

Physics Summary

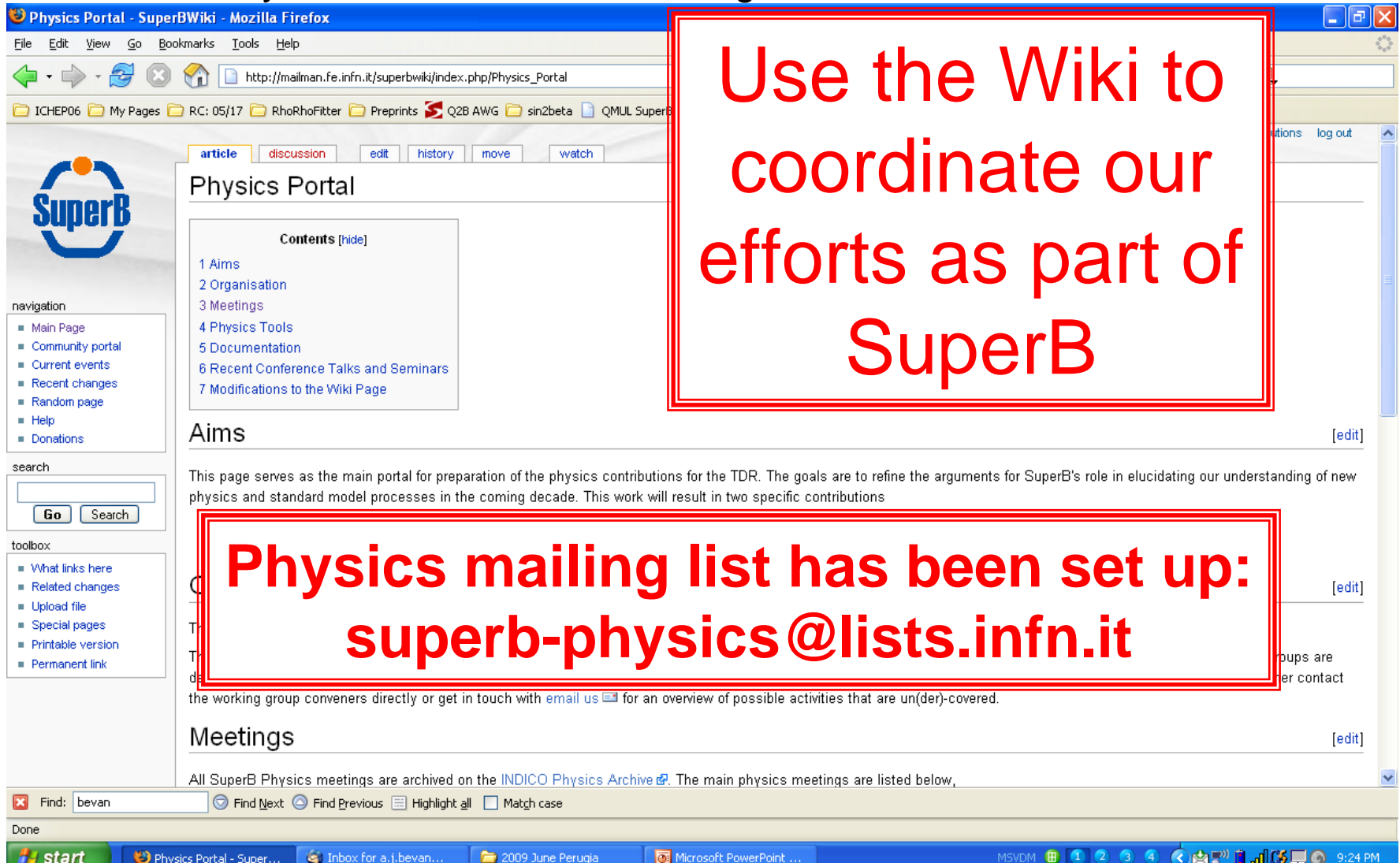


Adrian Bevan, Dave Brown, Marco Ciuchini, and Achille Stocchi

+ thanks to the session contributors for talks and the many useful discussions.

Wiki Pages Available

- http://mailman.fe.infn.it/superbwiki/index.php/Physics_Portal
 - Theory classification for our colleagues to edit the Wiki.



