Computing

Luca Tomassetti
on behalf of the computing group

Outline

- Summer Production
  - Infrastructure and Tools
  - Fast simulation code validation
  - Results (Infrastructure and Tools)
  - Results (Analysis)
- R&D Program

Goals

- Evaluate major DG options
  - Forward PID and backwards Emc
  - Generate signal, generic bkg. to $B \to K(*)\nu\nu$, $B \to \tau\nu$
- Include all known detector backgrounds
  - Rad Bhabha tertiaries from machine elements
  - Rad Bhabha primaries
  - Pair electrons
- 10X statistics of February production
- Required about 20X efficiency improvement

Production Schedule

- I period: July 26th – August 9th
- II period: August 30th – September 19th

- Production periods have been extended in
  – August (until the start of II period)
  – September (still in progress)

REQUESTS

- DG Studies
  HAD, SL, Generics — w/o pairs — 3.5×10^9 evt.
  w/ pairs — 5.7×10^8 evt.

- DG Studies + Physics (Signals)
  $B \to K \nu\nu$, $B \to K^* \nu\nu$ — w/ pairs — 5.4×10^8 evt.

- Physics
  ~~DST, Tau — w/ pairs — 6.2×10^{11} evt.~~
  (POSTPONED)

- TOTAL — 4.6×10^9 evt.

Production Status

- Production Tools worked properly
  - Interface for shifters
  - Improvements in DB, Tools, WebUI
- Remote Sites fully exploited:
  15 sites (EGEE, OSG, WestGrid)
- Total amount of produced data exceeded the requests

Shift takers

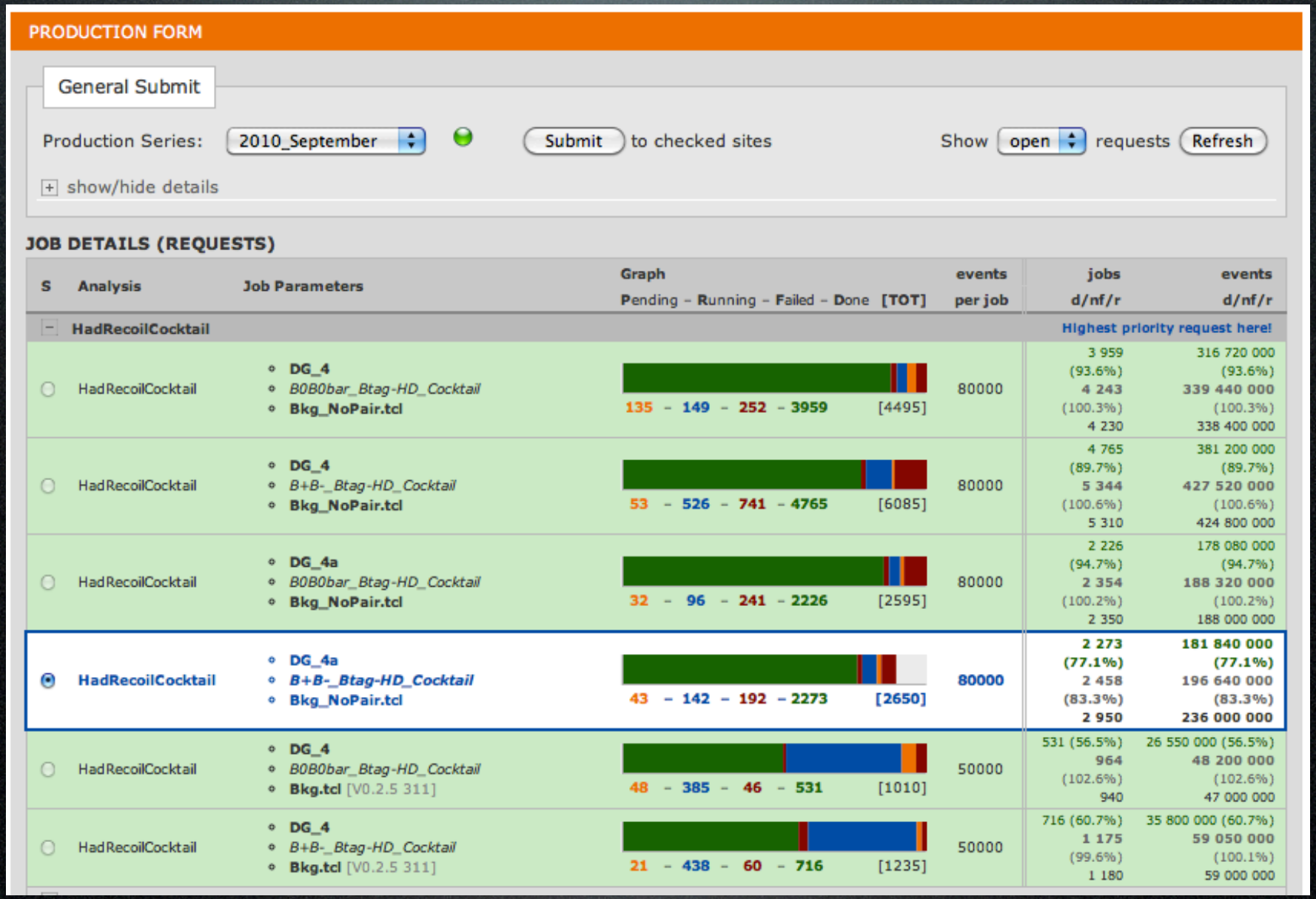
- Alejandro Perez
- **Dana Lindemann**
- **Bertrand Echenard**
- Alberto Cervelli
- Leonid Burmistrov
- Micheal Lazos
- Alessandro Rossi
- Alez Martin
- Adam Simpson
- **Nicola Gagliardi**
- **Enrico Feltresi**
- Darren Swersky

