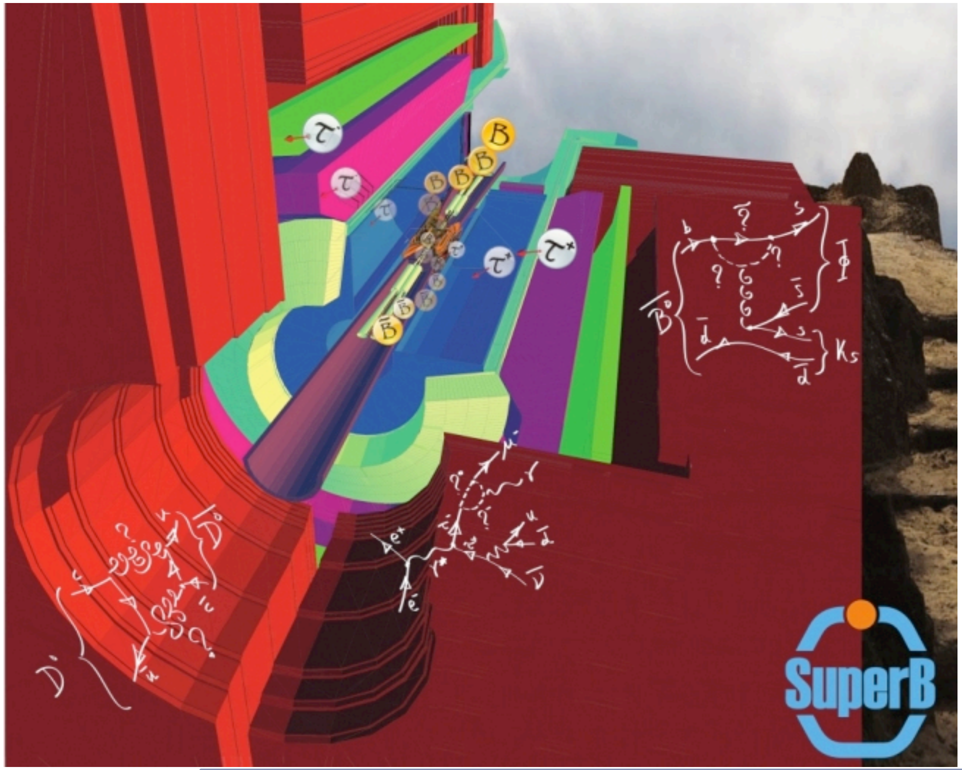

SuperB Physics

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1st SuperB Collaboration Meeting, London 13-16th Sept. 2011

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Comparison Document

INFN/AE_ZZ/ZZZZ, LAL-11-200, SLAC-R-14548, MZ-TH/11-25

The impact of Super*B* on flavour physics

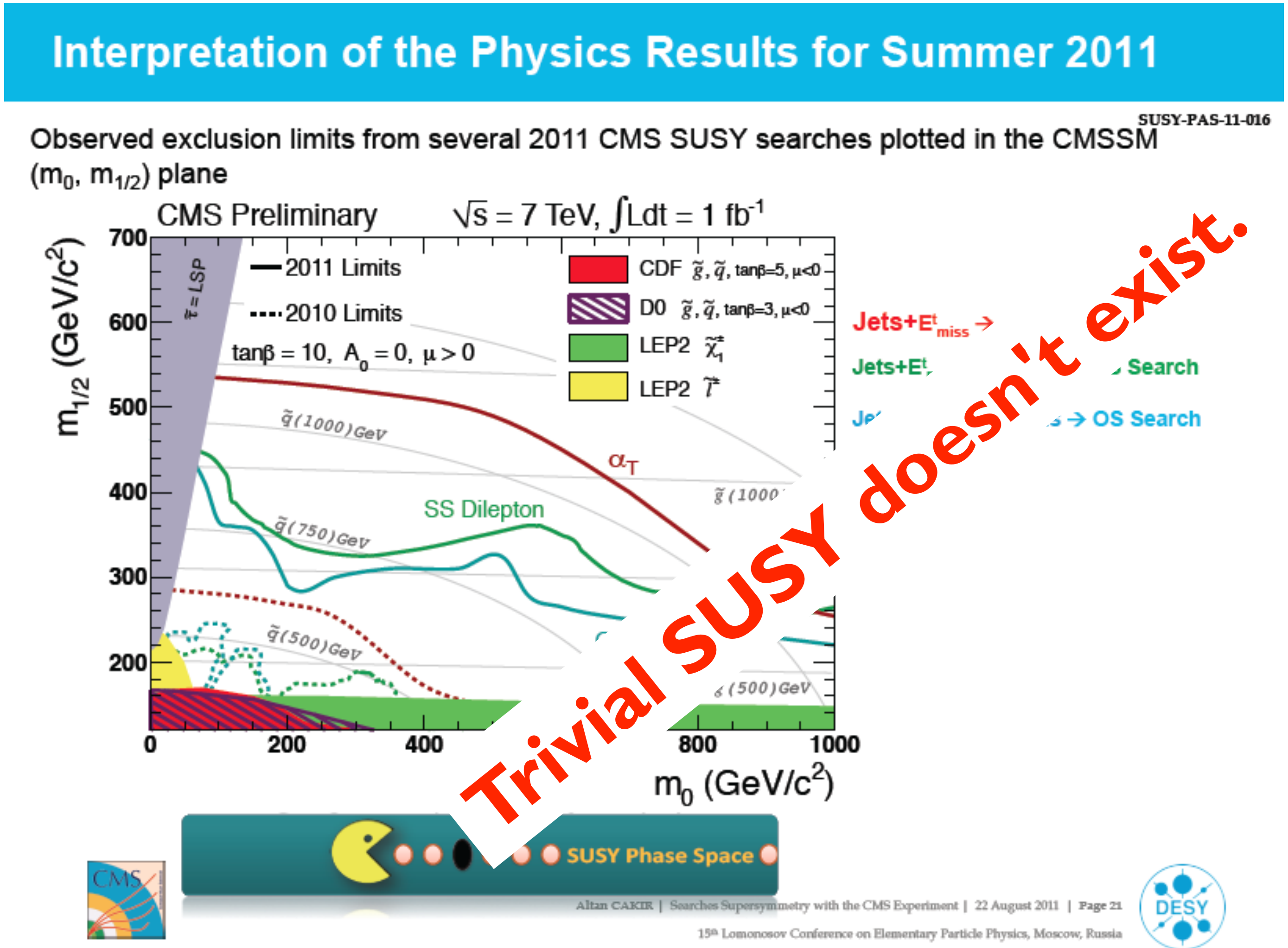
July 1, 2011

Abstract

This report provides a succinct summary of the physics programme of Super*B*, and describes that potential in the context of experiments making measurements in flavour physics over the next 10 to 20 years. Detailed comparisons are made with Belle II and LHCb, the other *B* physics experiments that will run in this decade. SuperB will play a crucial role in defining the landscape of flavour physics over the next 20 years.

Need to update charm numbers for LHCb, otherwise finished.

LHC Results on SUSY (slide from A. Cakir, Lomonosov XV)



So far no evidence for SUSY.

The SUSY mass scale is now looking likely to be above 1TeV.

This has interesting implications for some of our measurements.

We need to make sure our benchmark processes and assumed scales are still valid.

Hone our case for indirect constraints.

SUSY

- Example: Consider MSSM as an illustration of SUSY
  - Simple, and being constrained by the LHC but general enough to illustrate the issue:

e.g. MSSM: 124 (160 with ν_R) couplings, most are flavour related.

Δ's are related to NP mass scale.

LHCb, SuperB

$$M^2_{\tilde{d}} \approx \begin{pmatrix} m^2_{\tilde{d}_L} & m_d(A_d - \mu\tan\beta) & (\Delta^d_{12})_{LL} & (\Delta^d_{12})_{LR} & (\Delta^d_{13})_{LL} & (\Delta^d_{13})_{LR} \\ & m^2_{\tilde{d}_R} & (\Delta^d_{12})_{RL} & (\Delta^d_{12})_{RR} & (\Delta^d_{13})_{RL} & (\Delta^d_{13})_{RR} \\ & & m^2_{\tilde{s}_L} & m_s(A_s - \mu\tan\beta) & (\Delta^d_{23})_{LL} & (\Delta^d_{23})_{LR} \\ & & & m^2_{\tilde{s}_R} & (\Delta^d_{23})_{RL} & (\Delta^d_{23})_{RR} \\ & & & & m^2_{\tilde{b}_L} & m_b(A_b - \mu\tan\beta) \\ & & & & & m^2_{\tilde{b}_R} \end{pmatrix}$$

LHC, ILC - HE frontier

and similarly for $M^2_{\tilde{u}}$

  - In many NP scenarios the energy frontier experiments will probe the diagonal elements of mixing matrices.
  - Flavour experiments are required to probe off-diagonal ones.

