

Plans for Hadronic Recoil analyses in the next production



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3rd Superb Collaboration Meeting - LNF

Computing + Physics Session, March 22nd 2012

Introduction

- Collect info and numbers from previous FastSim production cycle and perform tests on time consumption as inputs for next production requests
- Some crucial info on production target, resources, timescale, and configurations (DG, bkg, ..) are missing
- As a consequence, the numbers that will be given are preliminary

2010 FastSim production

Samples for HAD reco analyses

Geometry	Generator	Analyses	Backgrounds	N requested	Luminosity	Time/event (1)	Purpose
DG_BaBar	B0B0bar_Btag-HD_Cocktail	HadRecoilCocktail	NoPair	0.94x10 ⁸	1.0	0.6	DG Study
DG_BaBar	B+B-_Btag-HD_Cocktail	HadRecoilCocktail	NoPair	1.18x10 ⁸	1.0	0.6	DG Study
DG_4	B0B0bar_Btag-HD_Cocktail	HadRecoilCocktail	NoPair	3.76x10 ⁸	4.0	0.66	DG Study
DG_4	B+B-_Btag-HD_Cocktail	HadRecoilCocktail	NoPair	4.72x10 ⁸	4.0	0.66	DG Study
DG_4a	B0B0bar_Btag-HD_Cocktail	HadRecoilCocktail	NoPair	3.76x10 ⁸	4.0	0.66	DG Study
DG_4a	B+B-_Btag-HD_Cocktail	HadRecoilCocktail	NoPair	4.72x10 ⁸	4.0	0.66	DG Study
DG_4	B0B0bar_Btag-HD_Cocktail	HadRecoilCocktail	All	0.94x10 ⁸	1.0	0.87	DG Study
DG_4	B+B-_Btag-HD_Cocktail	HadRecoilCocktail	All	1.18x10 ⁸	1.0	0.87	DG Study
DG_4	B0B0bar_generic	Generics	NoPair	1x10 ⁸	0.1	0.66	DG Study
DG_4	B+B-_generic	Generics	NoPair	1x10 ⁸	0.1	0.66	DG Study
DG_4	B0B0bar_generic	Generics	All	1x10 ⁸	0.1	0.87	DG Study
DG_4	B+B-_generic	Generics	All	1x10 ⁸	0.1	0.87	DG Study
DG_4	B+B-_K+nunu	BtoKnuNu	All	3x10 ⁶			DG Study, Physics
DG_4a	B+B-_K+nunu	BtoKnuNu	All	3x10 ⁶			DG Study, Physics
DG_4	B0B0bar_K0nunu	BtoKnuNu	All	3x10 ⁶			DG Study, Physics
DG_4a	B0B0bar_K0nunu	BtoKnuNu	All	3x10 ⁶			DG Study, Physics
DG_4	B+B-_Kstar+nunu	BtoKstarNuNu	All	3x10 ⁶			DG Study, Physics
DG_4a	B+B-_Kstar+nunu	BtoKstarNuNu	All	3x10 ⁶			DG Study, Physics
DG_4	B0B0bar_Kstar0nunu_Kpi	BtoKstarNuNu	All	3x10 ⁶			DG Study, Physics
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DG_4	B+B-_Btag-HD_Cocktail					6	DG Study
DG_4a	B0B0bar_Btag-HD_Cocktail					6	DG Study
DG_4a	B+B-_Btag-HD_Cocktail					6	DG Study
DG_4	B0B0bar_Btag-HD_Cocktail					7	DG Study
DG_4	B+B-_Btag-HD_Cocktail					7	DG Study
DG_4	B0B0bar_generic	Generics	NoPair	1x10 ⁸	0.1	0.66	DG Study
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Used for
SuperB FastSim vs BaBar FullSim
comparison

Samples for HAD reco analyses

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DGs

machine bkg
configs

Used for
DG and Physics studies

Physics background

breco sample (HAD/SL)	generator	dec file name	number of modes	fraction of BBbar decay**
HAD	B+B-_Btag-HD_Cocktail	B+B-_Btag-HD_Cocktail.dec	31	0.2176
HAD	B0B0bar_Btag-HD_Cocktail	B0B0bar_Btag-HD_Cocktail.dec	38	0.1806