- 3 shifts a day / 1week
- Only 4 days out of 28 have been “used”
- Delays, Software distribution and testing, tuning of the system
- Thanks!

Production Tools

- Simplified job preparation
- Management of user's requests and validation by production manager
- Selection of jobs to be submitted based on requests
- Automatic preparation of scripts to launch jobs to ALL available sites
- Sensor(s) to determine working and available sites
- 'Single-User', 'Single-script' submission to the GRID

WebUI for shifts



PRODUCTION FORM

General Submit

Production Series: 2010_September Submit to checked sites Show open requests Refresh

show/hide details

JOB DETAILS (REQUESTS)

S	Analysis	Job Parameters	Graph Pending - Running - Failed - Done [TOT]	events per job	jobs d/nf/r	events d/nf/r
	HadRecoilCocktail				Highest priority request here!	
○	HadRecoilCocktail	DG_4 *B0B0bar_Btag-HD_Cocktail* Bkg_NoPair.tcl	135 - 149 - 252 - 3959 [4495]	80000	3 959 (93.6%) 4 243 (100.3%) 4 230	316 720 000 (93.6%) 339 440 000 (100.3%) 338 400 000
○	HadRecoilCocktail	DG_4 *B+B-_Btag-HD_Cocktail* Bkg_NoPair.tcl	53 - 526 - 741 - 4765 [6085]	80000	4 765 (89.7%) 5 344 (100.6%) 5 310	381 200 000 (89.7%) 427 520 000 (100.6%) 424 800 000
○	HadRecoilCocktail	DG_4a *B0B0bar_Btag-HD_Cocktail* Bkg_NoPair.tcl	32 - 96 - 241 - 2226 [2595]	80000	2 226 (94.7%) 2 354 (100.2%) 2 350	178 080 000 (94.7%) 188 320 000 (100.2%) 188 000 000
◉	**HadRecoilCocktail**	DG_4a ***B+B-_Btag-HD_Cocktail*** Bkg_NoPair.tcl	43 - 142 - 192 - 2273 [2650]	**80000**	**2 273** **(77.1%)** 2 458 (83.3%) **2 950**	**181 840 000** **(77.1%)** 196 640 000 (83.3%) **236 000 000**
○	HadRecoilCocktail	DG_4 *B0B0bar_Btag-HD_Cocktail* Bkg.tcl [V0.2.5 311]	48 - 385 - 46 - 531 [1010]	50000	531 (56.5%) 964 (102.6%) 940	26 550 000 (56.5%) 48 200 000 (102.6%) 47 000 000
○	HadRecoilCocktail	DG_4 *B+B-_Btag-HD_Cocktail* Bkg.tcl [V0.2.5 311]	21 - 438 - 60 - 716 [1235]	50000	716 (60.7%) 1 175 (99.6%) 1 180	35 800 000 (60.7%) 59 050 000 (100.1%) 59 000 000