SUSY

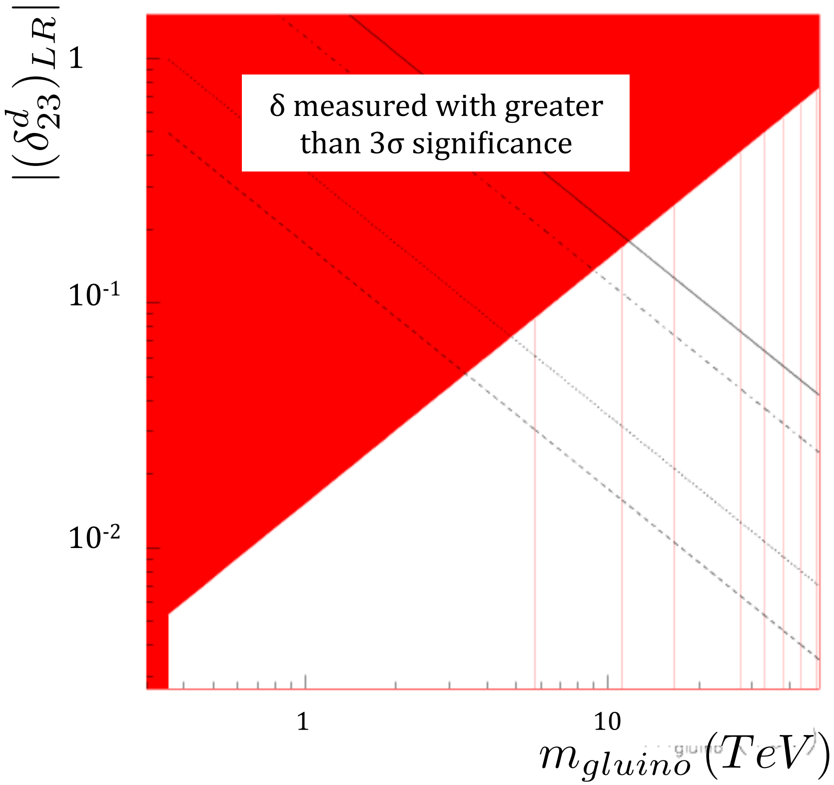
- e.g. MSSM with generic squark mass matrices.
- Use Mass insertion approximation with $m_{\tilde{q}} \sim m_{\tilde{g}}$ to constrain couplings:

$$(\delta^q_{ij})_{AB} = \frac{(\Delta_{ij})^q_{AB}}{m^2_{\tilde{q}}}$$

- Can constrain the δ^d_{ij}'s using

$$\mathcal{B}(B \to X_s\gamma)$$
$$\mathcal{B}(B \to X_s\ell^+\ell^-)$$
$$\mathcal{A}_{CP}(B \to X_s\gamma)$$

LHC constraints on the gluino mass, mean couplings are non-zero, and SuperB can provide an upper bound on Λ_{NP}.



e.g. see Hall et al., Nucl. Phys. B **267** 415-432 (1986)
Ciuchini et al., hep-ph/0212397

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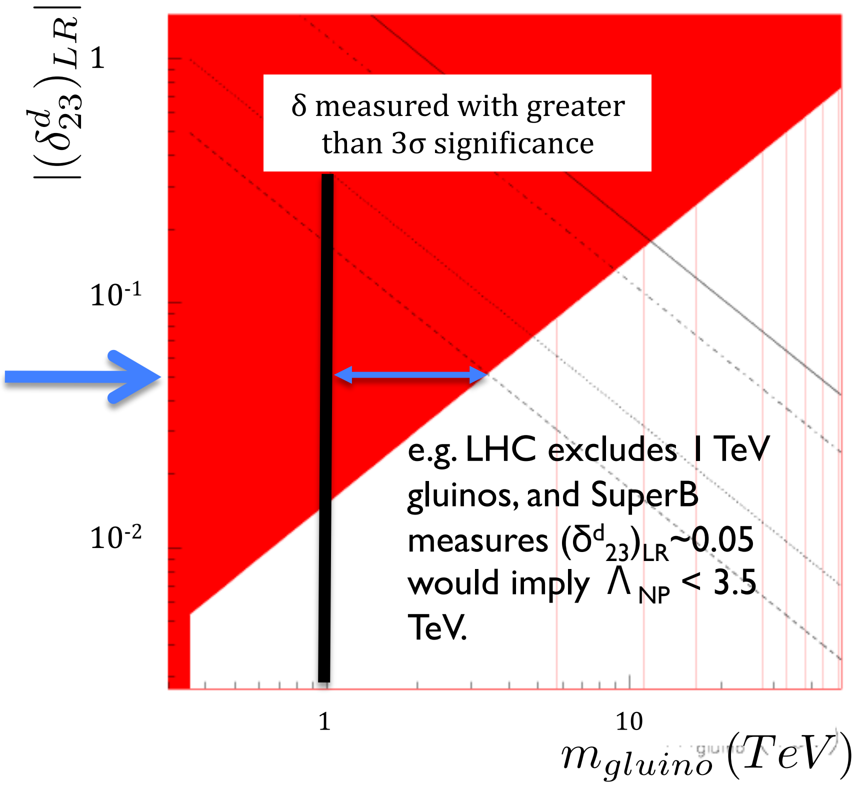

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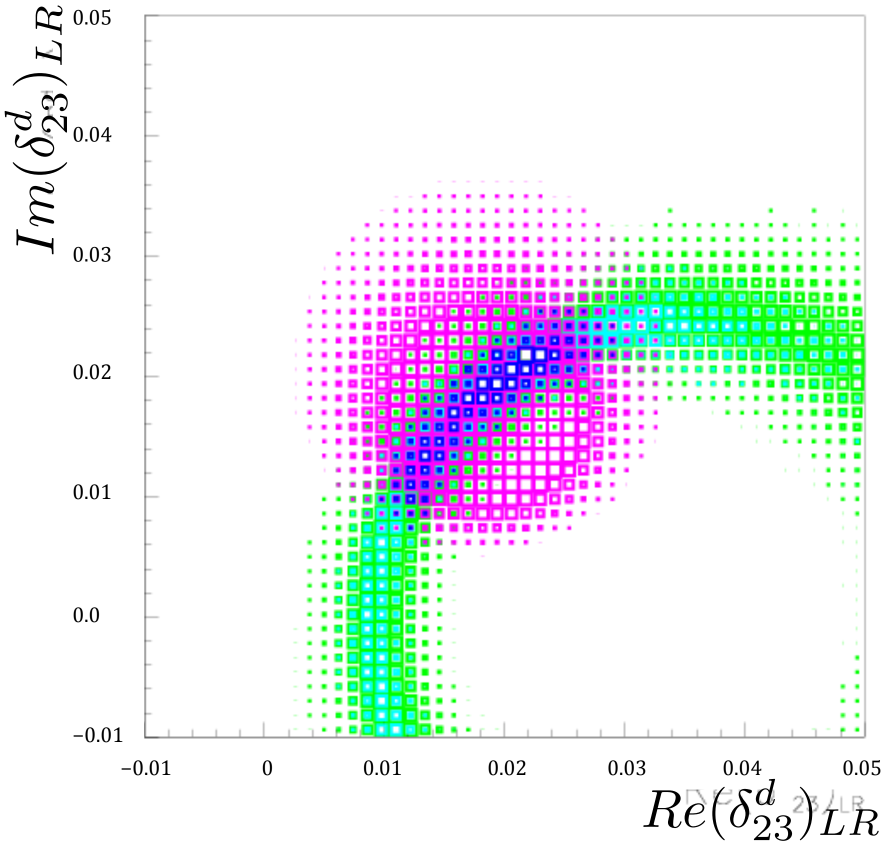
$$(\delta^q_{ij})_{AB} = \frac{(\Delta_{ij})^q_{AB}}{m^2_{\tilde{q}}}$$

- Can constrain the δ^d_{ij}'s using
  - $\mathcal{B}(B \to X_s \gamma)$
  - $\mathcal{B}(B \to X_s \ell^+ \ell^-)$
  - $\mathcal{A}_{CP}(B \to X_s \gamma)$



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Charged Lepton Flavour Violation (LFV)

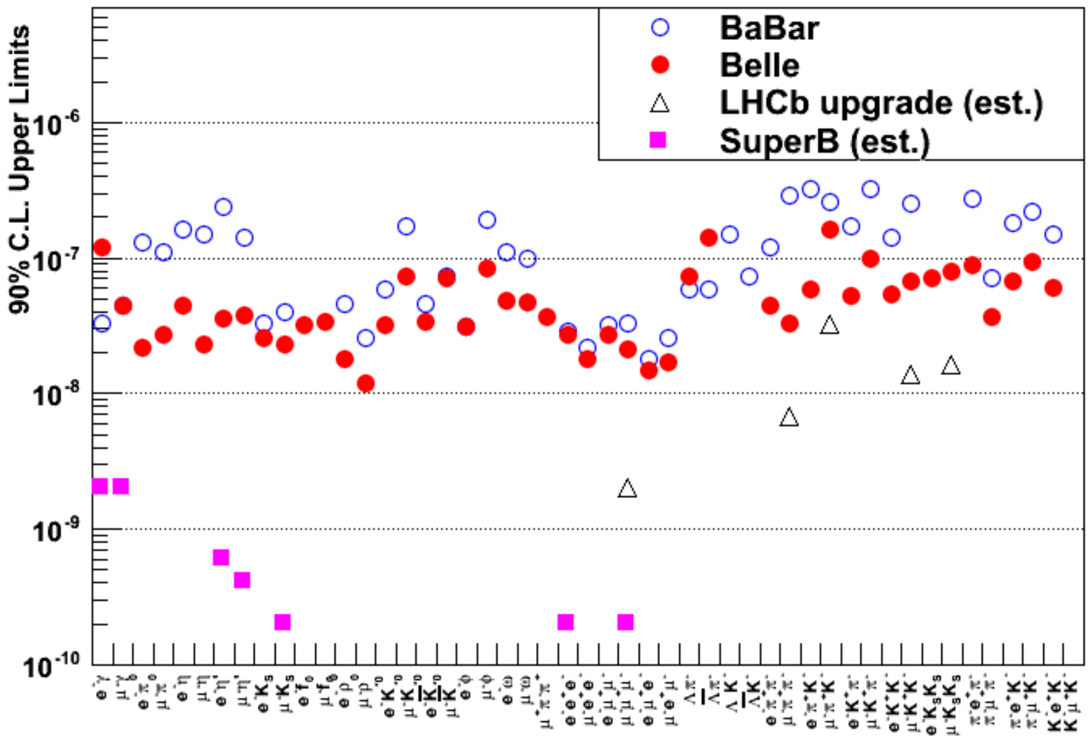
- ν mixing leads to a low level of charged LFV ($B \sim 10^{-54}$).
  - Enhancements to observable levels are possible with new physics scenarios.
  - Searching for transitions from 3rd generation to 2nd and 1st, i.e.

$$\tau \longrightarrow \mu \ \text{and} \ \tau \longrightarrow e$$

➢Two orders of magnitude improvement at SuperB over current limits.