** 100% means B->everything, Bbar->everything

- Cut on **HAD Breco mode purity** (>50%, was >10% in most BaBar analysis) to reduce running time: lower purity → higher multiplicity → higher combinatoric → higher running time
- **HAD cocktail** was ok for DG studies
 - reduce event run time wrt BB generic
 - evaluate the impact of BWD EMC and FWD PID on physics performances comparing event selection efficiency with/without a given device
- **Is it ok for physics studies?**

Next FastSim production

An old exercise on event counting (I)

- Physics bkg samples in 2010 production for final DG study results
 - DG_4, NoPair
 - Cut and count selection a-la-BaBar (with some looser cuts) for $B \rightarrow K^* \nu \nu$

sample	gen (10^8)	selected
B0B0bar_Btag-HD_Cocktail	3.76	181
B+B-_Btag-HD_Cocktail	4.72	211

An old exercise on event counting (II)

- July 2011 estimate of the amount of event needed
- Assumptions:
 - production goal: detailed sensitivity estimates, including systematics studies
 - enough man-power to perform such studies
- Event counting:
 - need some 10^3 BB surviving the selection
 - stay with **purity cut**, bias on sensitivity estimate quantified by using BaBar FullSim and comparing analysis results with and without purity cut.
 - use the **cocktail** increasing the number of decay modes?
- $20\text{-}25 \times 10^9$ events in SuperB config + small BB generic samples in the BaBar config to perform SuperB FastSim/BaBar FullSim comparison

HAD Breco analyses in next production

- Not sure this is up to date

Name	Channel(s)	Hadronic tags	SL tags	Notes	WG
Elisa Manoni	$K^{(*)}nunu$	yes			Rare
Steve Robertson	$B \rightarrow Xs l+l-$	yes			Rare
Wenfeng Wang	$B \rightarrow Xs \text{ gamma}$				Rare
Alejandro Perez			yes	support for SL tags	Rare
Elisabetta Baracchini	$B \rightarrow K^{(*)}nunu$		yes		Rare
Marcello Rotondo, Valentina Santoro	$B \rightarrow \mu \nu, e \nu$	yes			Rare
Guglielmo De Nardo	$B \rightarrow \tau \nu$	yes			Rare
Marcin Chrzaszcz	$B \rightarrow K \text{ phi phi}$				CPV & mixing

HAD Breco analyses in next production

- Not sure this is up to date

Name	Channel(s)	Hadronic tags	SL tags	Notes	WG
Elisa Manoni	K(*)nunu			<ul style="list-style-type: none"> ○ PacHadRecoilUser FastSim code should be ok for channels with neutrinos, not sure about $B \rightarrow Xsll$; ○ Analysts should check if the cut applied at reconstruction level are ok with them 	
Steve Robertson	B->Xs l+l-				
Wenfeng Wang	B->Xs gamma				
Alejandro Perez					
Elisabetta Baracchini	B->K(*)nunu				
Marcello Rotondo, Valentina Santoro	B-> mu nu, e nu				
Guglielmo De Nardo	B-> tau nu				
Marcin Chrzaszcz	B -> K phi phi				CPV & mixing

Some tests on time consumption

- Test performed with Nov 2011 background frames from FullSim: Radiative Bhabha + neutrons
- FastSim release V0.3.1 with patches, running HAD recoil analysis only
- running on CNAF batch queue

Bkg config sec/evt	signal MC	BB generic
No bkg	~ 0.12	~ 0.40
1x bkg	~ 0.70	~ 1.06
3x bkg	~ 2.64	~ 5.80