WebUI for shifts

☐	GRIF	2010-09-26 05:55:42 [16:02:51]	2010-09-25 15:38:50 [30:19:43]	45 - 0 - 164 - 3041 [3250]	35-0-0-15	[30] [10] [551]	[50]	Test
☐	IN2P3-CC	2010-09-26 21:58:32 [00:00:01]	2010-09-26 11:26:17 [10:32:16]	86 - 214 - 309 - 4691 [5300]	66-11-1-22	[50] [10] [700]	[100]	Test
☐	INFN-BARI	2010-09-26 21:29:41 [00:28:52]	2010-09-26 21:18:06 [00:40:27]	57 - 101 - 89 - 1353 [1600]	50-0-0-0	[30] [10] [300]	[50]	Test
☑	INFN-CAGLIARI	2010-09-26 21:39:48 [00:18:45]	2010-09-25 17:14:56 [28:43:37]	1 - 4 - 38 - 37 [80]	1-4-0-5	[5] [3] [300]	[10]	Submit Test
☐	INFN-LNL-2	2010-09-26 17:15:43 [04:42:50]	2010-09-26 09:07:43 [12:50:50]	50 - 5 - 174 - 1950 [2179]	50-0-0-0	[30] [10] [500]	[50]	Test
☐	INFN-NAPOLI-ATLAS	2010-09-26 21:36:11 [00:22:22]	2010-09-26 18:54:03 [03:04:30]	53 - 17 - 46 - 159 [275]	43-0-7-0	[30] [10] [300]	[50]	Test
☐	INFN-PISA	2010-09-26 21:58:32 [00:00:01]	2010-09-26 20:08:41 [01:49:52]	147 - 422 - 465 - 3166 [4200]	58-37-5-0	[50] [10] [1000]	[100]	Test
☑	INFN-T1	2010-09-26 21:58:32 [00:00:01]	2010-09-26 19:19:40 [02:38:53]	12 - 628 - 240 - 13240 [14120]	0-100-0-0	[150] [10] [900]	[100]	Submit Test
☑	INFN-TORINO	2010-09-26 21:13:06 [00:45:27]	2010-09-26 18:59:18 [02:59:15]	29 - 70 - 86 - 590 [775]	29-21-0-0	[30] [10] [300]	[50]	Submit Test
☑	RAL-LCG2	2010-09-26 21:56:30 [00:02:03]	2010-09-26 11:36:32 [10:22:01]	0 - 534 - 2406 - 4880 [7820]	0-99-1-0	[30] [10] [800]	[100]	Submit Test
☐	SLAC	2010-09-26 21:54:59 [00:03:34]	2010-09-26 12:45:11 [09:13:22]	32 - 160 - 62 - 1796 [2050]	32-68-0-0	[50] [10] [150]	[100]	OVERLOAD Test
☑	UKI-LT2-QMUL	2010-09-26 21:58:33 [00:00:00]	2010-09-26 21:17:11 [00:41:22]	0 - 818 - 185 - 4907 [5910]	0-100-0-0	[50] [10] [950]	[100]	Submit Test

Production Status

- 2010_February

Done:	20 Kjobs	1.7 x 10^9 evt.
WCT:	591 451 996 s	or about 20 yr

- "2010_Summer"

Done:	**133** Kjobs	8.5 x 10^9 evt.
Failures:	13 Kjobs	
	about 10% (grid, site issues)	

- Total WCT: 4 965 933 822 s (157 yr)

See A. Fella Talk

Production Status

- Various issues at simulation code level 6 rev: 292, 293, 294, 302, 307, **311** (all of them deployed and used)
- Main issues on
  - Navigation
  - Background mixing with pairs
- Produced data also used for validation and debugging purposes

See D. Brown Talk(s)

Fastsim navigation

- Old model: particle simulation navigation loops over detector elements in a fixed order
  - Fails when particles come from ‘unexpected’ directions, or when elements have no fixed order WRT particle direction
- New navigation based on **voxels**
  - Detector volumes are divided into voxels (cylindrical geometry)
  - Voxels reference enclosed detector elements. No assumptions about element order inside a voxel

See D. Brown Talk(s)

