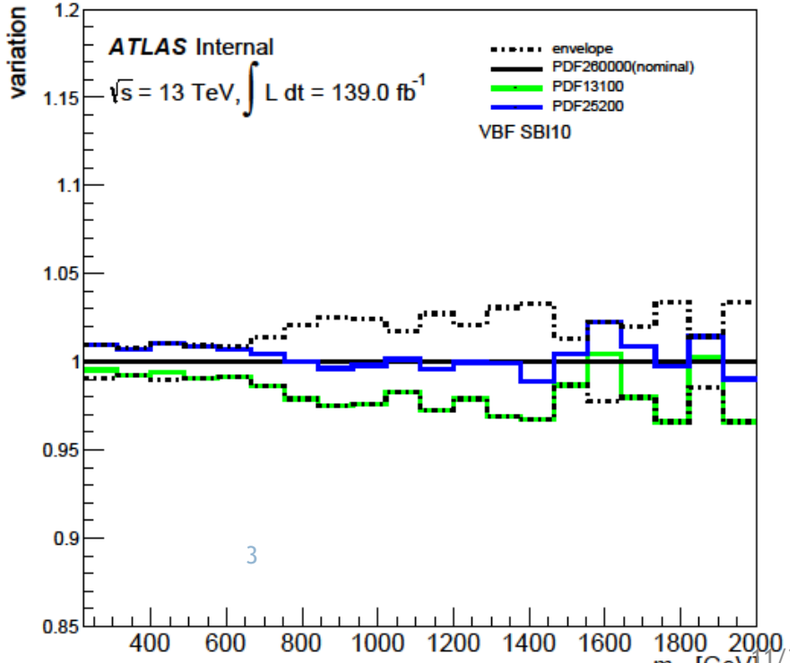






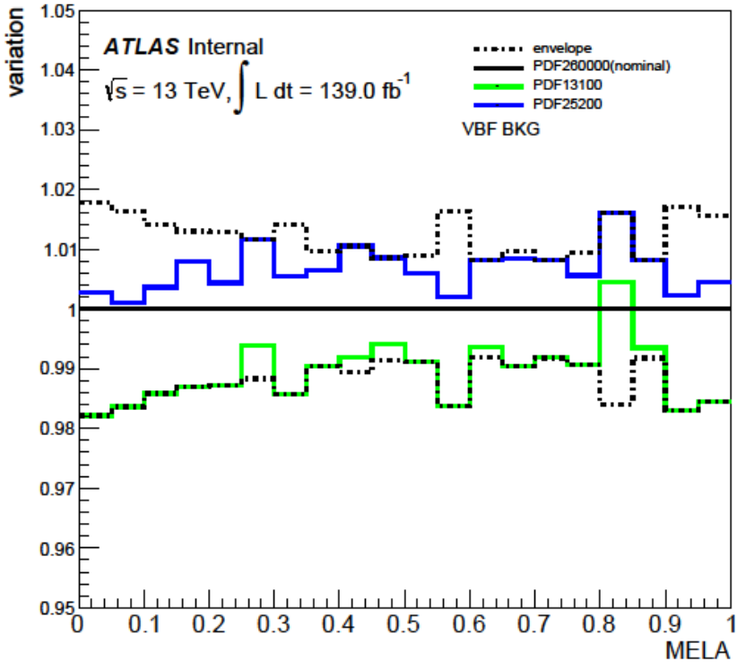
category	Maximum
SBI	12.4%
SBI5	6.9%
SBI10	3.4%
SIG	4.1%
BKG	8.0%

