

# Measurement of $CP$ violation in $B^0 - \overline{B}^0$ mixing at LHCb

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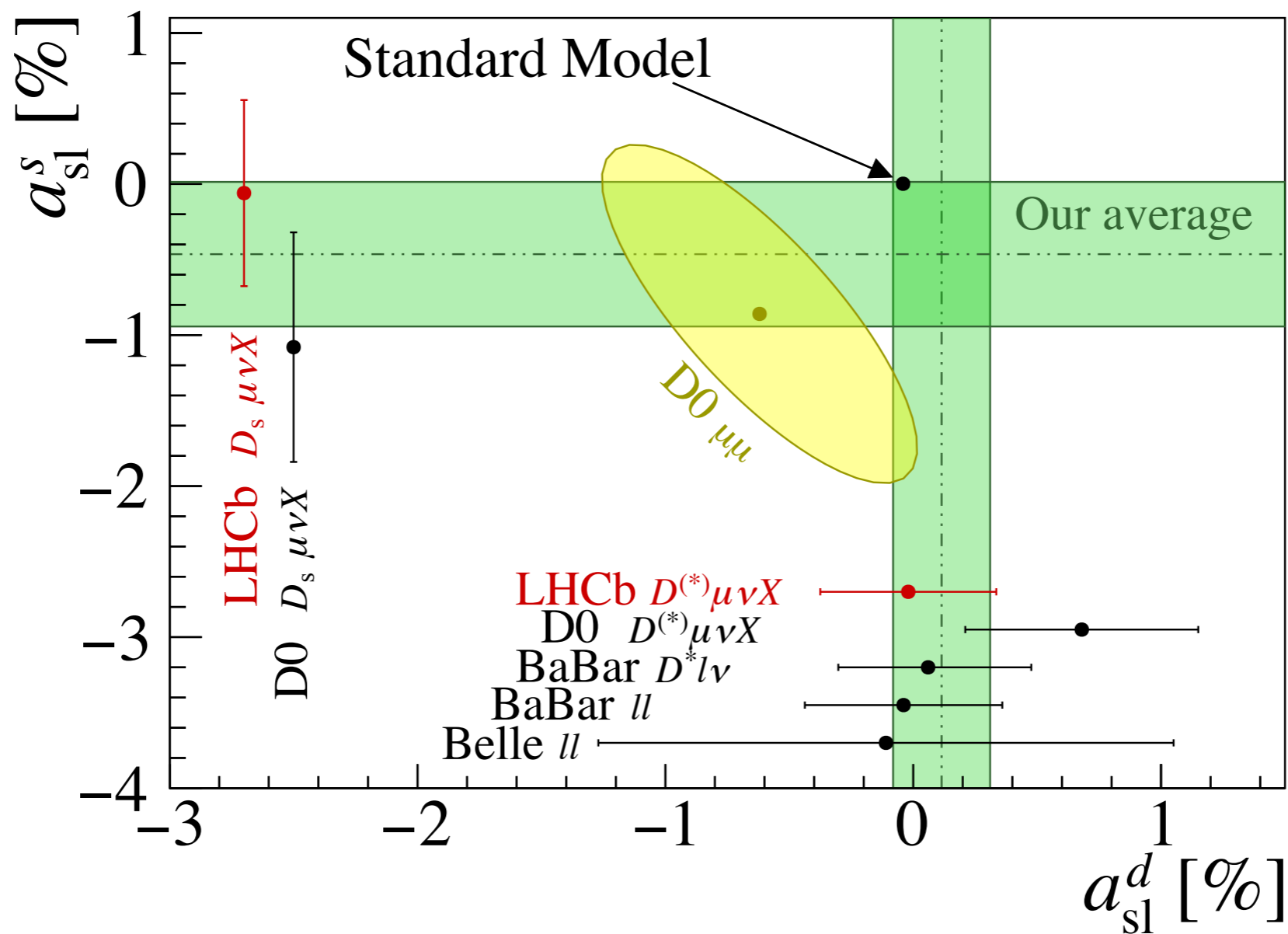
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RTG students lectures