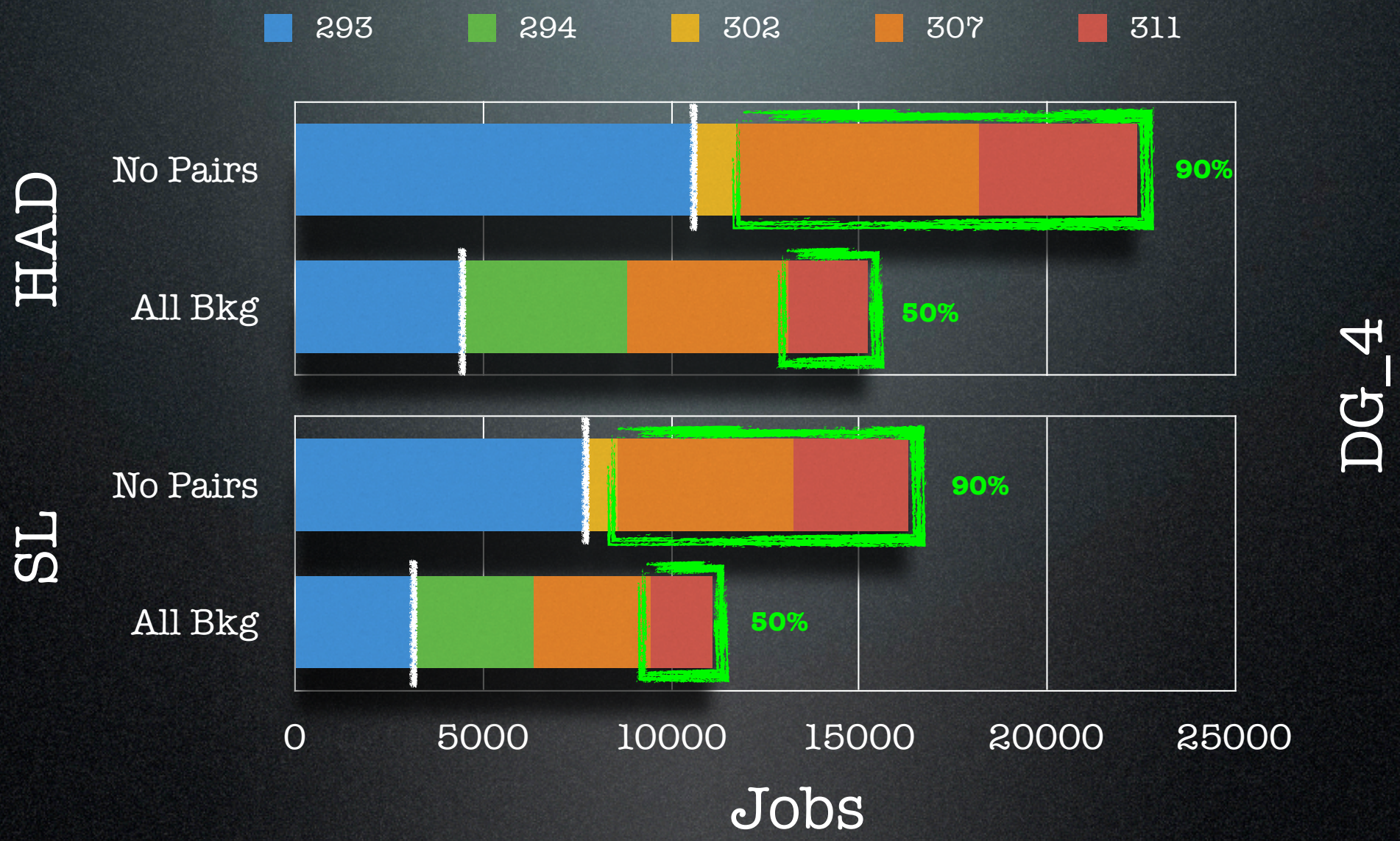
Fastsim Bkg mixing

- Pair filtering exposed old BaBar bug
  - PID maps keyed to candidate pointers, not UID
  - ‘Solution’: limit electron selectors to >100MeV

See D. Brown Talk(s)