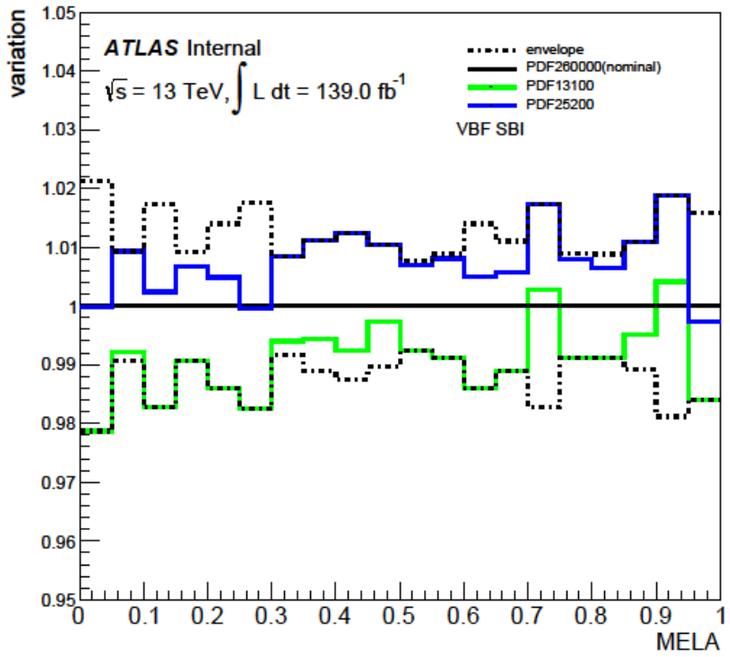


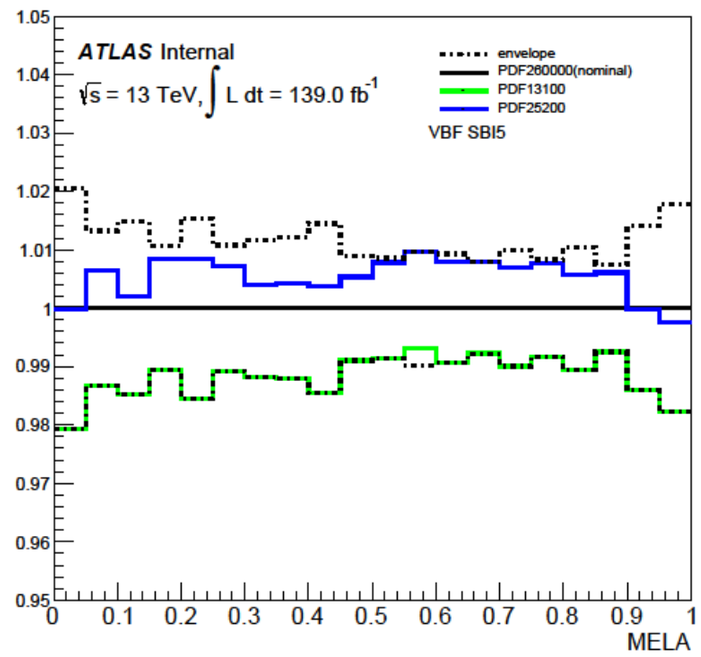


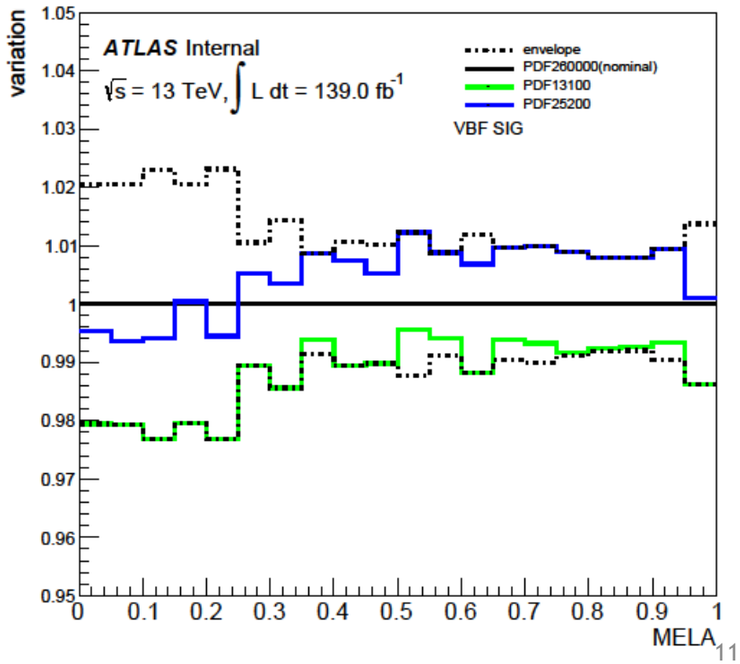
Alternative PDF systematic uncertainty on VBF signal region

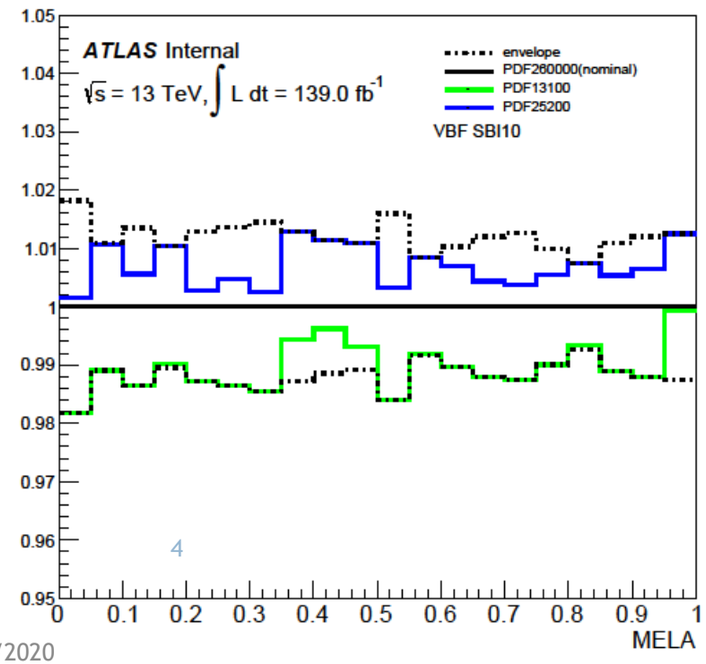
- As a function of MELA
- Larger in marginal region











category	Maximum
SBI	2.1%
SBI5	2.1%
SBI10	1.8%
SIG	2.3%
BKG	1.8%

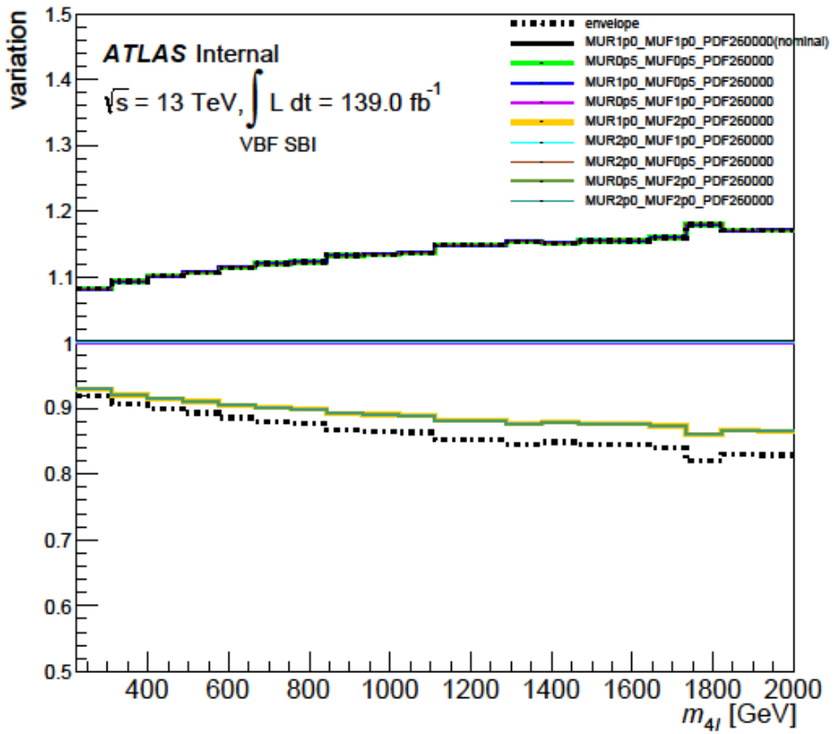
QCD scales systematic uncertainty on VBF signal region