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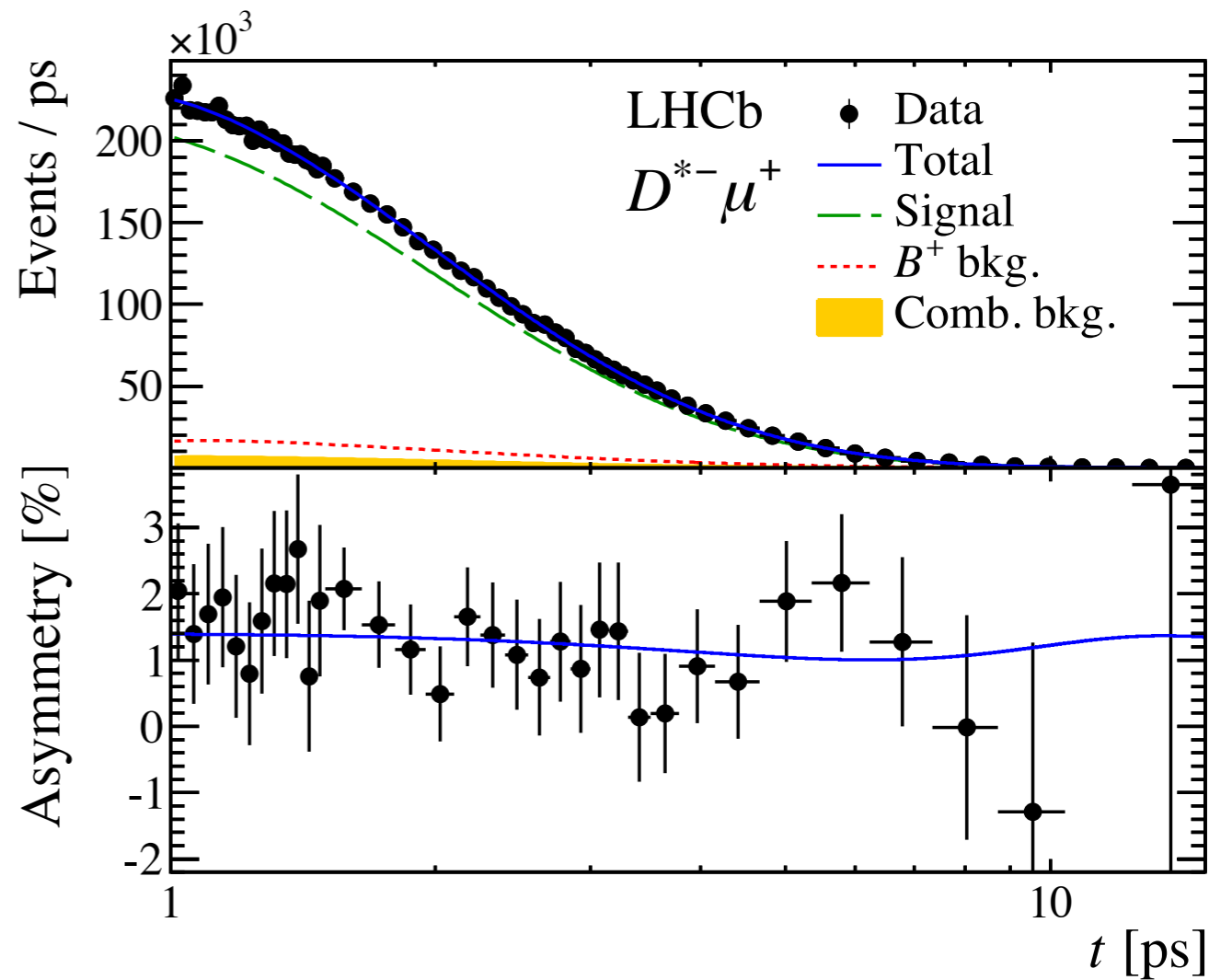
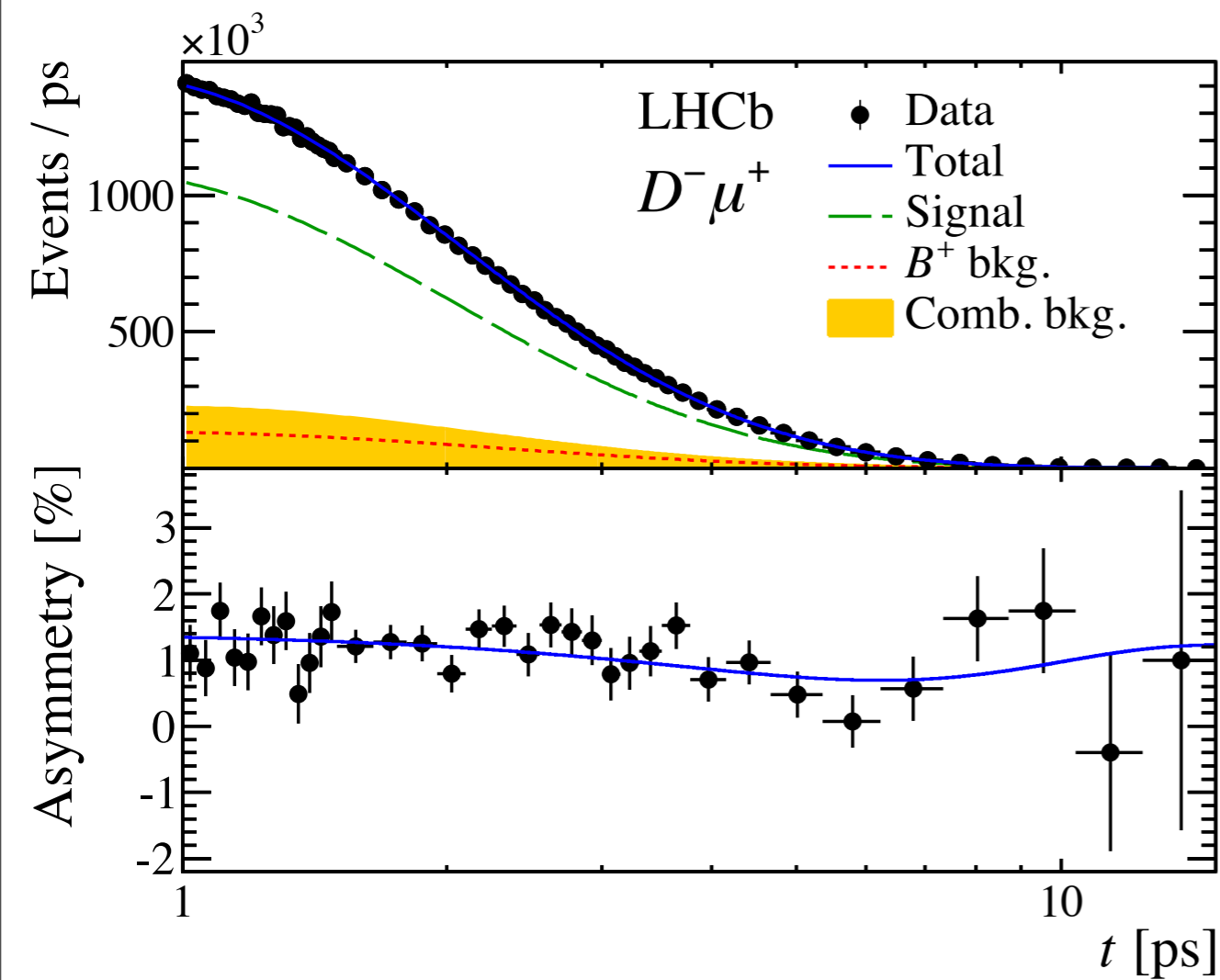
# Results (I)