Production Status

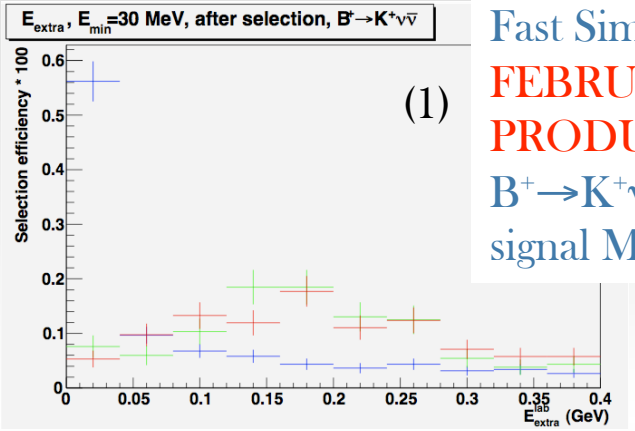
- Two Production Series:
  - 2010_July
  - 2010_September (preferred **data**)
- "Preferred" Data is below requests due to limited time
  (rev. 311 has been released one week ago)
- Results from Signals and Cocktails w/o and w/ pairs will be presented during the meeting


293
294
302
307
311
HAD
No Pairs
All Bkg
90%
50%
SL
No Pairs
All Bkg
90%
50%
DG_4
0
5000
10000
15000
20000
25000
Jobs

Ultra-Preliminary Results

Eextra distributions before Bsig selection (II)

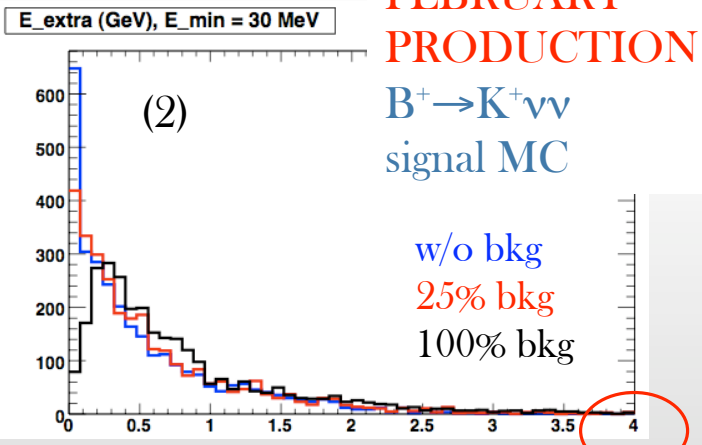
* evolution of Eextra distribution from February to Summer production



(1)

Fast Sim
FEBRUARY
PRODUCTION
$B^+ \to K^+ \nu\nu$
signal MC

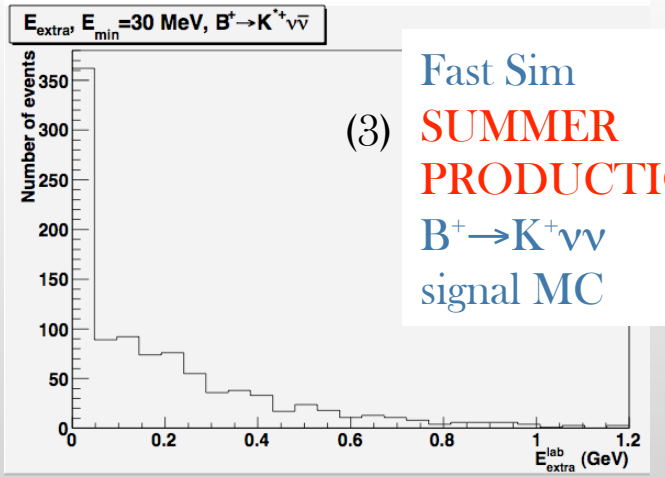
← 4 times the expected machine bkg; reducing amount of bkg photons by hand we expect...



(2)

Fast Sim
FEBRUARY
PRODUCTION
$B^+ \to K^+ \nu\nu$
signal MC

w/o bkg
25% bkg
100% bkg



(3)