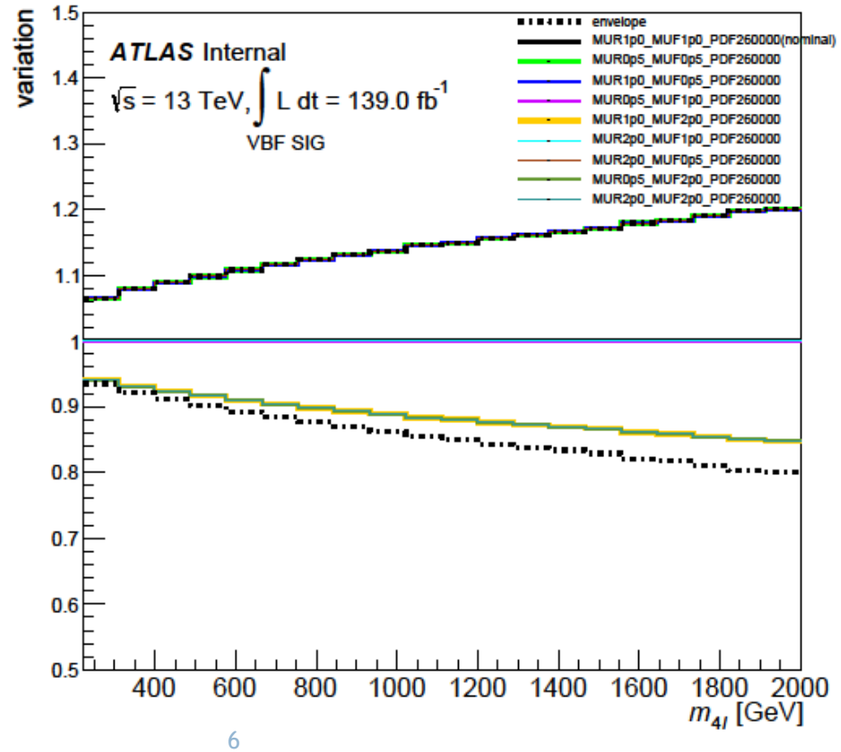
- QCD scale: MUR1.0_MUF1.0_PDF260000 as nominal, $\mu_R = 0.5, 1.0, 2.0$, $\mu_F = 0.5, 1.0, 2.0$
- Taken as an envelope of all variations as a function of m4l and MELA
- Compare for SIG, SBI, SBI5, SBI10, BKG

QCD scales systematic uncertainty on VBF signal region

- As a function of m4l
- Up to 20% (?)
- Similar shape for SIG, SBI, SBI5, SBI10, BKG, increase with respect to m4l
- Only related to muF (?)

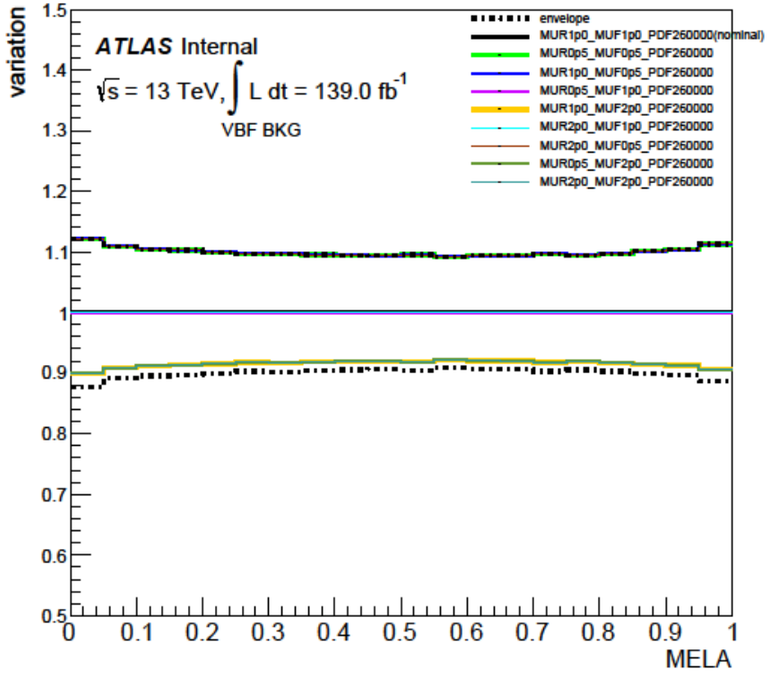
category	Maximum
SBI	17.9%
SBI5	19.4%
SBI10	19.7%
SIG	20.0%
BKG	18.8%