$$a_{sl}^d = (-0.02 \pm 0.19(\text{stat}) \pm 0.30(\text{syst}))\%$$

LHCb  $3 \text{ fb}^{-1}$   
<http://arxiv.org/abs/1409.8586>

# Results (II)



$$A_P(7 \text{ TeV}) = (-0.66 \pm 0.26(\text{stat}) \pm 0.22(\text{syst}))\%$$

$$A_P(8 \text{ TeV}) = (-0.48 \pm 0.15(\text{stat}) \pm 0.17(\text{syst}))\%$$

Backup

# Experimental status

Exp. & Ref.	Method	Measurement
CLEO [1]	Dileptons + partial hadronic	$a_{sl}^d = (1.4 \pm 4.1 \pm 0.6)\%$
Belle [2]	Dileptons	$a_{sl}^d = (-0.11 \pm 0.79 \pm 0.85)\%$
BaBar [3]	Full hadronic rec.	$a_{sl}^d = (-5.8 \pm 2.6 \pm 2.2)\%$
BaBar [4]	Dileptons	$a_{sl}^d = (0.16 \pm 0.54 \pm 0.38)\%$
BaBar [5]	Partial semilept.	$a_{sl}^d = (0.06 \pm 0.17^{+0.38}_{-0.32})\%$
Average of $B$ factories above [6]		$a_{sl}^d = (0.02 \pm 0.32)\%$
D0 [7]	Partial semilept.	$a_{sl}^d = (0.68 \pm 0.45 \pm 0.14)\%$
D0 [8]	Dimuon	$a_{sl}^d = (-0.62 \pm 0.42)\%$ $a_{sl}^s = (-0.86 \pm 0.74)\%$ $\rho = -0.79$
D0 [9]	Partial semilept.	$a_{sl}^s = (-1.12 \pm 0.74 \pm 0.17)\%$
LHCb [10]	Partial semilept.	$a_{sl}^s = (-0.06 \pm 0.50 \pm 0.36)\%$
Average of all measurements above [6]		$a_{sl}^d = (-0.09 \pm 0.21)\%$ $a_{sl}^s = (-0.77 \pm 0.42)\%$