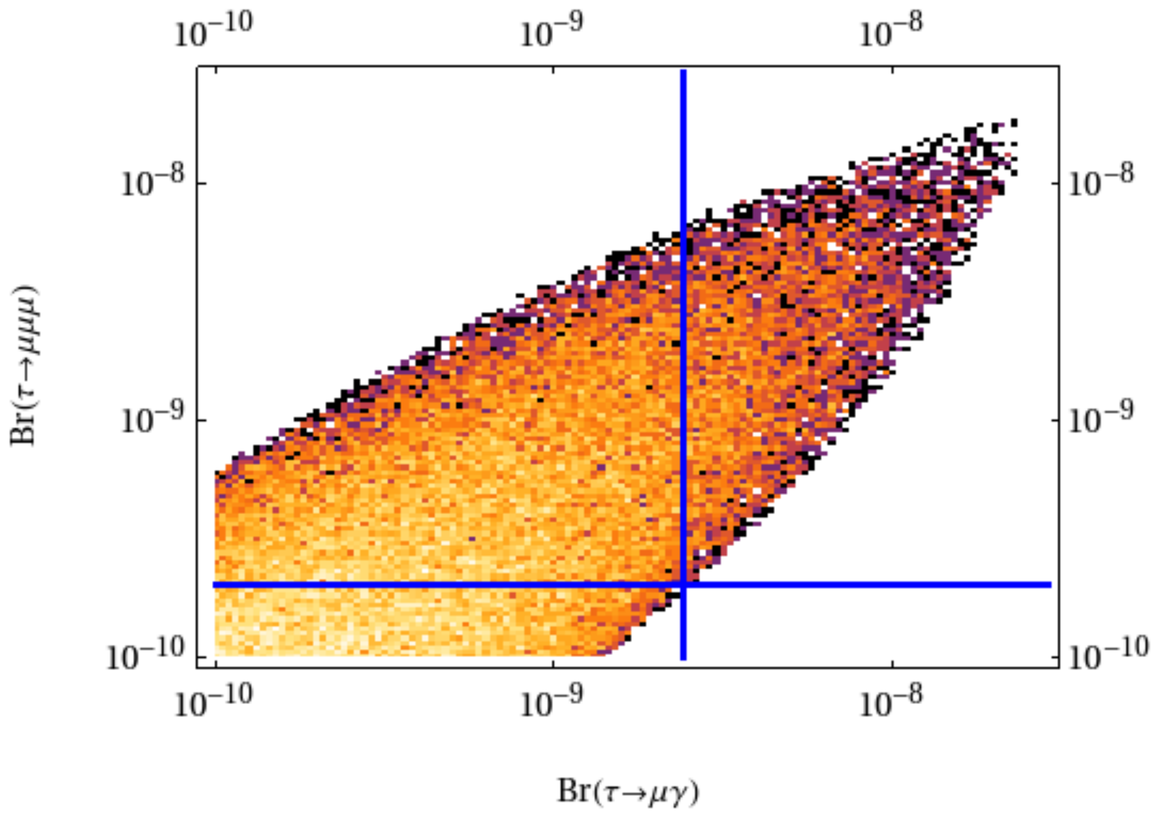
➢Hadron machines are not competitive with e^+e^- machines for this.

- N.B. e^- beam polarisation helps suppress background.



The golden LFV modes: $\tau \longrightarrow \mu\gamma, 3\mu$

- Symmetry breaking scale assumed: 500GeV.



NP scale assumed: 500GeV.

Current experimental limits are at the edges of the model parameter space

SuperB will be able to significantly constrain these models, and either find both channels, or constrain a large part of parameter space.

c/o M. Blanke

M. Blanke et al. arXiv:0906.5454

Specific example: $\tau \to \mu\gamma$

- Only accessible in e^+e^- (golden modes: $\mu\gamma$, 3 lepton)

Model dependent NP constraint.

Correlated with other flavour observables: MEG, LHCb etc.

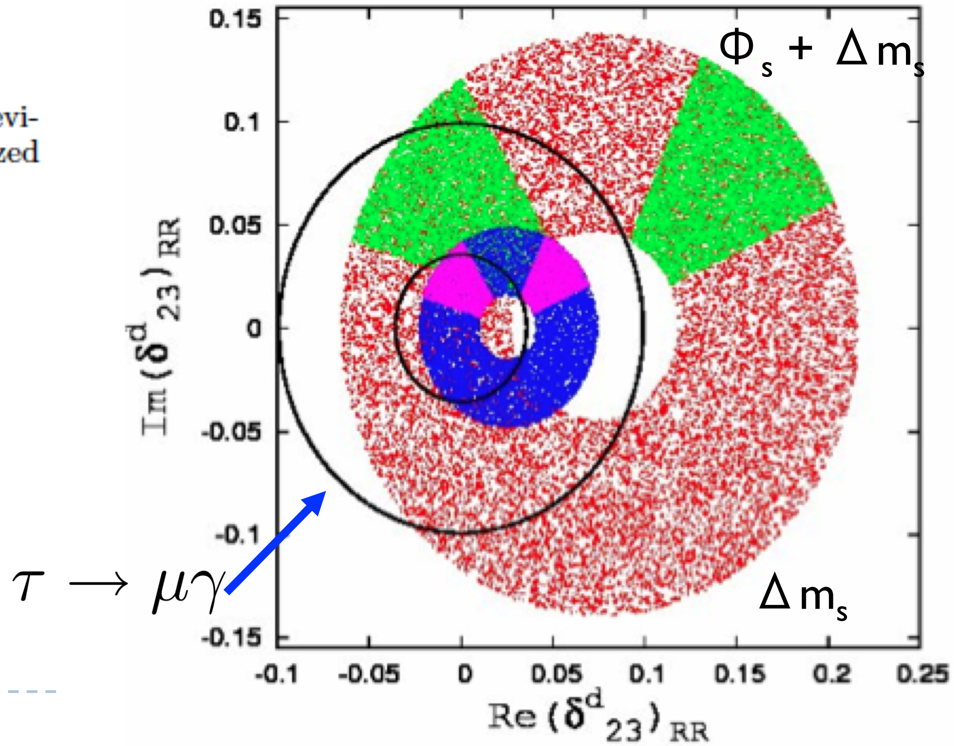
TABLE III: Expected 90% CL upper limits and 3σ evidence reach on LFV decays with 75 ab^{-1} with a polarized electron beam.

Process	Expected 90% CL upper limit	3σ evidence reach
$\mathcal{B}(\tau \to \mu\gamma)$	2.4×10^{-9}	5.4×10^{-9}
$\mathcal{B}(\tau \to e\gamma)$	3.0×10^{-9}	6.8×10^{-9}
$\mathcal{B}(\tau \to \ell\ell\ell)$	2.3–8.2×10^{-10}	1.2–4.0×10^{-9}

$m_{\tilde{q}} = 300\,GeV$ BLUE

$m_{\tilde{q}} = 500\,GeV$ RED

Not updated to latest results from LHCb

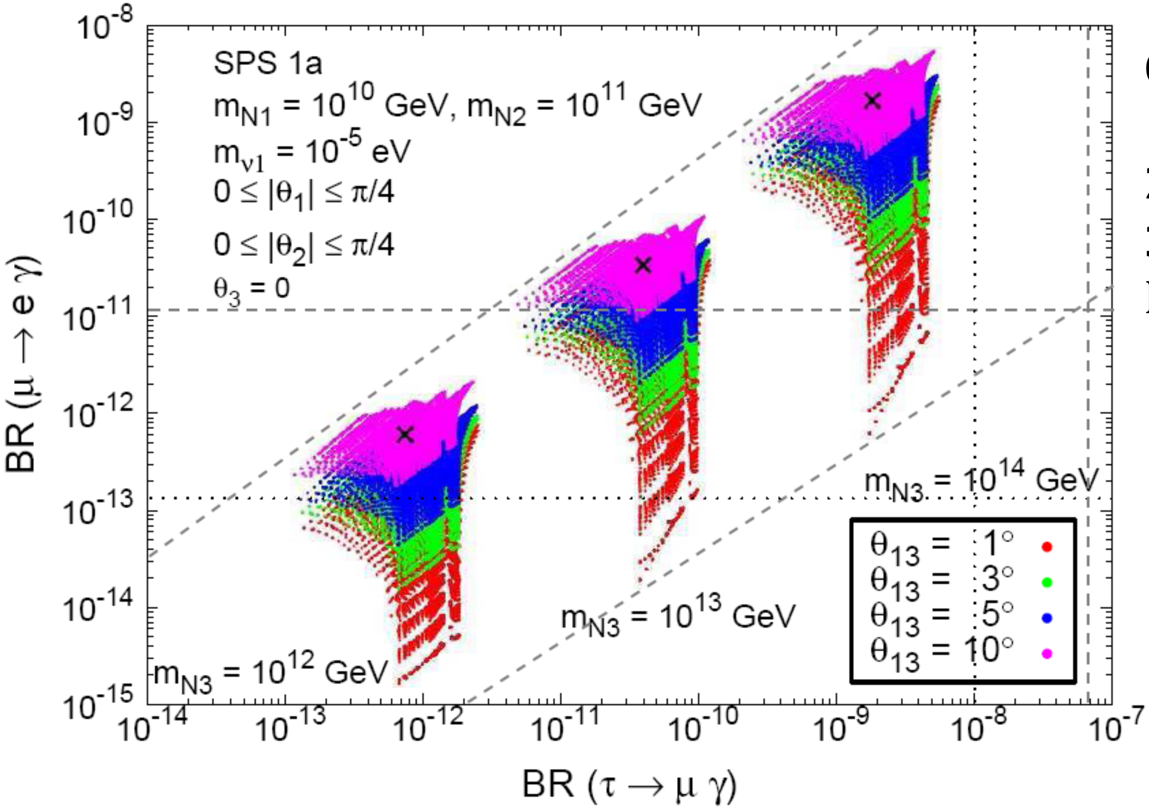


Parry and Zhang Nucl.Phys.B802:63-76,2008

Another model...