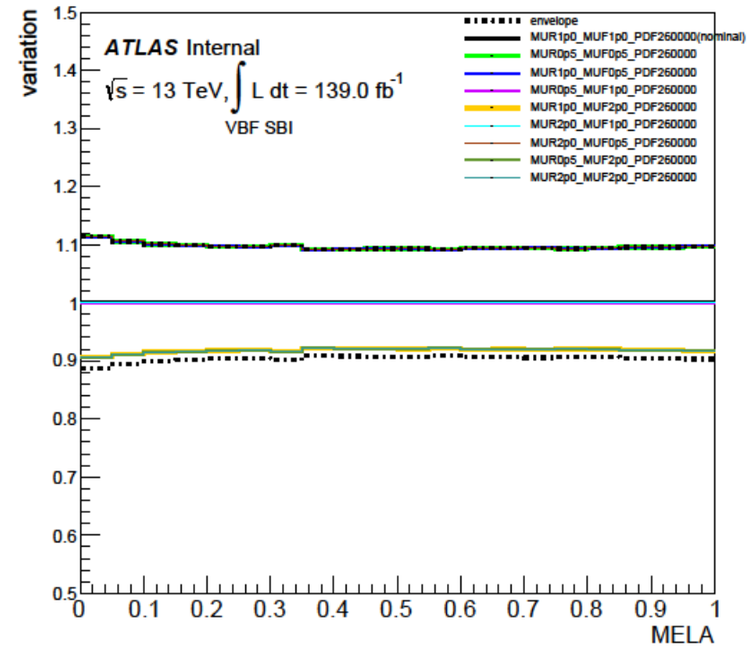


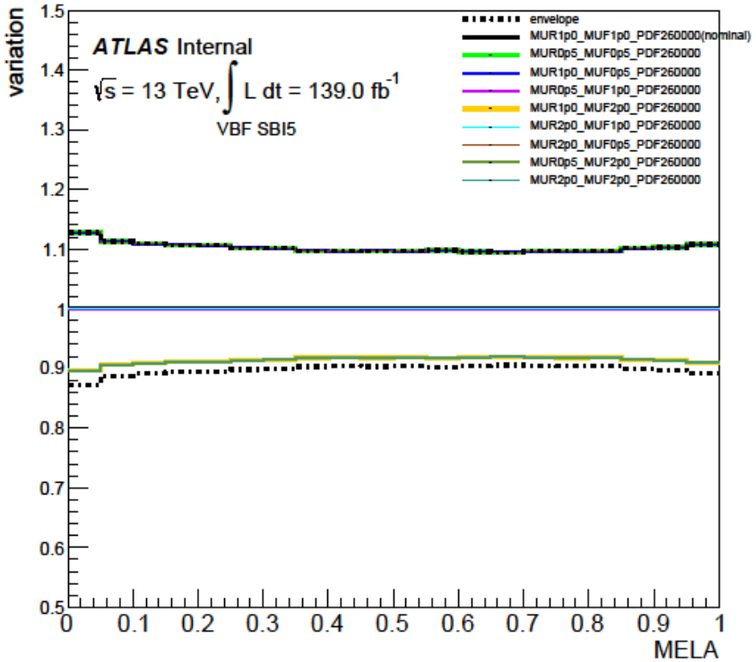
QCD scales systematic uncertainty on VBF signal region