Fast Sim
SUMMER
PRODUCTION
$B^+ \to K^+ \nu\nu$
signal MC

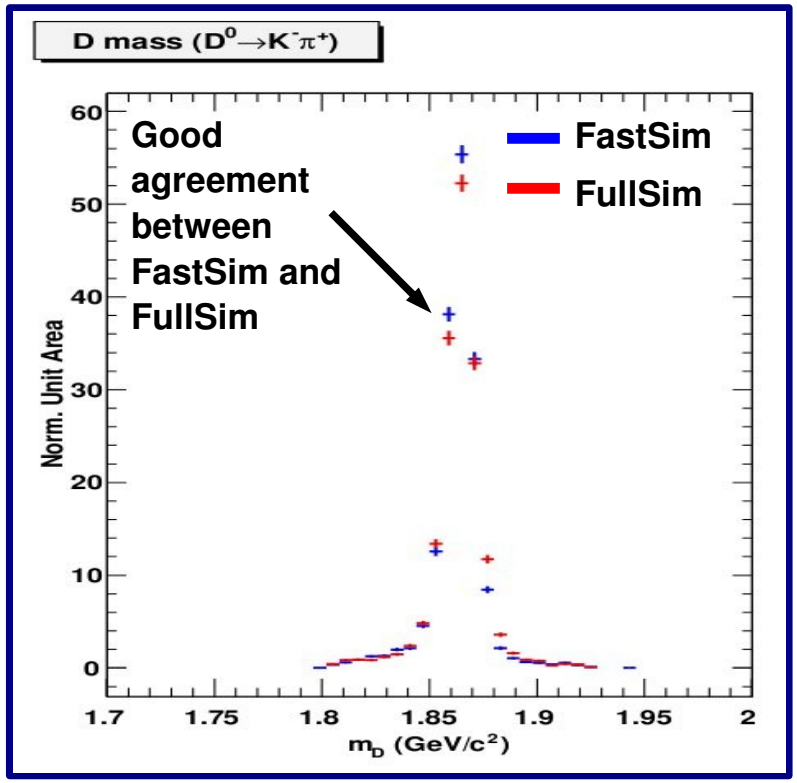
← ...and in the summer production we obtain

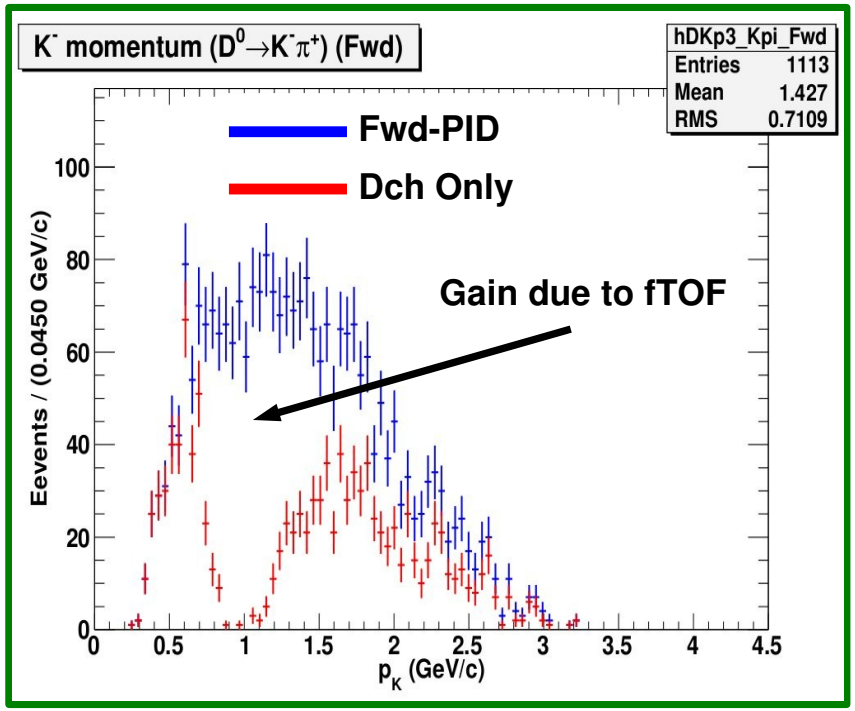
Ultra-Preliminary Results

Semi-Leptonic Recoil Analyses

Production validation:

- Comparison between FastSim and FullSim (simulation tuning)





DGWG studies:

estimate the sensitivities due to improvements of the detector layout

A. Perez

Talks

Tuesday

14:00->*15:40* Parallel - Phys + Comp: FastSim (Convener: David Brown (*Lawrence Berkeley National Lab*) , Matteo Rama (*LNF*)) (Aula Seminari)

Description:

Phone number: +39 06 6228 8548
or http://server10.infn.it/video/index.php?page=telephone_numbers
Meeting ID: 1553