- $\tau \rightarrow \mu\gamma$ upper limit can be correlated to θ_{13} (neutrino mixing/CPV, T2K etc.) and also to $\mu \rightarrow e\gamma$.

SUSY seasaw = CMSSM + $3\nu_R$ + ν



Combine information from:

$2^{nd} \rightarrow 1^{st}$ generation transitions
$3^{rd} \rightarrow 1^{st}$ generation transitions
Neutrino mixing: θ_{13}.

Correlated results from T2K, MEG and SuperB

Arganda et al., JHEP, 06:079, 2008.

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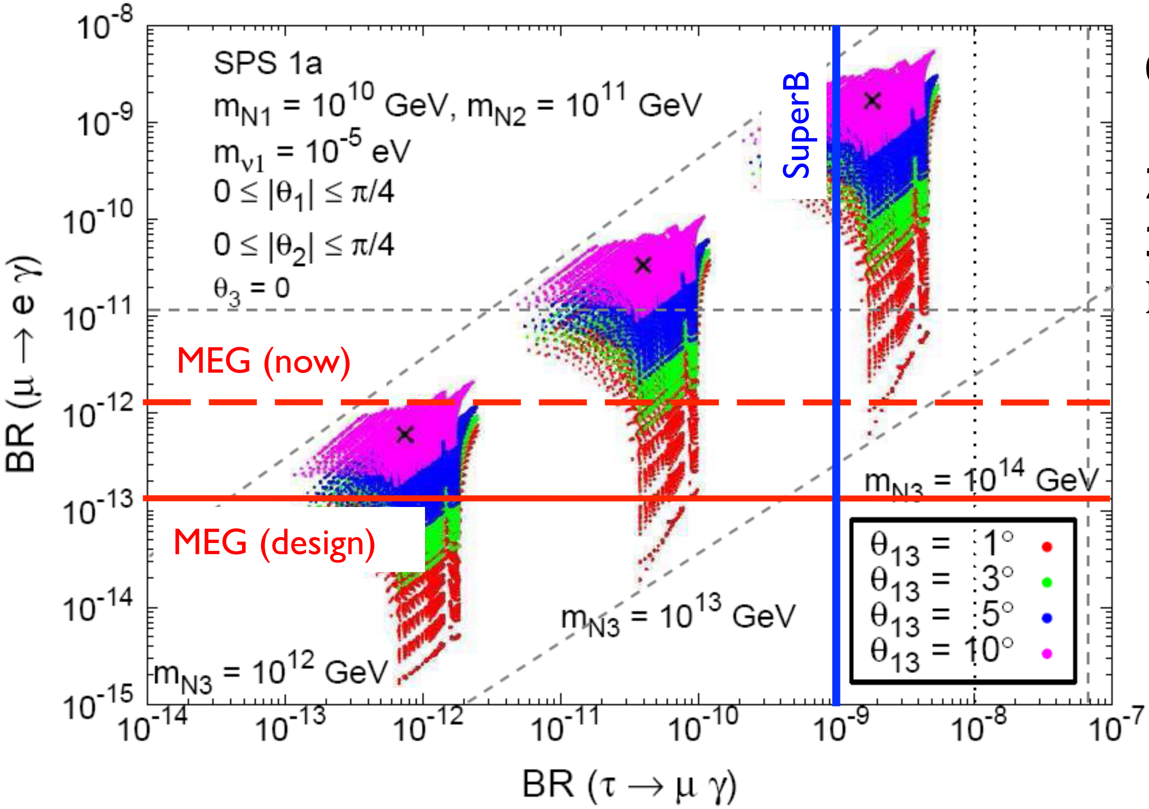


Correlated results from T2K, MEG and SuperB

Combine information from:

$2^{nd} \rightarrow 1^{st}$ generation transitions
$3^{rd} \rightarrow 1^{st}$ generation transitions
Neutrino mixing: θ_{13}.

This model will be ruled out if we find $\mu\gamma$

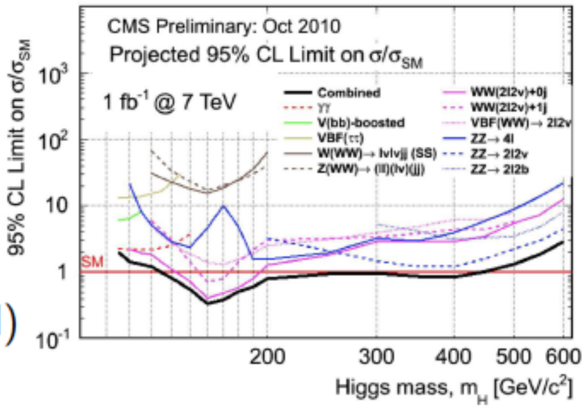
Arganda et al., JHEP, 06:079, 2008.

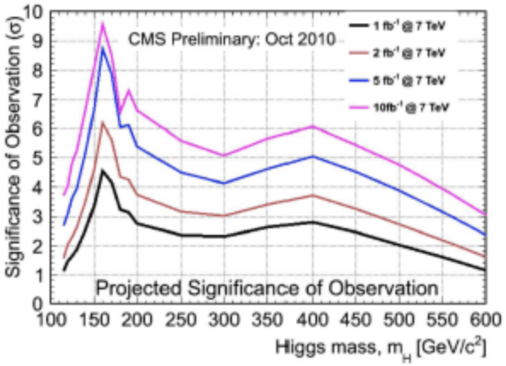
Higgs searches from the LHC

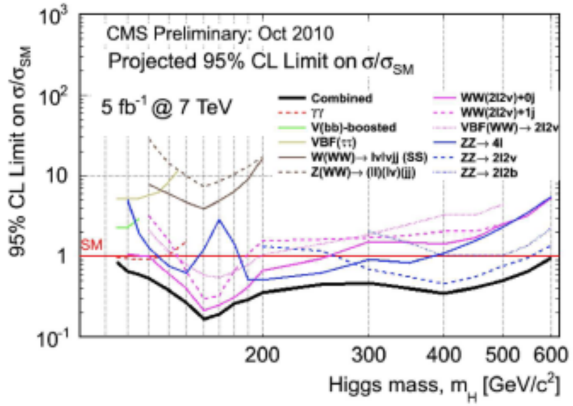
(slide from A. Gritsan, Lomonosov XV)

Projections

- Reasonable prediction in 2010
  - expect to exclude SM Higgs in 2012 if no signal shows up
  - otherwise expect $\sim 4\sigma$ (local) even at low mass







Andrei Gritsan, JHU XXIX 24 August 2011

EW data point to a light Higgs (~115 GeV). Nothing found so far.

Searches for a SM Higgs could yield a stable point to guide non-SM Higgs searches.

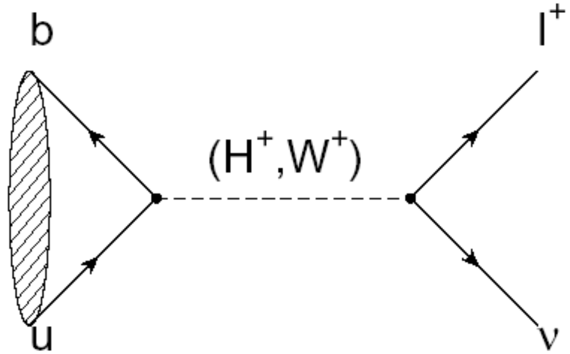
Non-SM searches are of relevance for many of our rare decays.

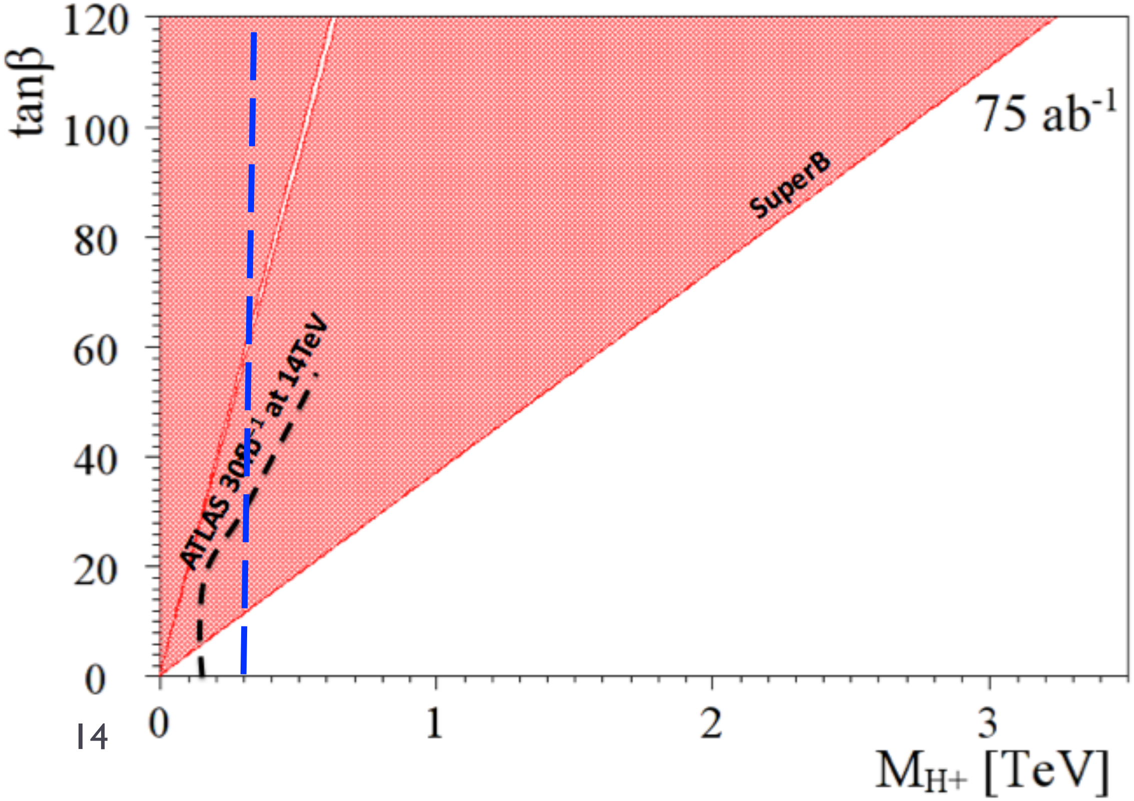
No SM Higgs would take the field back to the drawing board, and in this case FCNC's will have an inevitable role in understanding nature.