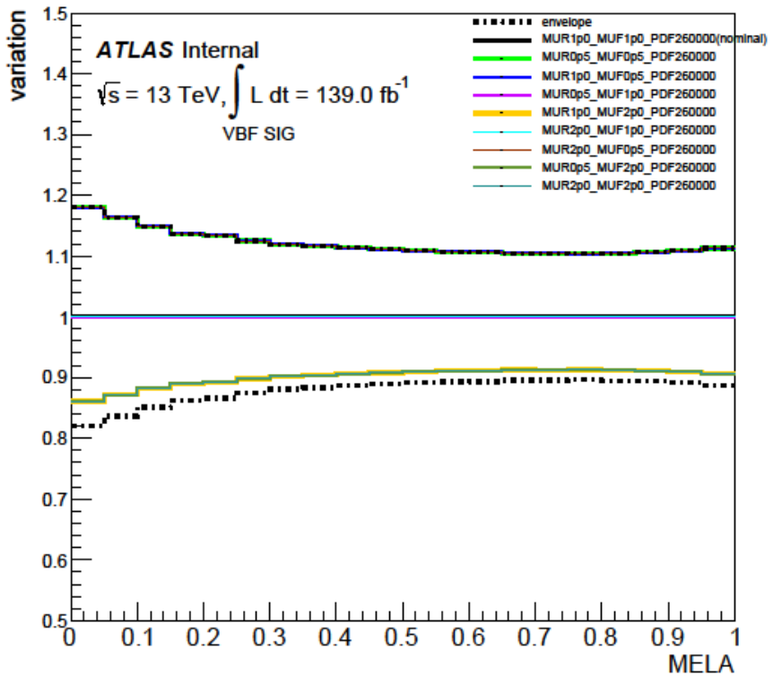
- As a function of MELA
- All within 2%

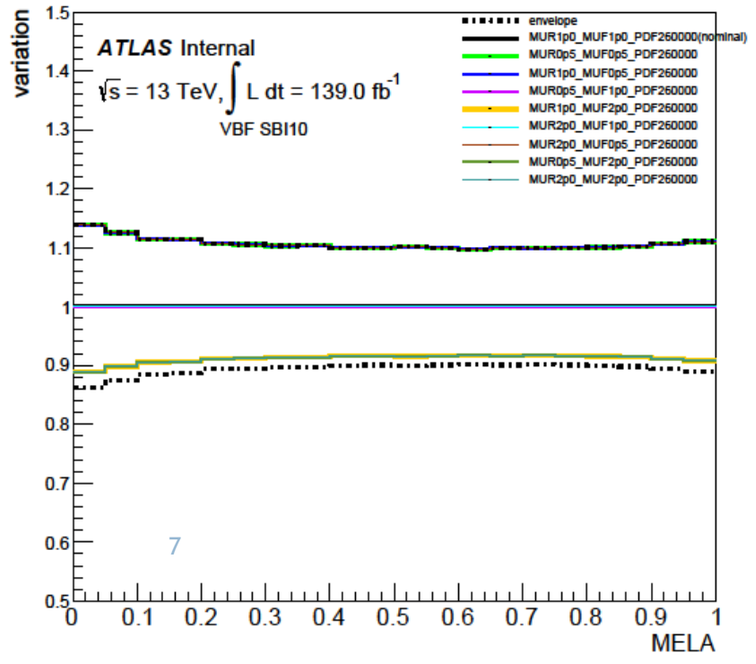


category	Maximum
SBI	11.3%
SBI5	12.8%
SBI10	13.9%
SIG	18.0%
BKG	12.2%







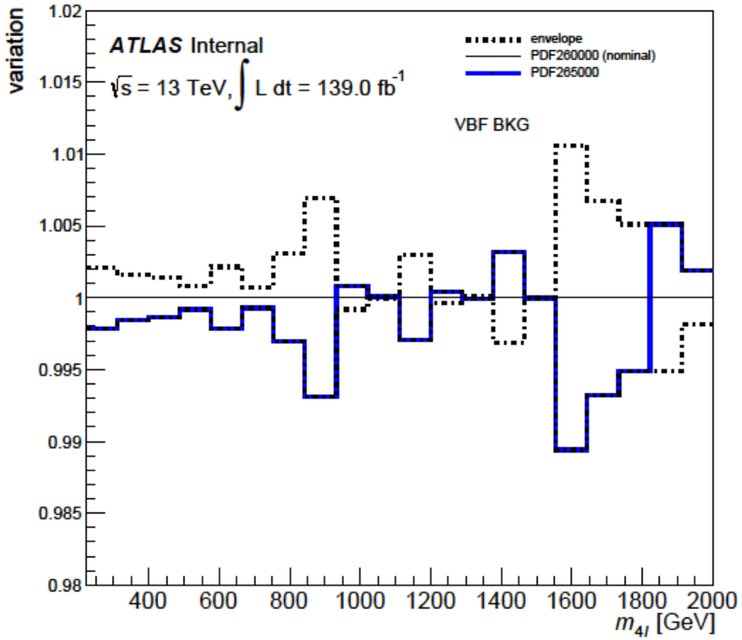


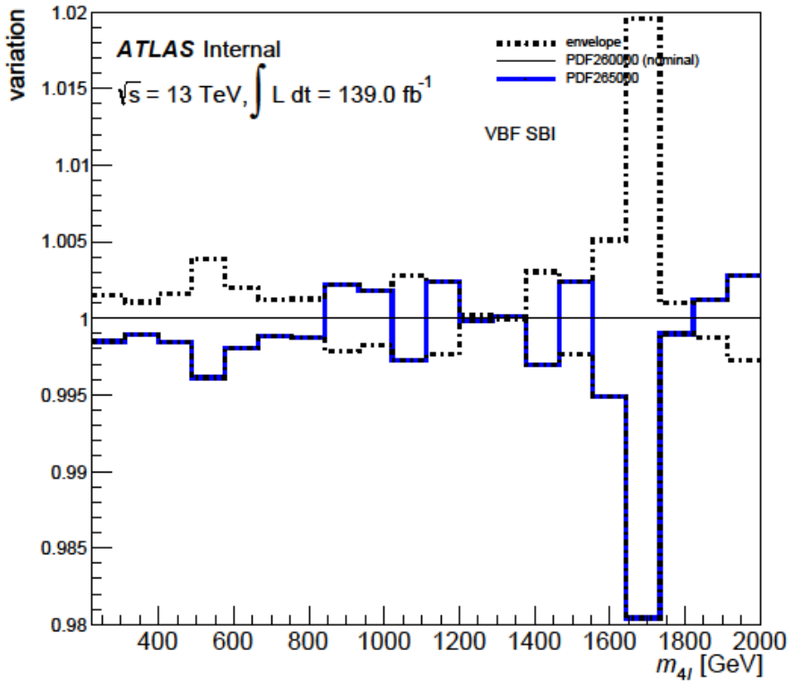
Alpha_S systematic uncertainty on VBF signal region

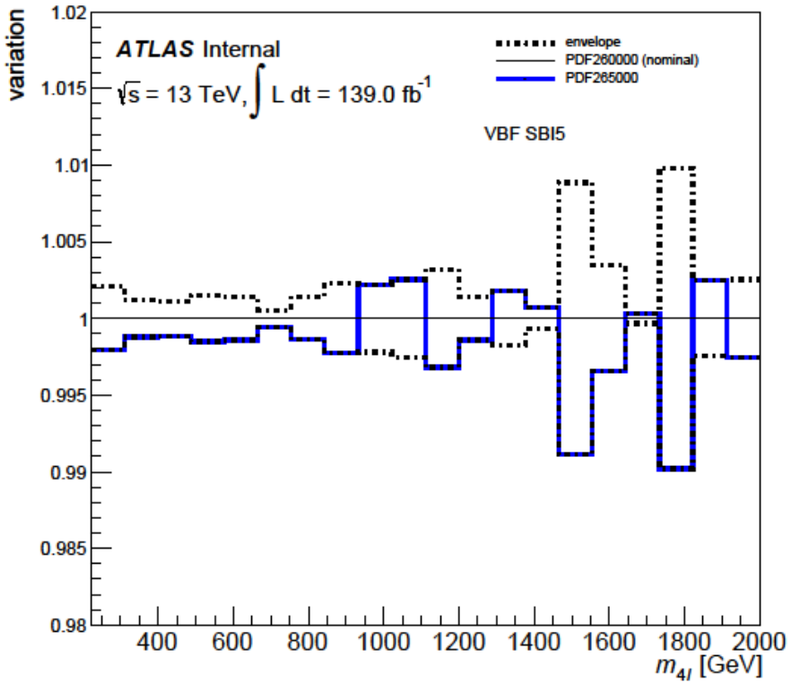
- α_S variation: MUR1.0_MUF1.0_PDF265000 (α_S = 0.117), MUR1.0_MUF1.0_PDF260000 (nominal, α_S = 0.118)
- Taken as an envelope of all variations as a function of m4l and MELA
- Compare for SIG, SBI, SBI5, SBI10, BKG

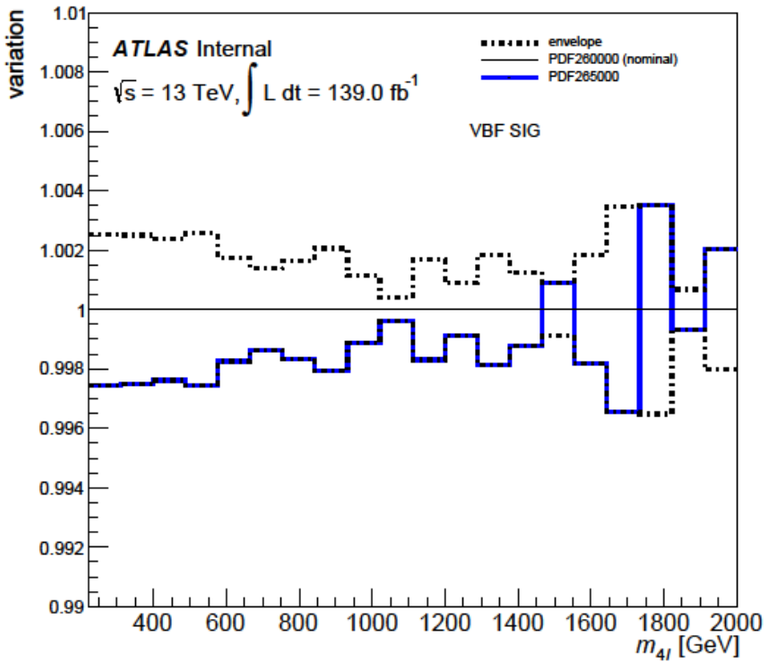
Alpha_S systematic uncertainty on VBF signal region