Use the Wiki to coordinate our efforts as part of SuperB

**Physics mailing list has been set up:
superb-physics@lists.infn.it**

Working Groups

SuperB WG page - SuperBWiki - Mozilla Firefox

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http://mailman.fe.infn.it/superbwiki/index.php/SuperB_WG_page

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SuperB WG page

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The following working groups were set up for the organisation of the Warwick 09 workshop and will be used as an organizational basis for the TDR effort. As the TDR process evolves, we expect the nature and structure of the SuperB WGs to change as necessary. In particular if there are potential areas of interest that are not covered by one of the groups listed below, please contact [email us](#) to discuss the possibility of including this area as part of an existing or new working group.

Group	Name	Web-page
WG1	New Physics in Mixing and CP Violation	WG1 web-page
WG2	Rare, Radiative and semi-leptonic decays	WG2 web-page
WG3	Lepton Flavor Violation and New Physics Models	WG3 web-page
WG4	Charm Mixing and CP Violation in D decays	WG4 web-page
WG5	Spectroscopy, Exotica and Other Physics	WG5 web-page
WGA	Phenomenology dealing with various topics	WGA web-page
WGB	Theoretical uncertainties	WGB web-page
WGC	Tools	WGC web-page

Each group has a wiki page

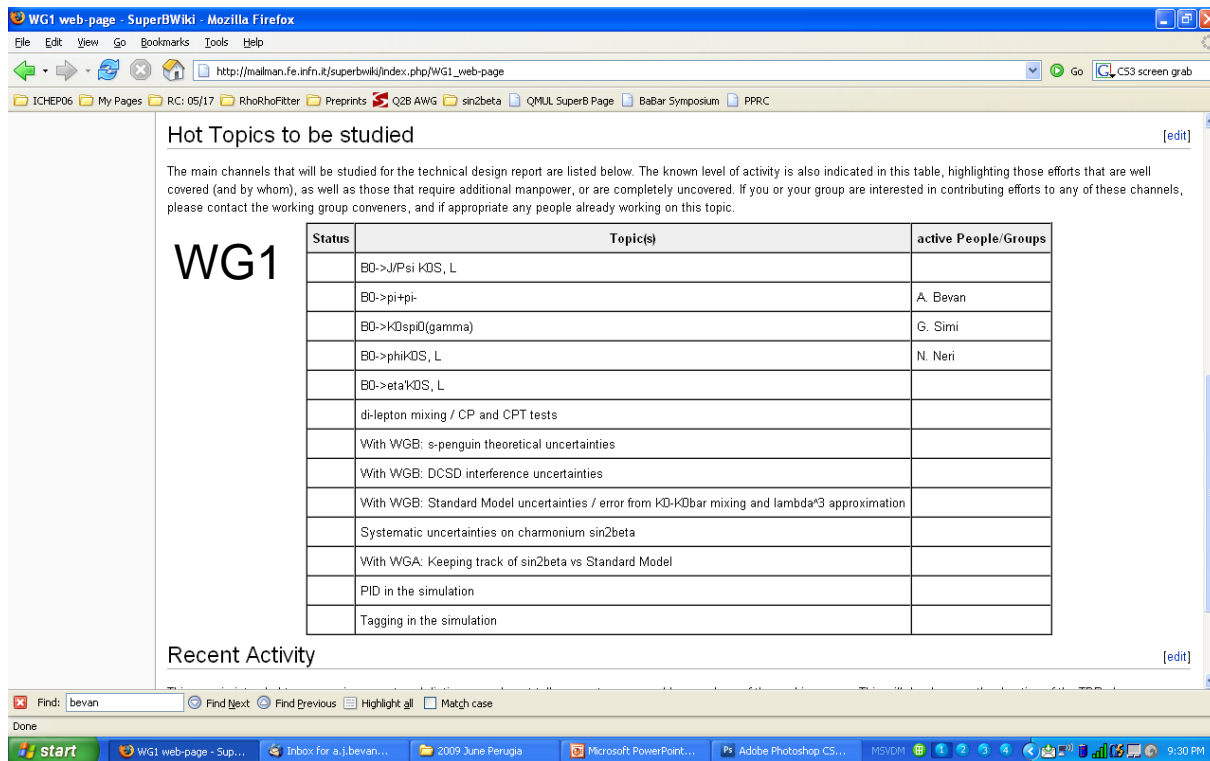
Very full session summarizing the Warwick workshop activities
See Thursday 2pm session!