[1] [Phys. Rev. Lett. 86 \(2001\) 5000](#)

[2] [Phys. Rev. D73 \(2006\) 112002](#)

[3] [Phys. Rev. 321 \(2004\) 012007](#)

[4] [Phys. Rev. Lett. 96 \(2006\) 251802](#)

[5] [Phys. Rev. Lett. 111 \(2013\) 101802](#)

[6] <http://www.slac.stanford.edu/xorg/hfag/>

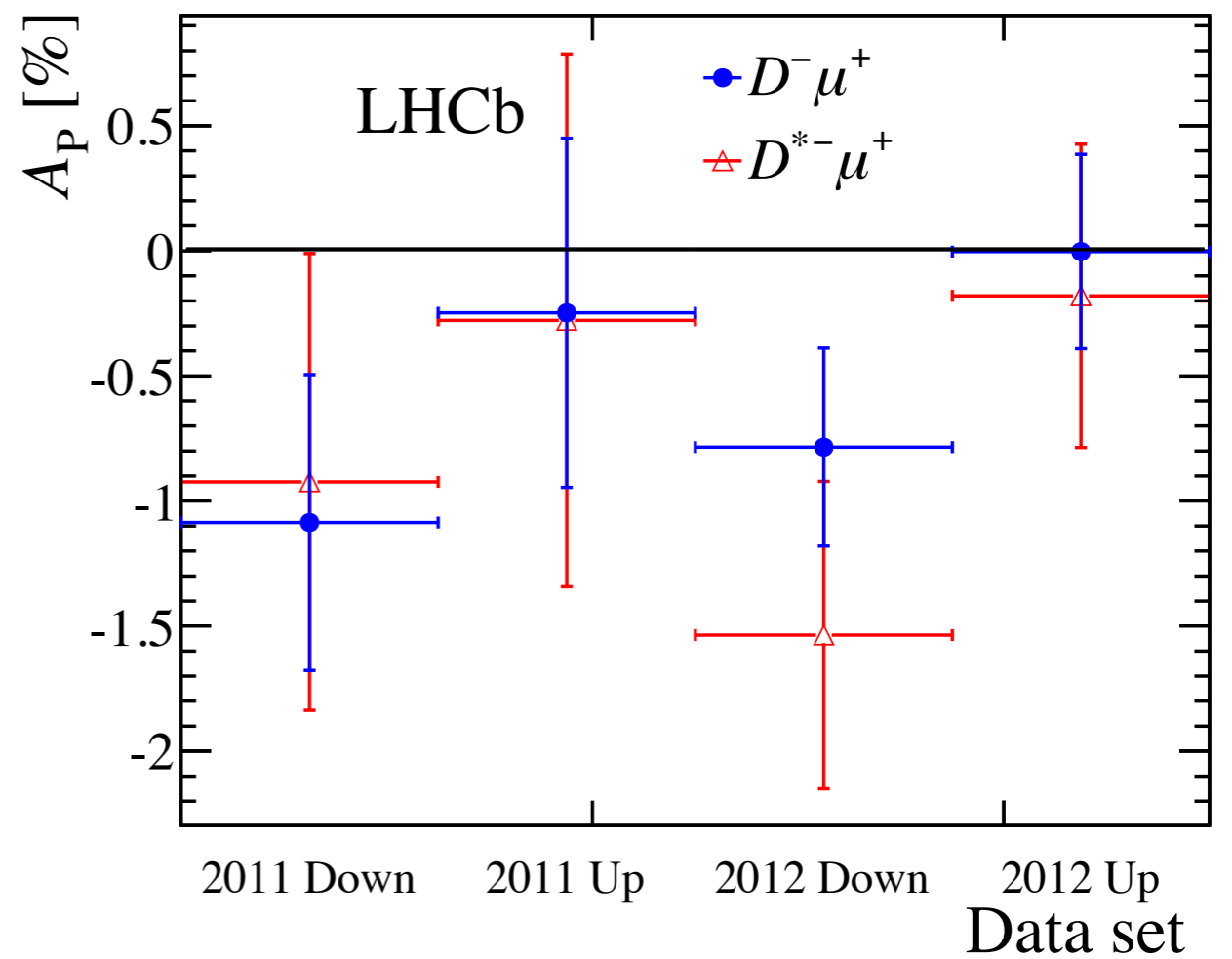
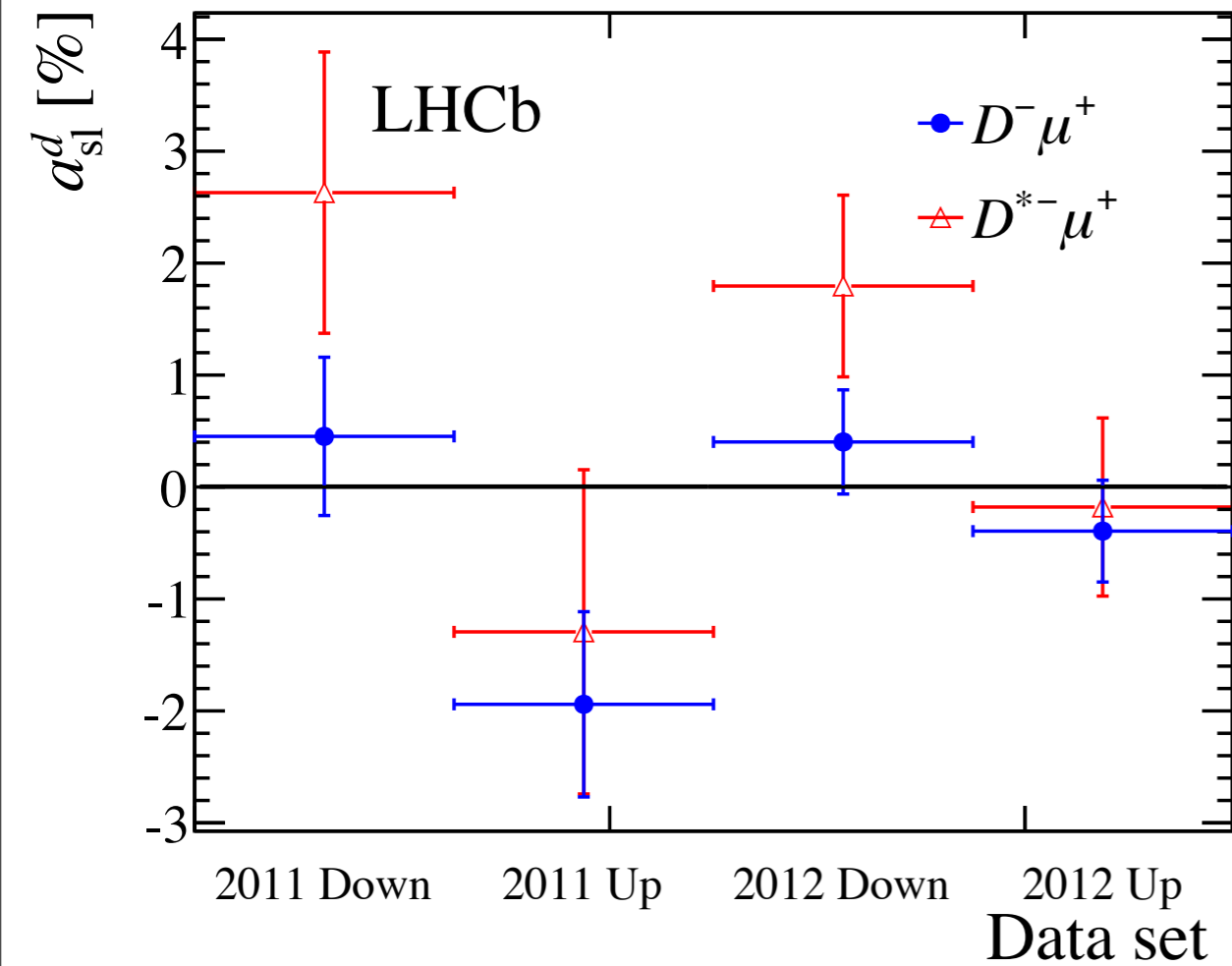
[7] [Phys. Rev. D86 \(2012\) 072009](#)

[8] [Phys. Rev. D89 \(2014\) 012002](#)

[9] [Phys. Rev. Lett.110\(2013\) 011801](#)

[10] [Phys. Lett.B 728 \(2014\) 607](#)

# Data samples



$$a_{sl}^d = (-0.19 \pm 0.21(\text{stat only}))\%$$

$$D^- \mu^+$$

$$a_{sl}^d = (0.77 \pm 0.45(\text{stat only}))\%$$

$$D^{*-} \mu^+$$