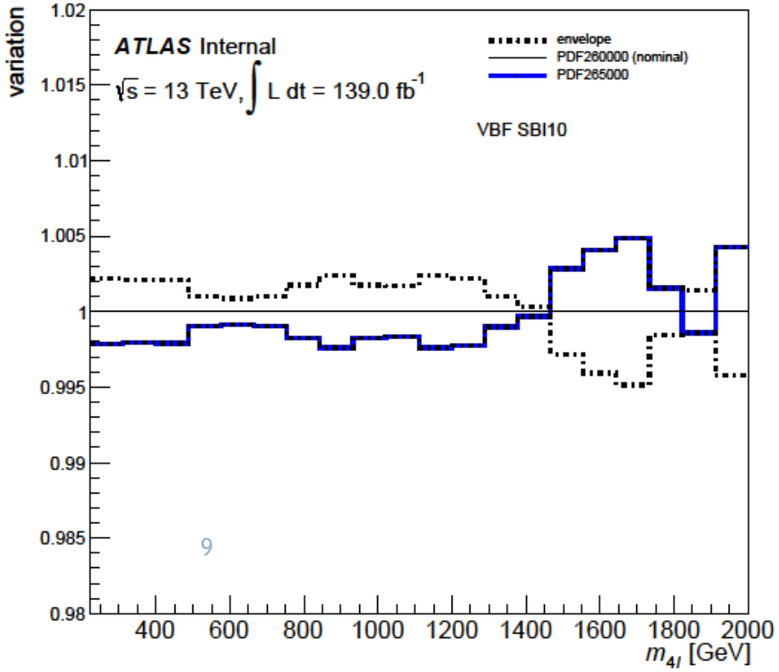
- As a function of m4l
- Up to 2% in SBI
- Within 1% in the rest







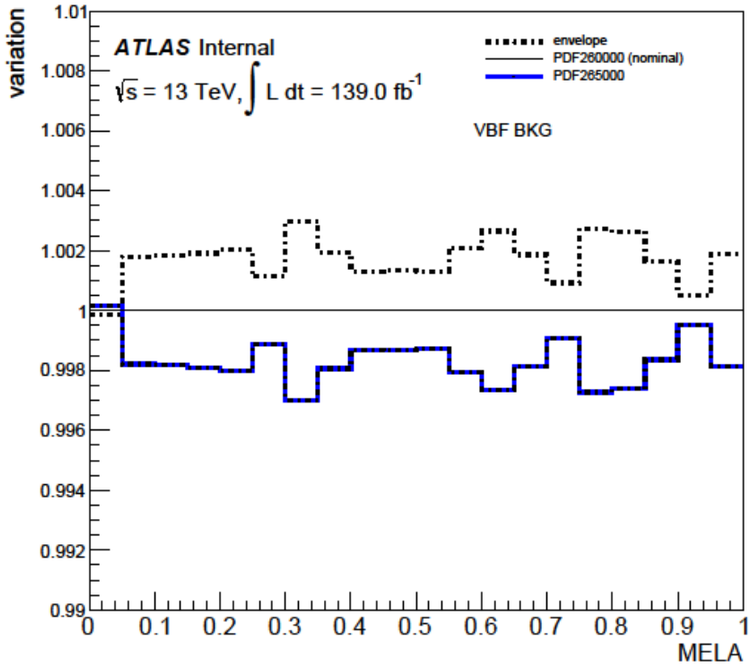




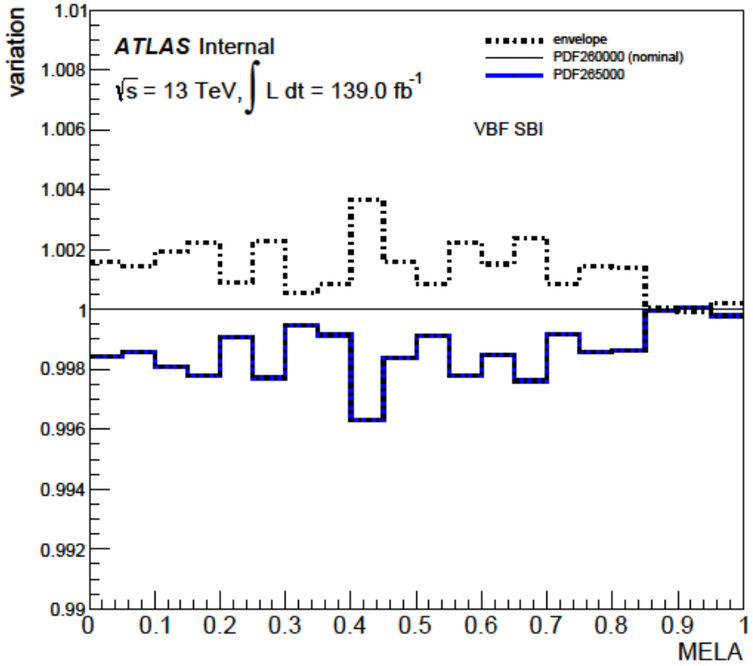
category	Maximum
SBI	0.2841%
SBI5	0.2540%
SBI10	0.2084%
SIG	0.1821%
BKG	0.2784%

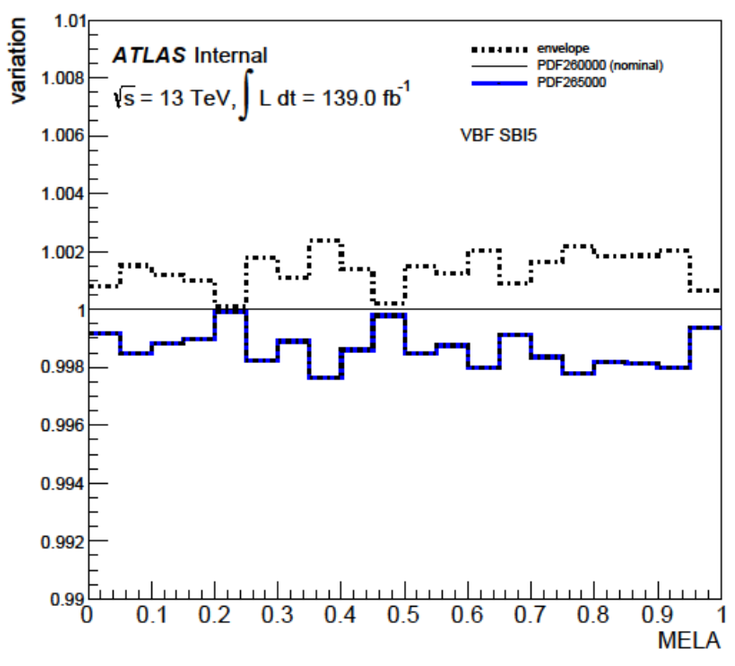
Alpha_S systematic uncertainty on VBF signal region