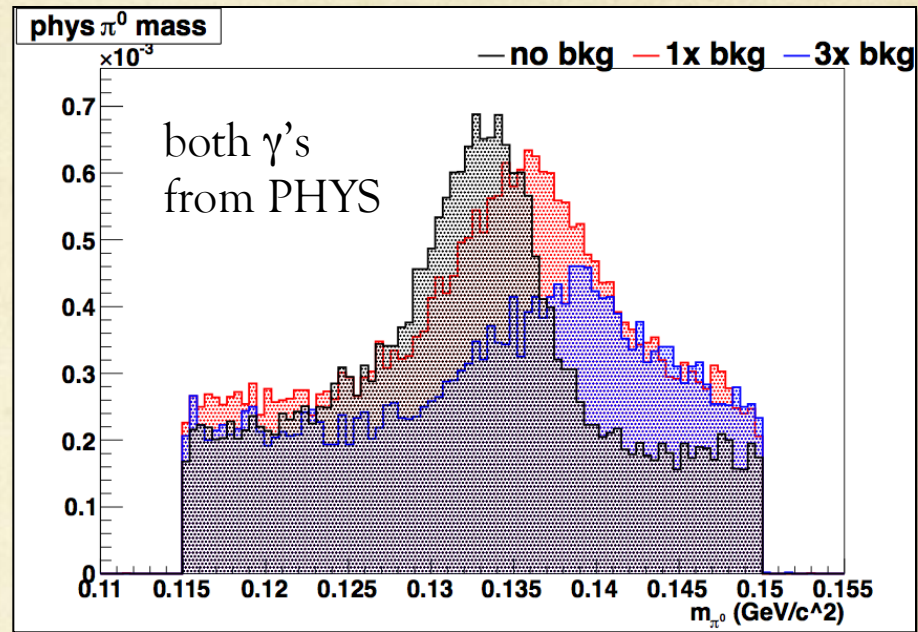
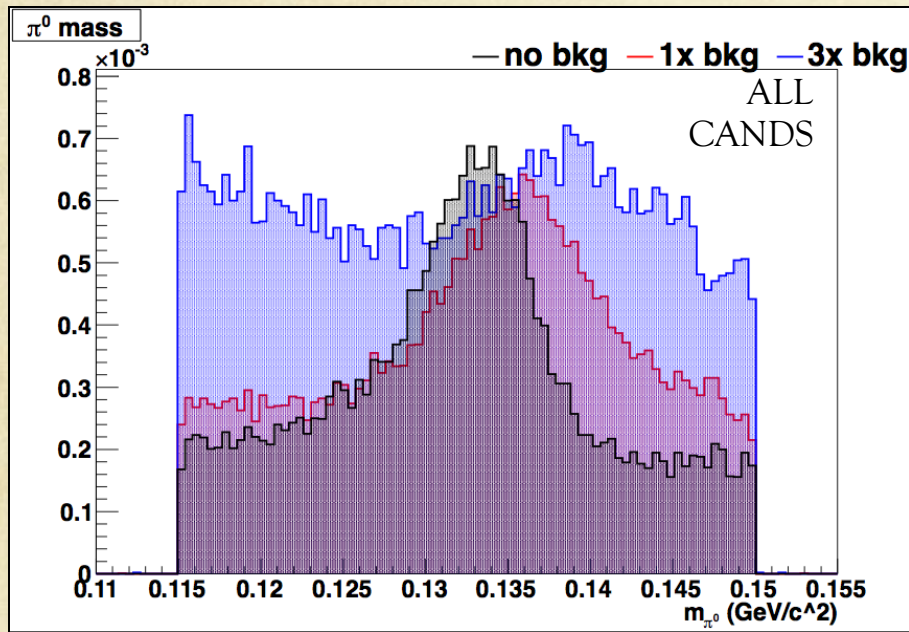
- some 3x BB generic jobs fails, reaching LSF memory usage limit
- 5x bkg configuration, signal MC: ~ 40 sec/evt

Some missing info..

- ..to make a realistic estimate of the needed number of events:
 - Which is the **aim** of the production? Is B HAD (SL) cocktail suitable for this or do we need BB generics?
 - Which **machine bkg** wants to be included?
 - Can FastSim reconstruction algorithms be optimized (i.e. clustering in EMC, **EMC calibration**)?
 - How many **geometries**?
 - Are we going to use **skims**?
 - (How many analyses other than Breco? How many computing resources?)
 -

Extra Slides

π^0 mass in FastSim



E_{extra} : bkg level and E_{min}^γ

— no bkg — 1x bkg — 3x bkg