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Working groups keep track of activities

- Charge
- Conveners
- Hot Topics
- Recent Activity



WG1 web-page - SuperBWiki - Mozilla Firefox

http://mailman.fe.infn.it/superbwiki/index.php/WG1_web-page

Hot Topics to be studied

The main channels that will be studied for the technical design report are listed below. The known level of activity is also indicated in this table, highlighting those efforts that are well covered (and by whom), as well as those that require additional manpower, or are completely uncovered. If you or your group are interested in contributing efforts to any of these channels, please contact the working group conveners, and if appropriate any people already working on this topic.

Status	Topic(s)	active People/Groups
	$B^0 \rightarrow J/\psi K^0_S, L$	
	$B^0 \rightarrow \pi^+ \pi^-$	A. Bevan
	$B^0 \rightarrow K^0_S \rho^0(\gamma)$	G. Simi
	$B^0 \rightarrow \phi K^0_S, L$	N. Neri
	$B^0 \rightarrow \eta K^0_S, L$	
	di-lepton mixing / CP and CPT tests	
	With WGB: s-penguin theoretical uncertainties	
	With WGB: DCSD interference uncertainties	
	With WGB: Standard Model uncertainties / error from $K^0-K^0_{\text{bar}}$ mixing and λ_{bda}^3 approximation	
	Systematic uncertainties on charmonium $\sin 2\beta$	
	With WGA: Keeping track of $\sin 2\beta$ vs Standard Model	
	PID in the simulation	
	Tagging in the simulation	

Recent Activity

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- Conveners should keep this information up to date.
- Gives an overview of activities for people interested in contributing.
- Will highlight open/undermanned areas.



Conference Talks/Seminars

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Recent SuperB seminars

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2009

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Title	Venue	Speaker
The Super Flavour Factory Project (ppt)	CERN	A. Stocchi
The Super Flavour Factory SuperB (pdf)	UAI Oxford	M. Giorgi

2008

Title	Venue	Speaker
The SuperB Facility (pdf)	Glasgow (and other UK institutes)	A. E.

2007

Title	Venue	Speaker
The SuperB Project (pdf)	LBNL	F. Fort
The SuperB Project (ppt)	LNF - Gruppo 1	F. Fort

Recent SuperB conference talks - SuperBWiki - Mozilla Firefox

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This page lists (in reverse chronological order) recent conference talks, linking directly to the conference record of the talk given. If your talk or proceedings are not listed in the tables below, please log in and correct this page!

2009

[edit]

Title	Conference	Speaker	Proceedings
The scientific case for Super B Factories	XXXVII International Meeting on Fundamental Physics, Benasque, Spain, February 2009	Giuseppe Finocchiaro	
Results of the DAPHNE Upgrade and Prospect for a SuperB	La Thuile, March 2009	Pantaleo Raimondi	
The SuperB Project	La Thuile, March 2009	Matteo Rama	
SuperB	Moriond Electroweak, March 2009	Adrian Bevan	arXiv:0905.2305
SuperB	Tenth Conference on the Intersections of Particle and Nuclear Physics, San Diego, USA, May 2009	Adrian Bevan	arXiv:0906.1008

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SuperB Perugia June 2009

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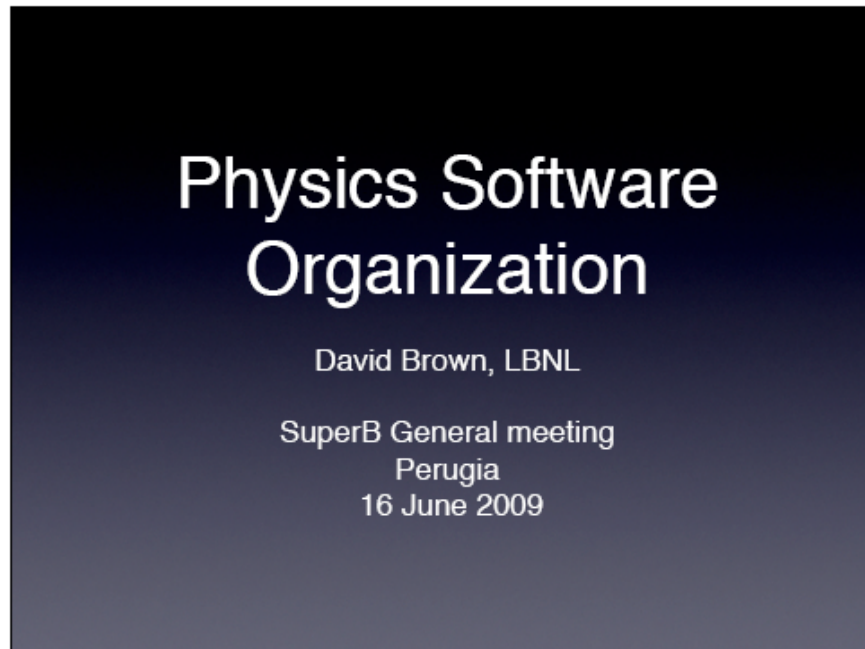
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start Recent SuperB confe... Inbox for a.j.bevan... 2009 June Perugia

