Observables for flavour part of the document

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The flavour part will be structured more or less as follows:

- Summary of status of flavour physics and its implications to the TeV scale.

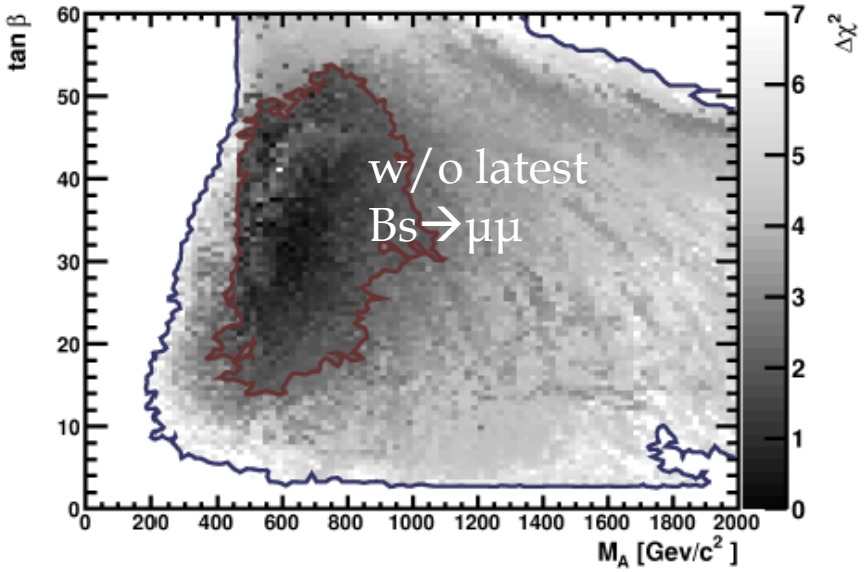
- Define a series of main observables (B physics, charm physics, kaon physics, and LFV) and the future prospects to measure them in LHCb upgrade and/or SuperB

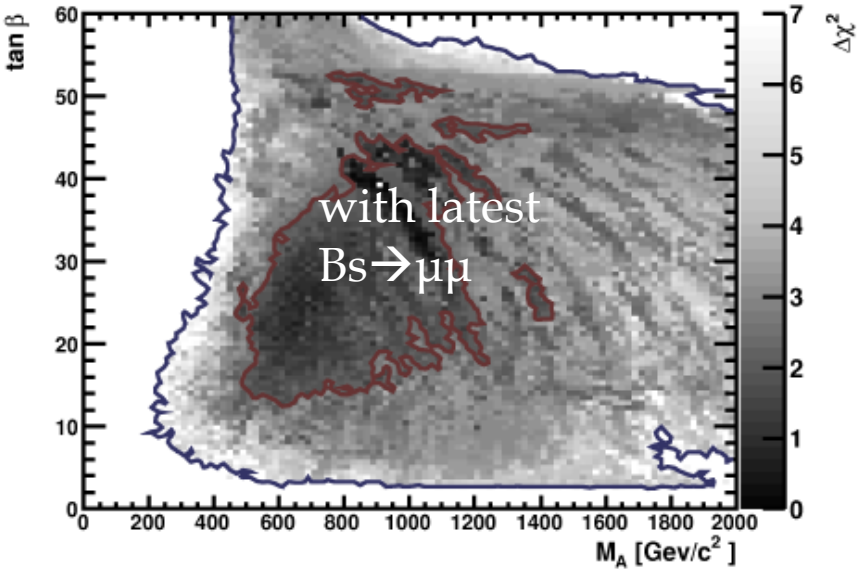
    - LHCb: Take input from talks at this workshop and LHCb implications document.
    - SuperB: take input from M. Ciuchini talk at this workshop and SuperB case document

Summary of implications (just an example)

Just an example: relevance of Bs→μμ for SUSY **on top of all other observables**

Higgs and SUSY searches at LHC, dark matter searches at XENON100, dark matter relic density, EW and B physics measurements (such as b → sγ, B+ → τν, Bs → μμ), g–2





Representative observables (Status and Future)