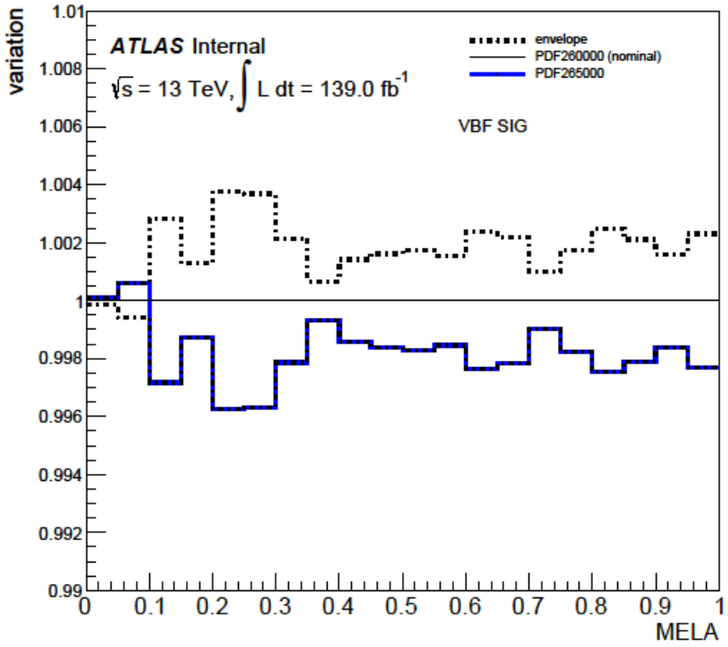
- As a function of MELA
- All within 0.4%

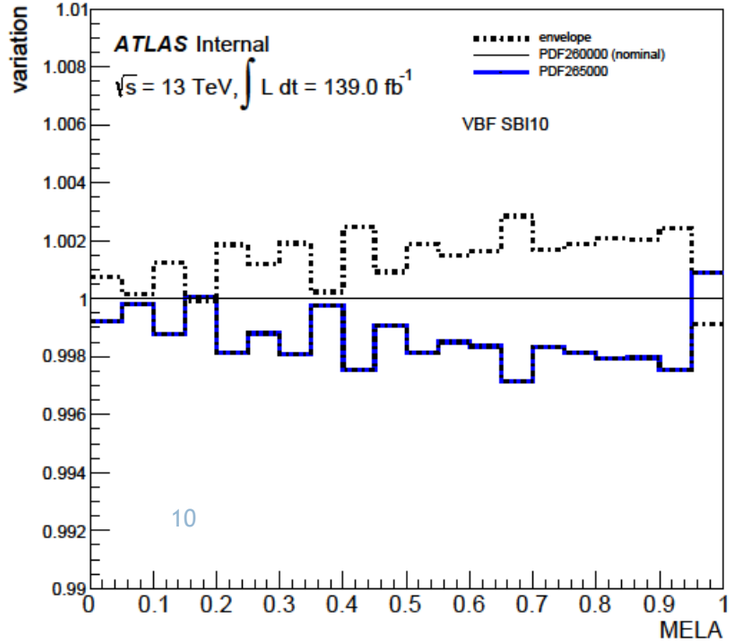


category	Maximum
SBI	0.1400%
SBI5	0.1366%
SBI10	0.1484%
SIG	0.1858%
BKG	0.1728%









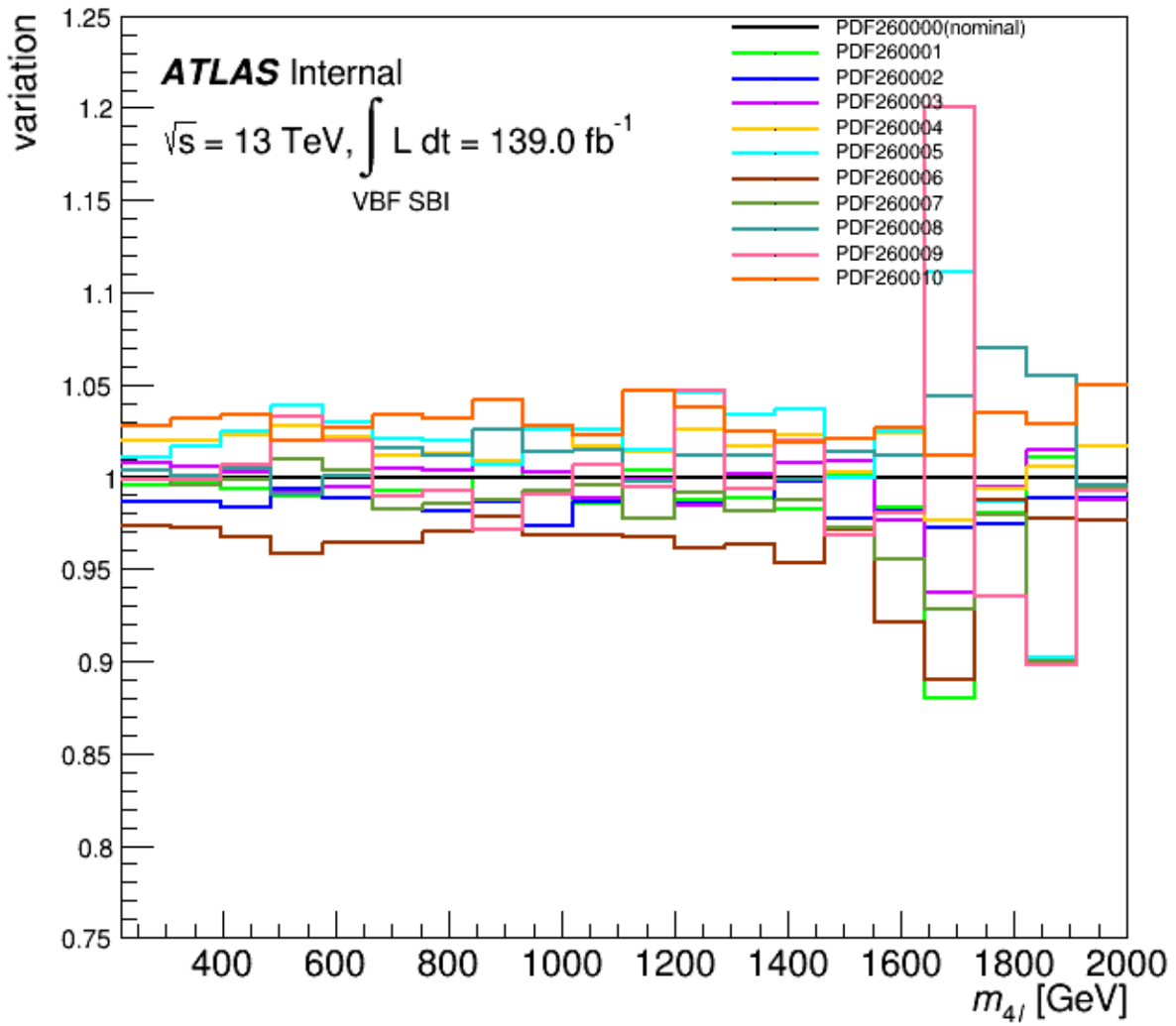
Internal PDF systematic uncertainty on VBF signal region