$B_{u,d}$ physics: Rare Decays

- Example: $B^{\pm} \rightarrow \ell^{\pm}\nu$
  - Rate modified by presence of H^+

$$r_H = \frac{\mathcal{B}_{SM+NP}}{\mathcal{B}_{SM}}$$





$$r_H = \left(1 - \frac{m_B^2}{m_H^2}\tan^2\beta\right)$$

Currently the inclusive b to sγ channel excludes $m_{H+} < 295$ GeV/c^2.

The current combined limit places a stronger constraint than direct searches from the LHC for the next few years.

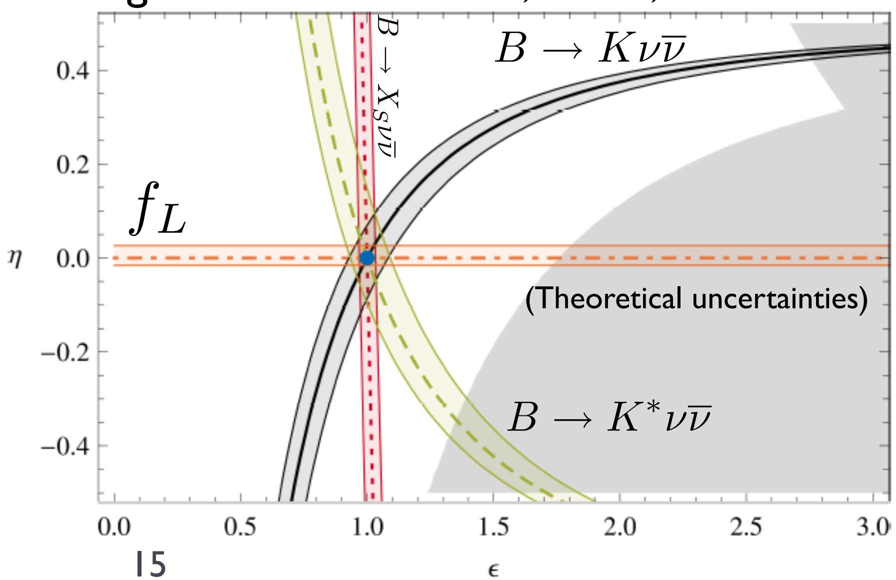
$B_{u,d}$ physics: Rare Decays

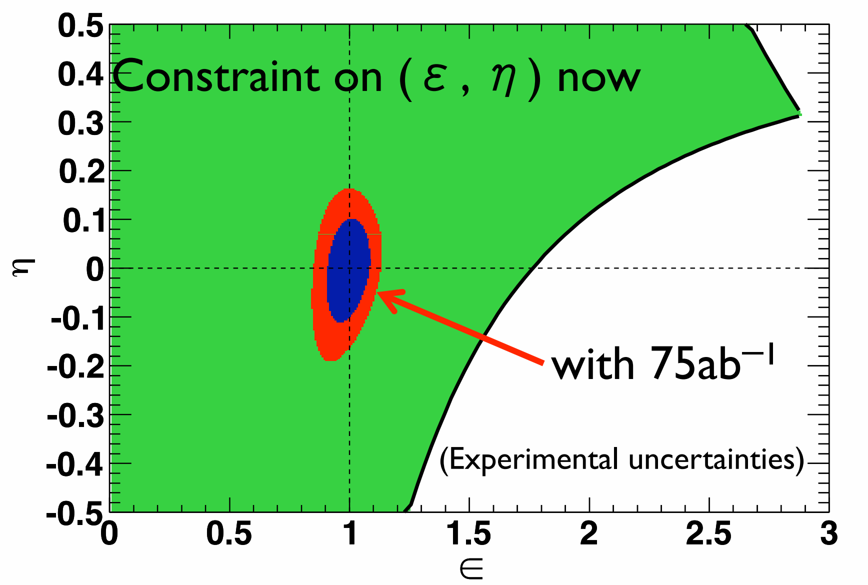
- Example: $B \to K^{(*)} \nu \overline{\nu}$
  - Need 75ab^{-1} to observe pseudoscalar and vector modes.
  - With more than 75ab^{-1} we could measure polarisation.

$$\epsilon = \frac{\sqrt{|C_L^\nu|^2 + |C_R^\nu|^2}}{|(C_L^\nu)^{\rm SM}|}\,, \qquad \eta = \frac{-{\rm Re}\,(C_L^\nu C_R^{\nu *})}{|C_L^\nu|^2 + |C_R^\nu|^2}$$

Sensitive to models with Z', RH currents and light scalar particles.

e.g. see Altmannshofer, Buras, & Straub





$b \rightarrow s l^+ l^-$

- SuperB can measure inclusive and exclusive modes.
  - Crosscheck results to understand source of NP.
  - Important as theory uncertainties differ.
  - Expect: 10-15,000 $K^*\mu\mu$ and 10-15,000 K^*ee events

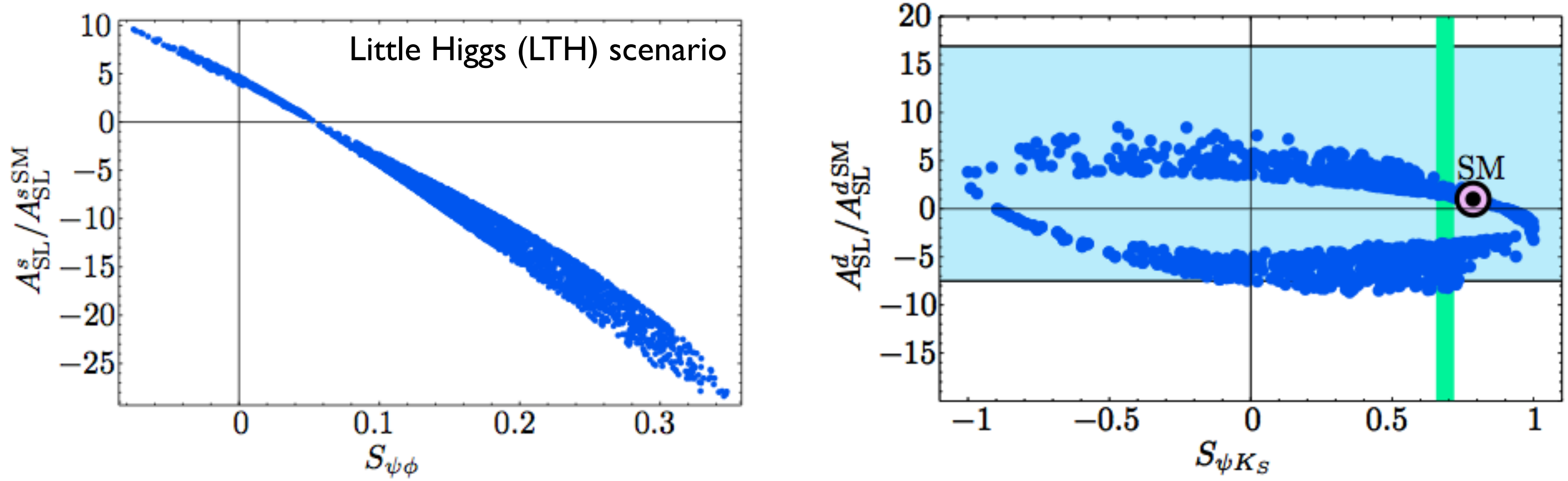
- SuperB can study all lepton flavours
  - Equal amounts of μ and e final states can be measured.
    - Need both of these to measure all NP sensitive observables.
    - LHCb will accumulate slight more events in the $\mu\mu$ mode.
    - Expect superior statistics wrt LHCb for ee mode.
    - S/B~ 0.3, c.f. S/B~1.0 for LHCb.
  - Can also search for $K^{(*)}\tau^+\tau^-$ decay.
  - ... and constrain Majorana ν's using like sign final states.
    - Also of interest for D_s decays to $K^{(*)}ll$ final states near charm threshold.