Planning Simulation Production

- Several talks on Monte Carlo production were given in the Wednesday Physics + Computing session.
- In particular look at:

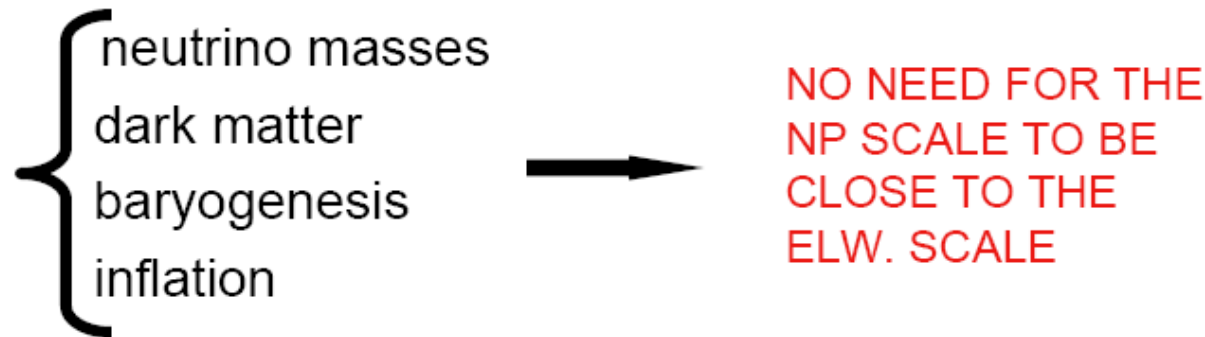


- Aim for a test production cycle for the October meeting (test).
- Jan 2010: Full Scale Production (for TDR)
- Summer 2010: Final Production (for TDR).
- Need to co-ordinate efforts with computing experts.

Public Seminar

- Antonio Masiero gave an inspiring seminar summarizing the *raison d'être* of flavour physics to probe EW symmetry breaking.

The Energy Scale from the “Observational” New Physics



The Energy Scale from the “Theoretical” New Physics

★ ★ ★ Stabilization of the electroweak symmetry breaking at M_W calls for an **ULTRAVIOLET COMPLETION** of the SM already at the TeV scale +

★ **CORRECT GRAND UNIFICATION “CALLS” FOR NEW PARTICLES AT THE ELW. SCALE** (in particular few hundred GeV SUSY particles)

THE MULTI-MESSENGER APPROACH TO TeV NEW PHYSICS

- **High-Energy** (Tevatron, LHC, ILC) + **High-Intensity** (SuperFlavour machines) + **Astro-Particle Physics** (DM searches) : we need a deep and efficient synergy of these three roads to be able to accomplish the **DISCOVERY+IDENTIFICATION (UNDERSTANDING?) of the TeV NP**
- **(KAON + BEAUTY + CHARM + LEPTON) FV + RARE FLAVOR CONSERVING (EDMs, $g - 2$) ROADS**: important to have an efficient interplay of these different approaches to i) achieve an **understanding/discovery of the NP flavor structure**; ii) explore the existence of **lepton – hadron connections** like in SUSYGUTs (possibility to access not only TeV NP, but also some “progenitor” of it at very high energy scales)

- Ikaros (also see Brian's WG summary)
 - Another inspiring talk!


Areas of top priority



experimental tasks

host of promising modes (doable at LHCb)

 $D^\pm \rightarrow K_S \pi^\pm, \pi^+ \pi^- \pi^\pm, K^+ K^- \pi^\pm, \dots$


 $D^0(\pm) \rightarrow K_S K^+ K^-, K_S \pi^+ \pi^-, K^+ K^-, \pi^+ \pi^-, K^+ \pi^-, K^+ K^- \pi^+ \pi^-, K^+ K^- \mu^+ \mu^-, \dots$

desirable modes (not doable at LHCb?)


 $D^0 \rightarrow l^- \nu K^+ \text{ vs. } D^0 \rightarrow l^+ \nu K^-$ (best at threshold?)

 final states with (multi)neutrals

theoretical tasks in interpreting data

 dealing with FSI

 analyzing Dalitz plots in 3-body modes

 treating >3-body modes: T-odd moments etc.