Observable class of observables)	SM prediction	Ultimate th. error	Present result	Future (S)LHCb	Future SuperB
$\gamma \qquad [B \to DK]$	input	$< 1^\circ$	$(70^{+27}_{-30})^\circ$	0.9°	1.5°
$S_{B_d \to \psi K}$	β	$\lesssim 0.01$	0.671 ± 0.023	0.0035	0.0025
$S_{B_s \to \psi\phi, \psi f_0(980)}$	$2\beta_s$	$\lesssim 0.01$	-0.002 ± 0.087	0.008	-
$S_{[B_s \to \phi\phi]}$	$2\beta_s^{eff}$	$\lesssim 0.05$	-	0.03	[?]
$S_{[B_s \to K^{*0}\bar{K}^{*0}]}$	$2\beta_s^{eff}$	$\lesssim 0.05$	**CPV in B**	0.02	[?]
$S_{[B_s \to \phi\gamma]}$	$2\beta_s^{eff,\phi\gamma}$	-	-	0.02	[?]
$A^d_{\rm SL}[\times 10^{-3}]$	-0.5	0.1	-5.8 ± 3.4	[?]	[?]
$A^s_{\rm SL}[\times 10^{-3}]$	2×10^{-2}	$< 10^{-2}$	-7.87 ± 1.96	-	4
$A^s_{\rm fs}[\times 10^{-3}]$	0.019 ± 0.003	...	-2.4 ± 6.3	0.2	-
$\mathcal{B}(B \to \tau\nu)[\times 10^{-4}]$	1	$5\%_{\rm Latt}$	(1.14 ± 0.23)	-	4%
$\mathcal{B}(B \to \mu\nu)[\times 10^{-7}]$	4	$5\%_{\rm Latt}$	< 13	-	5%
$\mathcal{B}(B \to D\tau\nu)[\times 10^{-2}]$		$5\%_{\rm Latt}$	1.02 ± 0.17	-	2%
$\mathcal{B}(B \to D^*\tau\nu)[\times 10^{-2}]$		$5\%_{\rm Latt}$	1.76 ± 0.17	-	2%

DRAFT

B→τν and friends

Representative observables (Status and Future)

DRAFT

Observable class of observables)	SM prediction	Ultimate th. error	Present result	Future (S)LHCb	Future SuperB
$\mathcal{B}(B_s \to \mu^+\mu^-)[\times 10^{-9}]$	3.5	$5\%_{\rm Latt}$	< 4.2	0.15	-
$\mathcal{B}(B_d \to \mu^+\mu^-)/\mathcal{B}(B_s \to \mu^+\mu^-)$	0.29	$\sim 5\%$	-	$\sim 35\%$	-
$q_0[A_{FB}(B \to K^*\mu^+\mu^-)]$				2%	[?]
$A_{\rm T}^{(2)}(B \to K^*\mu^+\mu^-)$	$< 10^{-3}$	b→s ll		0.04	[?]
$A_{\rm CP}(B \to K^*\mu^+\mu^-)$	$< 10^{-3}$			0.5%	1%
$B \to K\nu\bar{\nu}[\times 10^{-6}]$	4	$10\%_{\rm Latt}$	< 16	-	0.7
$\lvert q/p\rvert_{D-\rm mixing}$	1	$< 10^{-3}$	0.91 ± 0.17	$O(1\%)$	2.7%
ϕ_D	$\lesssim 0.1\%$		–	$O(1^\circ)$	1.4°
$\Delta a_{CP}^{\rm dir}(\pi\pi, KK)(\%)$	~ 0?	CPV	$-0.68 \pm .015$	0.015	[?]
$a_{CP}^{\rm dir}(\pi\pi)(\%)$	$\lesssim 0.3$	in charm	0.20 ± 0.22	0.015	[?]
$a_{CP}^{\rm dir}(KK)(\%)$	$\lesssim 0.3$		-0.23 ± 0.17	0.010	[?]
$a_{CP}^{\rm dir}(\pi\pi\gamma, KK\gamma)$	$\lesssim 0.3\%$		–	-	[?]
$\mathcal{B}(\tau \to \mu\gamma)[\times 10^{-9}]$			< 44	-	2.4
$\mathcal{B}(\tau \to 3\mu)[\times 10^{-10}]$	0		$< 210(90\%CL)$	1-80	2

LFV in taus

Representative observables (Status and Future)

Other observables not directly related to SuperB or LHCb upgrade

Observable class of observables)	SM prediction	Ultimate th. error	Present result	Future
$\mathcal{B}(\mu \to e\gamma)[\times 10^{-12}]$			$< 2.4(90\%CL)$	~ 0.1 MEG,~ 0.01 PSI, Project X
$\mathcal{B}(\mu N \to eN)(Tl)$	$\sim 10^{-57}$?		$< 4.3 \times 10^{-12}$	10^{-18} PRISM
$\mathcal{B}(\mu N \to eN)(Al)$	$\sim 10^{-57}$?		-	10^{-16} COMET, Mu2e
$\mathcal{B}(K^+ \to \pi^+ \nu\bar{\nu})[\times 10^{-11}]$	8.5	8%	$17.3^{+11.5}_{-10.5}$	$\sim 10\%$ NA62, $\sim 5\%$ ORKA $\sim 2\%$ Project X
$\mathcal{B}(K_L \to \pi^0 \nu\bar{\nu})[\times 10^{-11}]$	2.4	10%	<2600	$\sim 100\%$ KOTO, $\sim 5\%$ Project X
$\mathcal{B}(K_L \to \pi^0 e^+ e^-)_{SD}[\times 10^{-11}]$	1.4		<28	$\sim 10\%$ Project X