B_s physics

- Can cleanly measure A^s_{SL} using 5S data

$$A^s_{SL} = \frac{\mathcal{B}(B_s \to \overline{B}_s \to X^-\ell^+\nu_\ell) - \mathcal{B}(\overline{B}_s \to B_s \to X^-\ell^+\nu_\ell)}{\mathcal{B}(B_s \to \overline{B}_s \to X^-\ell^+\nu_\ell) + \mathcal{B}(\overline{B}_s \to B_s \to X^-\ell^+\nu_\ell)} = \frac{1-|q/p|^4}{1-|q/p|^4}$$

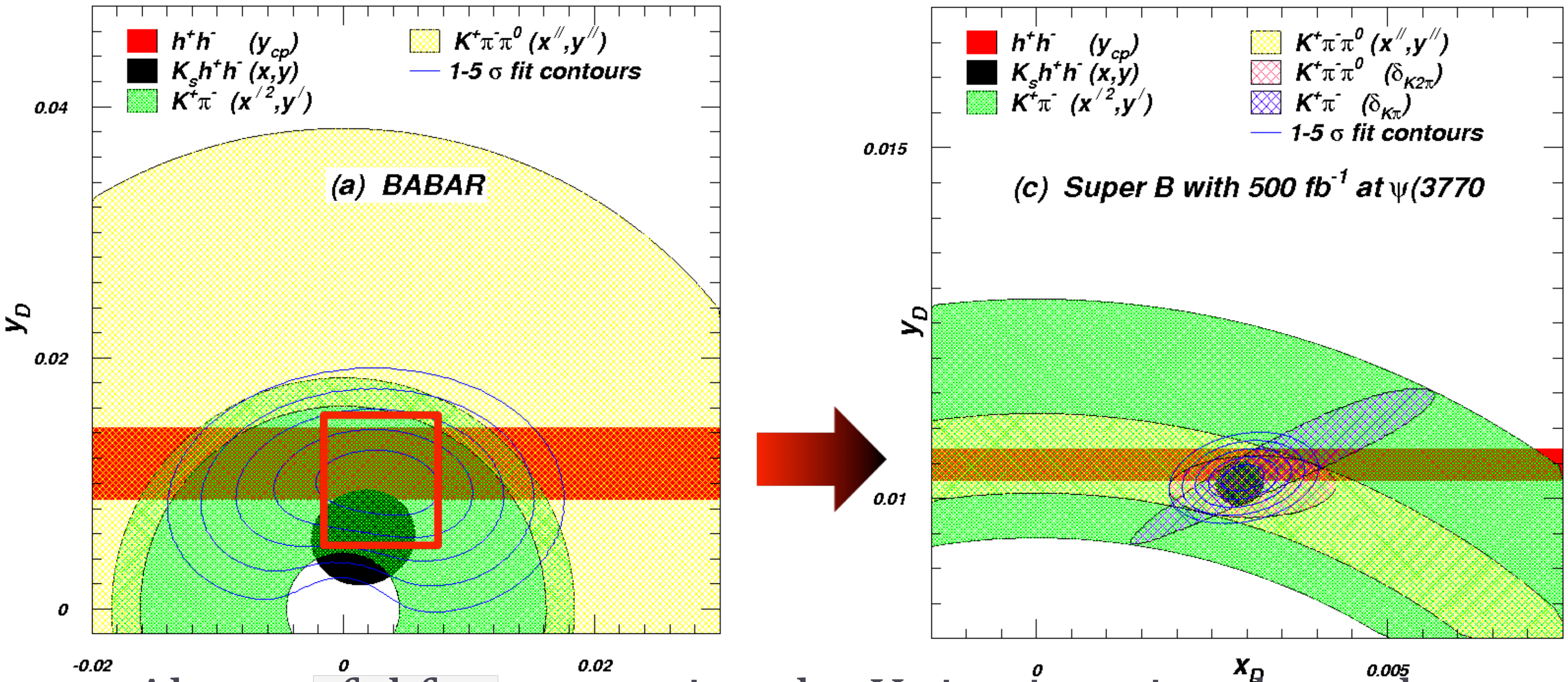
$$\sigma(A^s_{SL}) \sim 0.004 \text{ with a few } ab^{-1}$$



- SuperB can also study rare decays with many neutral particles, such as $B_s \to \gamma\gamma$, which can be enhanced by SUSY.

Charm Mixing

- Collect data at threshold and at the 4S.
  - Benefit charm mixing and CPV measurements.



  - Also useful for measuring the Unitarity triangle angle γ (strong phase in D→Kππ Dalitz plot).

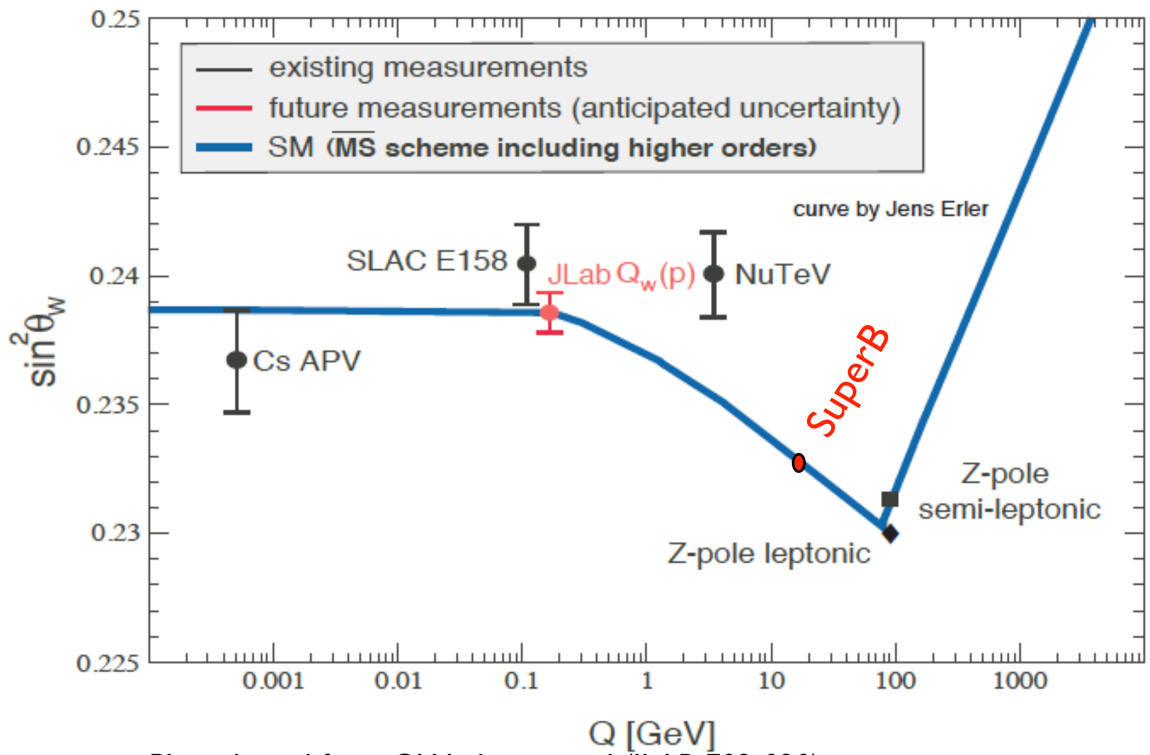
Charm Mixing: Summary

Strategy	Decay	$\sigma(\lvert q_D/p_D \rvert) \times 10^2$	$\sigma(\phi_M)^\circ$
HFAG (direct *CPV* allowed):			
Global χ^2 fit	<All modes>	± 18	± 9
Asymmetries a_z:			
x_D	<All modes>	± 1.8	–
y_D	<All modes>	± 1.1	–
y_{CP}	K^+K^-	± 3.8	–
y'	$K^+\pi^-$	± 4.9	–
x'^2	$K^+\pi^-$	± 4.9	–
x''	$K^+\pi^-\pi^0$	± 5.4	–
y''	$K^+\pi^-\pi^0$	± 5.0	–
TDDP (*CPV* allowed):			
Model-dependent	$K^0_S h^+h^-$	± 8.4	± 3.3
BES III DP model	$K^0_S h^+h^-$	± 3.7	± 1.9
Super*B* DP model	$K^0_S h^+h^-$	± 2.7	± 1.4
SL Asymmetries a_{SL}:			
75 ab^{-1} at $\Upsilon(4S)$	$X\ell\nu_\ell$	± 10	
500 fb^{-1} at $\psi(3770)$	$K\pi$	± 10	
500 fb^{-1} at $\psi(3770)$	$X\ell\nu_\ell$	TBD	

- Can perform a precision measurement of charm mixing.
- Need to evaluate the potential of TDCPV to measure charm mixing: a number of modes can each provide a sub 2° measurement.

Precision Electroweak

- $\sin^2\theta_W$ can be measured with polarised e^- beam
  - $\sqrt{s}=\Upsilon(4S)$ is theoretically clean, c.f. b-fragmentation at Z pole



Plot adapted from QWeak proposal (JLAB E02-020)

Measure LR asymmetry in

$$e^+e^- \rightarrow b\bar{b}$$
$$e^+e^- \rightarrow c\bar{c}$$
$$e^+e^- \rightarrow \tau^+\tau^-$$
$$e^+e^- \rightarrow \mu^+\mu^-$$

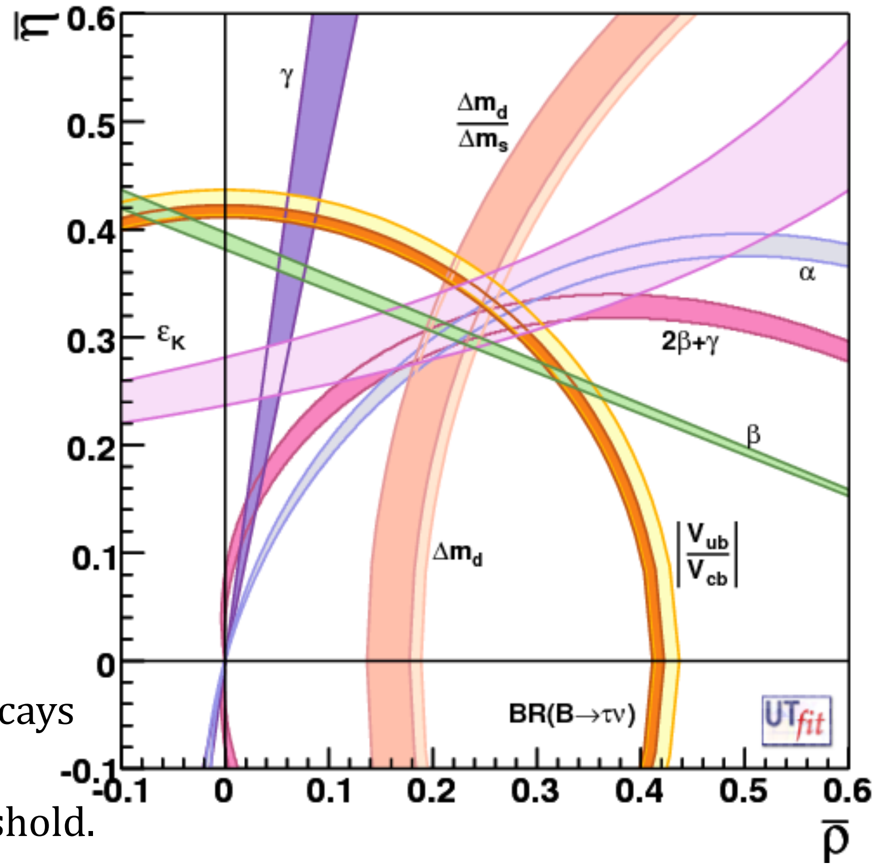
at the $\Upsilon(4S)$ to same precision as LEP/SLC at the Z-pole.