- do not count on miracles from theorists, but can expect a positive learning curve -- if faced by accurate data
 - ✍ a great deal of expertise exists in the hadronic community that can be applied in CP studies of Dalitz plots etc. with great profit!

Hanhart, Meissner, ibi trying to create working group

✦ Rare decays

- ✍ skeptical that $D_{(s)} \rightarrow \gamma X, l^+l^- X$ can teach us about NP
- ✍ promising modes

✍ $D^0 \rightarrow \mu^+\mu^-$

✍ $D^0 \rightarrow \gamma\gamma$ (best at threshold?)

in its own right and as LD background to $D^0 \rightarrow \mu^+\mu^-$

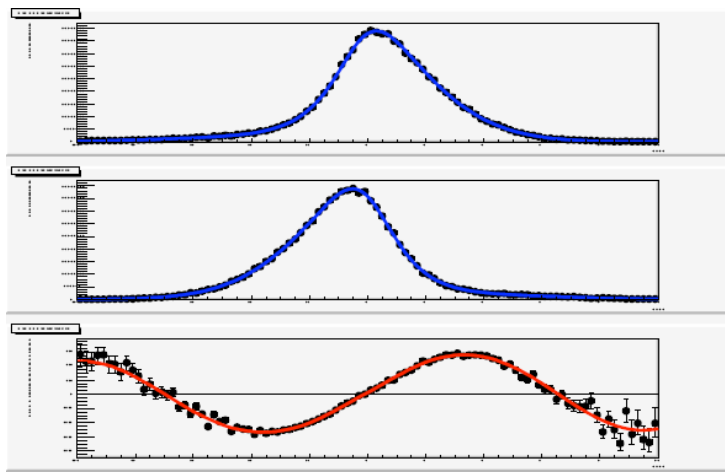
- Plenty of interesting physics to study:
 - Contact David, Brian, and Ikaros if you're interested!

Time-dependent measurements: I

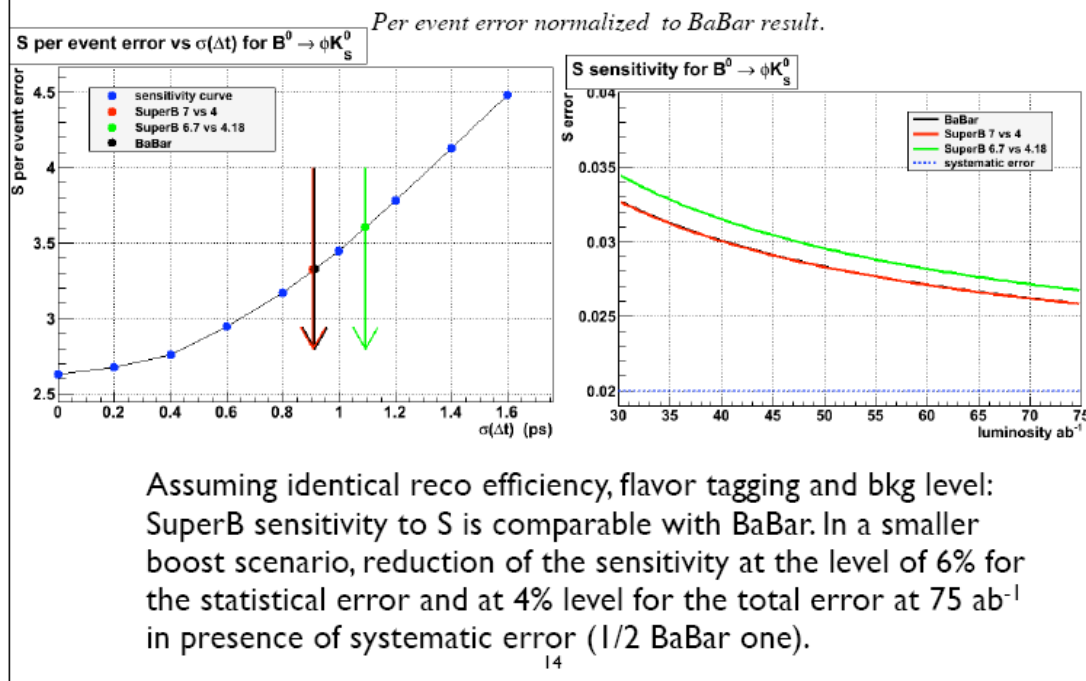
■ Nicola Neri:

$$B^0 \rightarrow \phi K_S^0$$

The shape of things to come!