- internal PDF sets: MUR1.0_MUF1.0_PDF260000, ……, MUR1.0_MUF1.0_PDF260100
- Taken as the standard deviation of all variations as a function of m4l and MELA
- 10 groups: 1-10, 11-20, ……, 91-100
- Compare for SIG, SBI, SBI5, SBI10, BKG

Internal PDF systematic uncertainty on VBF signal region

- As a function of m4l
- Standard deviation of 100 PDFs
- Haven’t finished yet

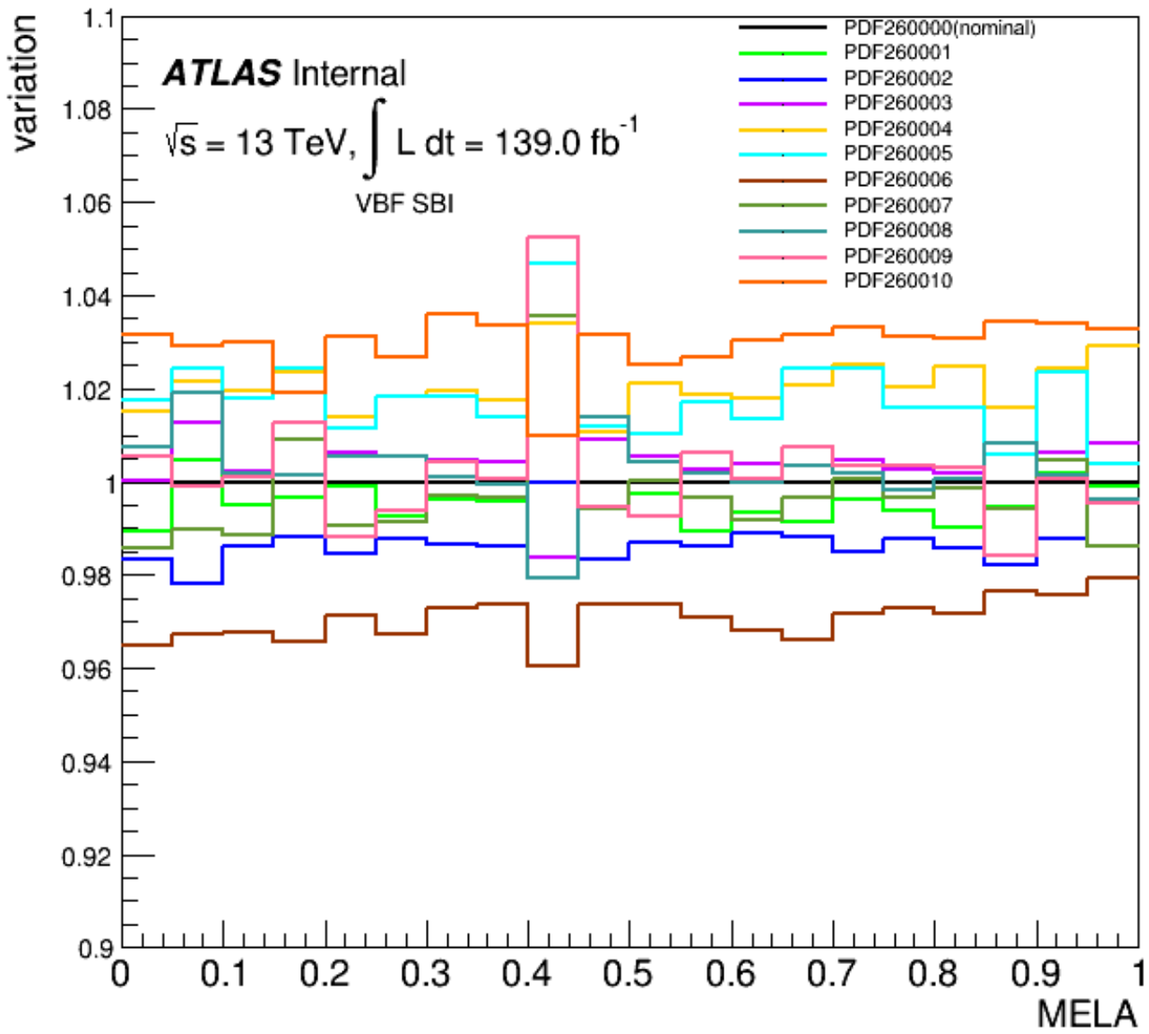
category	Standard deviation
SBI	1.2214%
SBI5	
SBI10	
SIG	
BKG	



Internal PDF systematic uncertainty on VBF signal region

- As a function of MELA
- ……

category	Standard deviation
SBI	1.0641%
SBI5	
SBI10	
SIG	
BKG	



Next steps

- Finish the rest of internal PDF sets

Thank you!