Complements measurements planned/ underway at lower energies (QWeak/MESA).

Precision CKM constraints

- Unitarity Triangle Angles
  - $\sigma(\alpha) = 1{-}2°$
  - $\sigma(\beta) = 0.1°$
  - $\sigma(\gamma) = 1{-}2°$
- CKM Matrix Elements
  - $|V_{ub}|$
    - Inclusive $\sigma = 2\%$
    - Exclusive $\sigma = 3\%$
  - $|V_{cb}|$
    - Inclusive $\sigma = 1\%$
    - Exclusive $\sigma = 1\%$
  - $|V_{us}|$
    - Can be measured precisely using τ decays
  - $|V_{cd}|$ and $|V_{cs}|$
    - can be measured at/near charm threshold.

The "dream" scenario with 75ab^{-1}



- SuperB Measures the sides and angles of the Unitarity Triangle

Interplay

- Combine measurements to elucidate structure of new

	Observable/mode	H^+ high $\tan\beta$	MFV	non-MFV	NP Z penguins	Right-handed currents	LTH	SUSY AC	SUSY RVV2	SUSY AKM	SUSY δLL	SUSY FBMSSM
✓	$\tau \to \mu\gamma$							★★★	★★★	★	★★★	★★★
✓	$\tau \to \ell\ell\ell$						★★★					
✓	$B \to \tau\nu, \mu\nu$	★★★(CKM)										
✓	$B \to K^{(*)+}\nu\bar{\nu}$			★	★★★			★	★	★	★	★
✓	S in $B \to K_S^0\pi^0\gamma$					★★★						
✓	S in other penguin modes			★★★(CKM)		★★★		★★★	★★	★	★★★	★★★
✓	$A_{CP}(B \to X_s\gamma)$			★★★		★★		★	★	★	★★★	★★★
✓	$BR(B \to X_s\gamma)$		★★★	★		★						
✓	$BR(B \to X_s\ell\ell)$			★	★	★						
✓	$B \to K^{(*)}\ell\ell$ (FB Asym)							★	★	★	★★★	★★★
	$B_s \to \mu\mu$							★★★	★★★	★★★	★★★	★★★
	β_s from $B_s \to J/\psi\phi$							★★★	★★★	★★★	★	★
✓	a_{sl}						★★★					
✓	Charm mixing							★★★	★	★	★	★
✓	CPV in Charm	★★									★★★	

✓= SuperB can measure this

More information on the golden matrix can be found in arXiv:1008.1541, arXiv:0909.1333, and arXiv:0810.1312.

Golden Measurements: General

Experiment:	No Result	Moderately precise	Precise	Very precise
Theory:		Moderately clean	Clean, needs Lattice	Clean

Observable/mode Luminosity	Current $\sim 1\,\mathrm{fb}^{-1}$	LHCb (2017) $5\,\mathrm{fb}^{-1}$	Super*B* (2022) $75\,\mathrm{ab}^{-1}$	LHCb upgrade $50\,\mathrm{fb}^{-1}$	Theory	
		τ Decays				
$\tau \to \mu\gamma$						Benefit from polarised e^- beam
$\tau \to e\gamma$						
		$B_{u,d}$ Decays				
$B \to \tau\nu, \mu\nu$						very precise with improved detector
$B \to K^{(*)+}\nu\overline{\nu}$						Statistically limited: Angular analysis with $>75\mathrm{ab}^{-1}$
S in $B \to K^0_S\pi^0\gamma$						Right handed currents
S (other penguin modes)						SuperB measures many more modes
A_{CP} $(B \to X_s\gamma)$						systematic error is main challenge
$\mathrm{BR}(B \to X_s\gamma)$						control systematic error with data
$\mathrm{BR}(B \to X_s ll)$						
$\mathrm{BR}(B \to K^{(*)} ll)$						SuperB measures e mode well, LHCb does μ
		B_s Decays				
$B_s \to \mu\mu$						
β_S from $B_s \to J/\psi\,\phi$						
$B_s \to \gamma\gamma$						
a_{sl}						
		D Decays				
Mixing parameters						
CP Violation						Clean NP search
		Precision Electroweak				
$\sin^2\theta_W$ at $\Upsilon(4S)$						Theoretically clean
$\sin^2\theta_W$ at Z-Pole						b fragmentation limits interpretation

Golden Measurements: CKM

- Comparison of relative benefits of SuperB ($75ab^{-1}$) vs. existing measurements and LHCb ($5fb^{-1}$) and the LHCb upgrade ($50fb^{-1}$).

Observable/mode Luminosity	Current $\sim 1\,\mathrm{fb}^{-1}$	LHCb (2017) $5\,\mathrm{fb}^{-1}$	Super$B$ (2022) $75\,\mathrm{ab}^{-1}$	LHCb upgrade $50\,\mathrm{fb}^{-1}$	Theory
α					
β from $b \to c\bar{c}s$					
$B_d \to J/\psi\pi^0$					
$B_s \to J/\psi K_S^0$					
γ					
$\lvert V_{ub}\rvert$ inclusive					
$\lvert V_{ub}\rvert$ exclusive					
$\lvert V_{cb}\rvert$ inclusive					
$\lvert V_{cb}\rvert$ exclusive					

LHCb can only use $\rho\pi$

β theory error B_d
β theory error B_s

Need an e^+e^- environment to do a precision measurement using semi-leptonic B decays.

Experiment:	No Result	Moderately precise	Precise	Very precise
Theory:		Moderately clean	Clean, needs Lattice	Clean

Observable/mode	Current now	LHCb (2017) 5 fb^{-1}	Super$B$ (2021) 75 ab^{-1}	Belle II (2021) 50 ab^{-1}	LHCb upgrade (10 years of running) 50 fb^{-1}	theory now
τ Decays						
$\tau \to \mu\gamma$ ($\times 10^{-9}$)	< 44		< 2.4	< 5.0		
$\tau \to e\gamma$ ($\times 10^{-9}$)	< 33		< 3.0	< 3.7 (est.)		
$\tau \to \ell\ell\ell$ ($\times 10^{-10}$)	$< 150 - 270$	< 244 [a]	$< 2.3 - 8.2$	< 10	< 24 [b]	
$B_{u,d}$ Decays						
BR($B \to \tau\nu$) ($\times 10^{-4}$)	1.64 ± 0.34		0.05	0.04		1.1 ± 0.2
BR($B \to \mu\nu$) ($\times 10^{-6}$)	< 1.0		0.02	0.03		0.47 ± 0.08
BR($B \to K^{*+}\nu\overline{\nu}$) ($\times 10^{-6}$)	< 80		1.1	2.0		6.8 ± 1.1
BR($B \to K^{+}\nu\overline{\nu}$) ($\times 10^{-6}$)	< 160		0.7	1.6		3.6 ± 0.5
BR($B \to X_s\gamma$) ($\times 10^{-4}$)	3.55 ± 0.26		0.11	0.13	0.23	3.15 ± 0.23
$A_{CP}(B \to X_{(s+d)}\gamma)$	0.060 ± 0.060		0.02	0.02		$\sim 10^{-9}$
$B \to K^*\mu^+\mu^-$ (events)	250[c]	8000	10-15k[d]	7-10k	100,000	-
BR($B \to K^*\mu^+\mu^-$) ($\times 10^{-6}$)	1.15 ± 0.16		0.06	0.07		1.19 ± 0.39
$B \to K^*e^+e^-$ (events)	165	400	10-15k	7-10k	5,000	-
BR($B \to K^*e^+e^-$) ($\times 10^{-6}$)	1.09 ± 0.17		0.05	0.07		1.19 ± 0.39
$A_{FB}(B \to K^*\ell^+\ell^-)$	0.27 ± 0.14[e]	[f]	0.040	0.03		-0.089 ± 0.020
$B \to X_s\ell^+\ell^-$ (events)	280		8,600	7,000		-
BR($B \to X_s\ell^+\ell^-$) ($\times 10^{-6}$)[g]	3.66 ± 0.77[h]		0.08	0.10		1.59 ± 0.11
S in $B \to K_S^0\pi^0\gamma$	-0.15 ± 0.20		0.03	0.03		-0.1 to 0.1
S in $B \to \eta' K^0$	0.59 ± 0.07		0.01	0.02		± 0.015
S in $B \to \phi K^0$	0.56 ± 0.17	0.15	0.02	0.03	0.03	± 0.02
B_s^0 Decays						
BR($B_s^0 \to \gamma\gamma$) ($\times 10^{-6}$)	< 8.7		0.3	$0.2 - 0.3$		0.4 - 1.0
A_{SL}^s ($\times 10^{-3}$)	-7.87 ± 1.96 [i]	[j]	4.	5. (est.)		0.02 ± 0.01
D Decays						
x	$(0.63 \pm 0.20\%$	0.06%	0.02%	0.04%	0.02%	$\sim 10^{-2}$ [k]
y	$(0.75 \pm 0.12)\%$	0.03%	0.01%	0.03%	0.01%	$\sim 10^{-2}$ (see above).
y_{CP}	$(1.11 \pm 0.22)\%$	0.05%	0.03%	0.05%	0.01%	$\sim 10^{-2}$ (see above).
$\lvert q/p \rvert$	$(0.91 \pm 0.17)\%$	10%	2.7%	3.0%	3%	$\sim 10^{-3}$ (see above).
$\arg\{q/p\}$ ($^\circ$)	-10.2 ± 9.2	5.6	1.4	1.4	2.0	$\sim 10^{-3}$ (see above).
Other processes Decays						
$\sin^2\theta_W$ at $\sqrt{s} = 10.58\ \mathrm{GeV}/c^2$			0.0002	[l]		clean