Sensitivity to S for $B^0 \rightarrow \phi K_S^0$



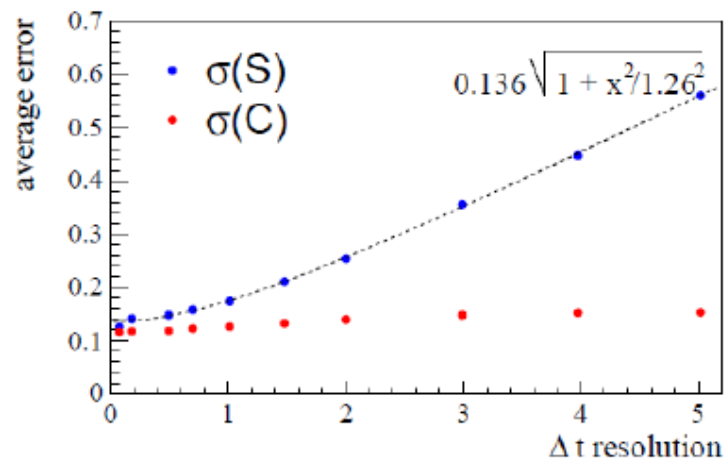
Clear we will have to worry
about doing precision
TDCPV measurements.

Effectively 10-15% less data with lower boost.

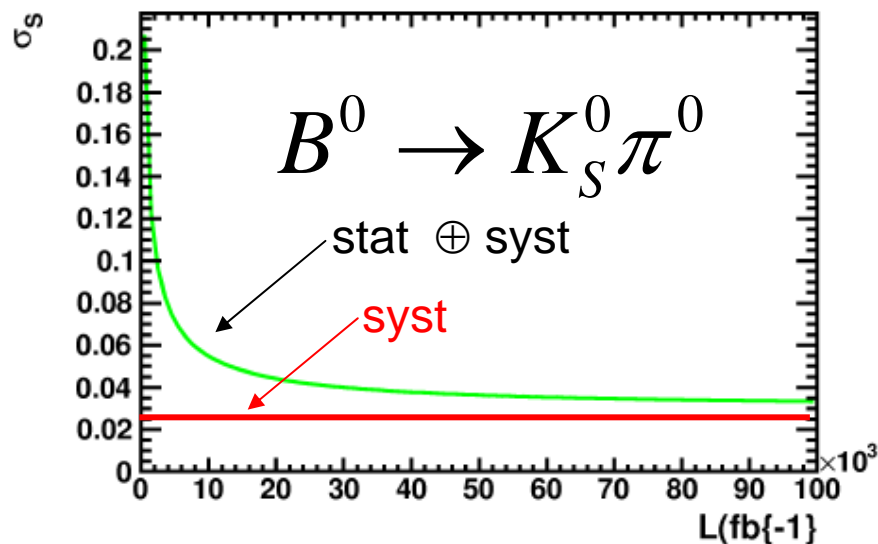
Think in terms of the running cost when
contemplating any such change!

Time-dependent measurements: II

■ Gabriele Simi



	rms[ps]	$f_{\text{good}}[\%]$	$\sigma_S/\sigma_S^{\text{nominal}}$	$\sigma_C/\sigma_C^{\text{nominal}}$
babar	1.84	69	0.90	0.98
nominal	2.19	72	1	1
expanded	2.71	88	1.07	1.00



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Deadlines: Interim Report

- Prepare a physics section for the interim report.
- Want to update our knowledge of the physics case for SuperB.
 - Particularly highlighting unique features of the programme.
- Audience:
 - The physics community.
- Focus:
 - Stand-alone description of the NP and unique capabilities of SuperB.
- Deadlines:
 - **Start of October**: SLAC Meeting will be used to bring contributions together.
 - **1st November**: Draft ready to circulate to SuperB community for comments.
 - **1st December**: Draft finalized and ready for circulation outside of SuperB.

Winter Physics Workshop

- To be held in Frascati (details to follow).
- Satellite meeting to the December General meeting.
- Before the CERN interplay workshop [14-16th Dec]
 - Opportunity for us to report progress to the regional community.
 - Try to identify a few NP studies that can be shown on this timescale.
- Aim of the workshop:
 - Finalize interim document.
 - Plan for TDR work over 2010:
 - Identify SuperB analyses being updated
 - Plan Simulated Production Cycle for TDR studies (mid 2010)
 - Write the document...