Observable/mode	Current now	LHCb (2017)	Super*B* (2021)	Belle II (2021)	LHCb upgrade (10 years of running)	theory now
		$5\,\mathrm{fb}^{-1}$	$75\,\mathrm{ab}^{-1}$	$50\,\mathrm{ab}^{-1}$	$50\,\mathrm{fb}^{-1}$	
α from $u\bar{u}d$	6.1°	$5^{\circ\,a}$	1°	1°	^{b}	$1-2^\circ$
β from $c\bar{c}s$ (S)	0.9° (0.024)	0.5° (0.008)	0.1° (0.002)	0.3° (0.007)	0.2° (0.003)	clean
S from $B_d \to J/\psi\pi^0$	0.21		0.014	0.021 (est)		clean
S from $B_s \to J/\psi K^0_S$		?			?	clean
γ from $B \to DK$	11°	$\sim 4^\circ$	1°	1.5°	0.9°	clean
$\lvert V_{cb}\rvert$ (inclusive) %	1.7		0.5%	0.6 (est.)		dominant
$\lvert V_{cb}\rvert$ (exclusive) %	2.2		1.0%	1.2 (est.)		dominant
$\lvert V_{ub}\rvert$ (inclusive) %	4.4		2.0%	3.0		dominant
$\lvert V_{ub}\rvert$ (exclusive) %	7.0		3.0%	5.0		dominant

- With the exceptions of y_{CP} and $K^*\mu\mu$, there are no planned or existing experiments that will surpass SuperB precision in these modes for at least the next two decades.
- The best place to measure the other 33 golden modes is SuperB!

This week:

SuperB Meeting
Queen Mary University, London
Sep 13 - 16, 2011
Agenda

All Plenary Sessions will be held

Meeting Registration Desk :

Welcome Reception:

	Monday, September 12, 2011		Tuesday, September 13, 2011		Wednesday, September 14, 2011		Thursday, September 15, 2011		Friday, September 16, 2011
8:00		8:00	Registration						
9:00		8:30	PLENARY	8:30	PARALLEL 4	8:30	PARALLEL 8	8:30	G. O. Jones (Physics) 410
		 5 20 30 25 20	*Introduction and Status* Welcome Project status (M. Giorgi) Physics (A. Bevan) Detector (F. Forti) Computing (L. Tomassetti)	FB 320 FB 321 FB 240	DET: ETD COMP: FULLSIM PHYS Charm	FB 320 FB 321 FB 240 tbc	DET: ETD COMP: R&D PHYS DET: INTEGRATION Charm	9:00	Project Board Detector Techincal Board
10:30		10:30	*Coffee Break*	10:30	*Coffee Break*	10:30	*Coffee Break*	10:30	*Coffee Break*
11:00		11:00	PARALLEL 1	11:00	PARALLEL 5	11:00	PLENARY	11:00	G. O. Jones (Physics) 410
		FB 240 FB 320 FB 321 FB 322 FB 323	SVT DCH PID EMC IFR	FB 320 FB 240	DET: ETD COMP+PHYS: FASTSIM TUTORIAL	30	ACCELERATOR STATUS (M. Biagini)		Detector Technical Board
						11:30	PLENARY		
							TOPICAL SEMINAR (J. ELLIS)		
				12:30	*Lunch*	12:30	*Lunch*	12:30	*Lunch*
				14:00	PARALLEL 6	14:00	PLENARY	14:00	
				FB 320 FB 321 FB 240	DET: BACKGROUNDS COMP: DIST COMP PHYS Planning	 15 15 15 15 15 15	Summaries and outlook Physics Summary SVT DCH PID EMC IFR		
				15:30	*Coffee Break*	15:30	*Coffee Break*	15:30	
				16:00	PARALLEL 7	16:00	PLENARY	16:00	
	Detector Technical Board	FB 240 FB 320 FB 321 FB 322 FB 323	SVT DCH PID EMC IFR	FB 320 FB 321 FB 240	DET: MDI COMP: PLANNING PHYS B / EW	 15 15 15 15 15 15	*Summaries and outlook* MDI ETD COMP INTEGRATION LNF&SuperB (U. Dosselli) Project outlook		
17:00	Project Board								
18:00		17:30		17:30		17:30	*END OF GENERAL MEETING*	17:30	
		18:00	*Wine and cheese reception*	17:30	*COLLABORATION COUNCIL*				

Room Codes		*Call ID #*	Phone Conference Number:	*Room Codes*		*Call ID #*	*Phone Conference Number:*
FB 240	*Francis Bancroft Room 240*			*FB 323*	*Francis Bancroft Room 323*		
FB 320	*Francis Bancroft Room 320*			*P 410*	*G. O. Jones (Physics) 410*		
FB 321	*Francis Bancroft Room 321*			*P 410B*	*Working room: G. O. Jones 401B*		
FB 322	*Francis Bancroft Room 322*						

4 general parallel sessions covering D, B and Precision EW physics & discussion

+ Convenor meeting at 13:00 on Wednesday in here (FB 240)

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FastSim Tutorial:
Learn how to start
doing physics studies.

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		FB 322 FB 323	EMC IFR	FB 320 FB 321 FB 240	DET: BACKGROUNDS COMP: DIST COMP PHYS	15 15 15 15 15 15	Summaries and outlook Physics Summary SVT DCH PID EMC IFR		
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FB 322	*Francis Bancroft Room 322*								

Topical Seminar: John Ellis on SUSY

Physics tools

Many opportunities to contribute:

- detector response simulation in FastSim (SVT, DCH, DIRC, EMC, IFR)
- PID selectors
- simulation of background
- physics analysis tools (tagging, vertexing, …)
- development of 'skims' for physics studies
- documentation

for more information contact Matteo Rama

Charm Threshold Generation

- CLEO-c have given us their code and DEC files for charm threshold simulation.
  - Follows from a request made by Brian for access to these.

- DECAY.DEC for generating *uncorrelated* D0D0bar MC

- Source code for QCMCReweightProc, a filtering processor that discards events from the uncorrelated MC to make it look more like correlated MC. By no means is this meant to be a complete simulation of all strong phases in all modes; we were mainly concerned with the particular modes in our analysis (CP eigenstates, semileptonic, and two-body Kpi).

- Documentation (K0SPi+Pi- and K0LPi+Pi-, using the CLEO Dalitz model is not documented in this).

- There is also a known bug: the spins of resonances in the final state were ignored in determining the strong phase to be assigned to the decay mode. So, PP, VP, and VV modes with the same flavor content are all given the same phase. For example, K-pi+, K*-pi+, and K*-rho+ all have a phase of zero, whereas K*-pi+ should have a phase of pi (because L=1), and the phase of K*-rho+ depends in principle on the helicity amplitudes.

  - This generous donation of technology will give the SuperB physics effort a head start for threshold running studies.

Monte Carlo resource request

- Estimate for Monte Carlo simulation: 134×10^9 events
  - Requests broken down into:
    - Recoil (SL and Had tags) + Charm:

$$B \to \tau\nu,\ B \to K^{(*)}\nu\overline{\nu},\ b \to s\ell\ell,\ b \to d\ell\ell,$$

$$\psi(3770) \to D^0\overline{D}^0 \text{ \& charm at 4S}$$

    - Generic backgrounds dominate sample requests, but we will also need large samples of signals generated.
    - Calorimeter: $B^0 \to \pi^0\pi^0$ calibration mode
  - Expect that requests may come for 5S once we have integrated appropriate generators.

TDR / December Workshop

- TDR: Need to prepare
  - A section for the detector TDR.
  - A section for the accelerator TDR.

- **Planning for the December workshop:**

• What have we learned from the summer conference results?
• Are there any channels that are no longer interesting to focus on?
• Are there any channels that are more important now, than before?
• What changes are there to the interplay problem in terms of elucidating new physics?
• What are the highest priority areas to get analysts working on?
• What computing resources are required to perform such an analysis?
• What tools are require to perform such an analysis (are they available)?

December Physics Workshop

- Dates: 11^{th}-12^{th} December (just before next CM)
- Location: LNF

Proposal for sessions

subjects we would like to see discussed: these are some suggestions, please add to them

- Day 1
  - Welcome: Aims/intro
  - DESY sll workshop summary
  - WG5 session
    - progress on α_s
  - b→sγ session
    - Theory + Expt overview, esp A_{CP}
  - $B_{u,d,s}$ session(s)
    - Bs→gg &/or ASL Fast Sim progress
    - b→sll inclusive/exclusive FastSim progress
- Day 2
  - charm
    - TDCPV progress
  - tau
    - CPV
  - Lattice
    - 2011 Comparison with CDR predictions
  - Planning Session
    - Discuss tools required, and what FastSim mode studies we need for TDR/Book
  - TDR / Elba planning session

Currently have one room booked for both days: all plenary.
Probably want some parallel sessions on Monday Morning. How many?

Organisation will be discussed in one of the parallel sessions this week.

Please give your input for the agenda.