14:00	recent changes to fastsim (15')	David Brown (*Lawrence Berkeley National Lab*)
14:15	validation of recent Fastsim production output (10')	Elisa Manoni (*PG*)
14:25	Fastsim Validation (10')	Alejandro Perez (*LPNHEP*)
14:40	Voxel and loop configuration: Dch examples (15')	Darren Swersky (*McGill University*)
14:55	Distributing core Fastsim as a general simulation tool (15')	David Brown (*Lawrence Berkeley National Lab*)
15:20	needs for future Fastsim production (15')	

Wednesday

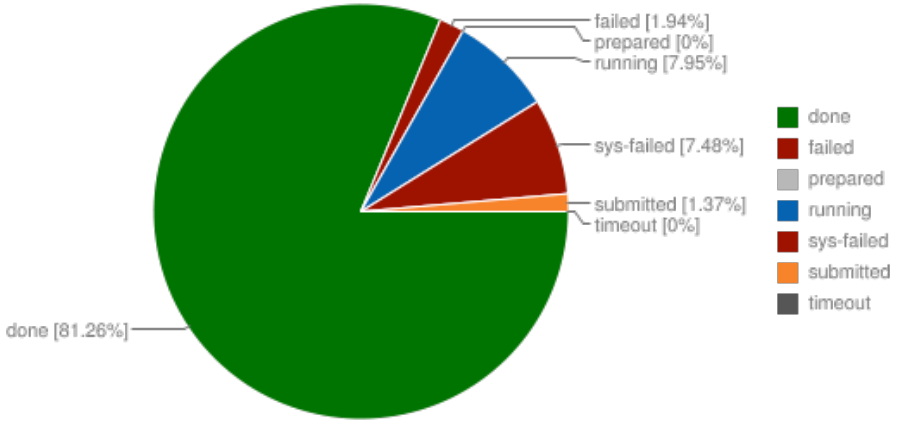
11:00->*12:30* Parallel - Det + Phys + Comp: DGWG (Convener: Matteo Rama (*LNF*) , Achille Stocchi (*LAL - Univeriste Paris Sud and IN2p3/CNRS*)) (Aula Touschek)

Description:

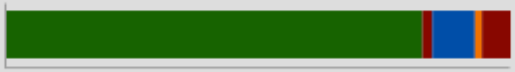
Phone number: +39 06 6228 8548
or http://server10.infn.it/video/index.php?page=telephone_numbers
Meeting ID: 1550

11:00	study of B->tau nu (25')	Alexander Rakitin (*Caltech*)
11:25	B->K(*)nunu breco SL vs. bwd EMC and fwd PID (25')	Alejandro Perez (*LAL*)
11:50	B->K(*)nunu HAD tag vs bwd EMC and fwd PID (25')	Elisa Manoni (*PG*)

2010_September

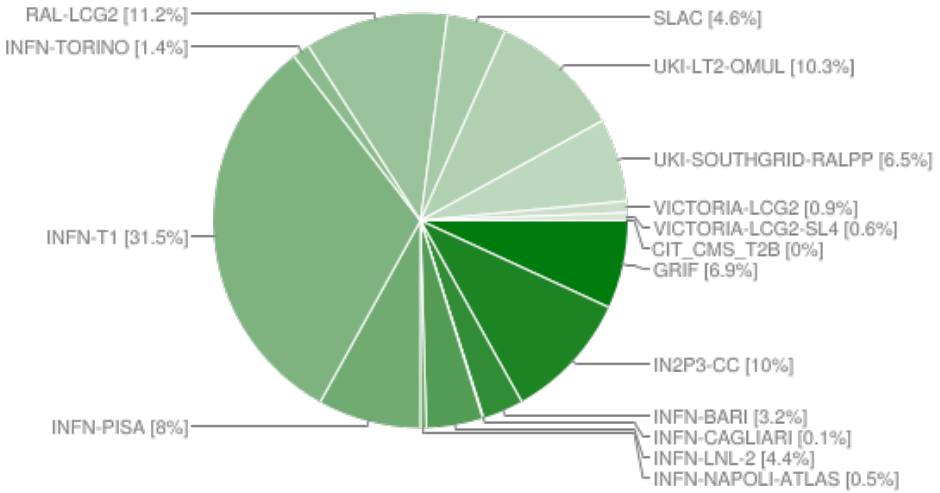


Status	# of jobs	events
done	43 081	2 720 300 000
failed	1 007	63 760 000
running	4 427	266 490 000
submitted	717	45 600 000
sys-failed	2 967	200 010 000
Total	52 199	3 296 160 000

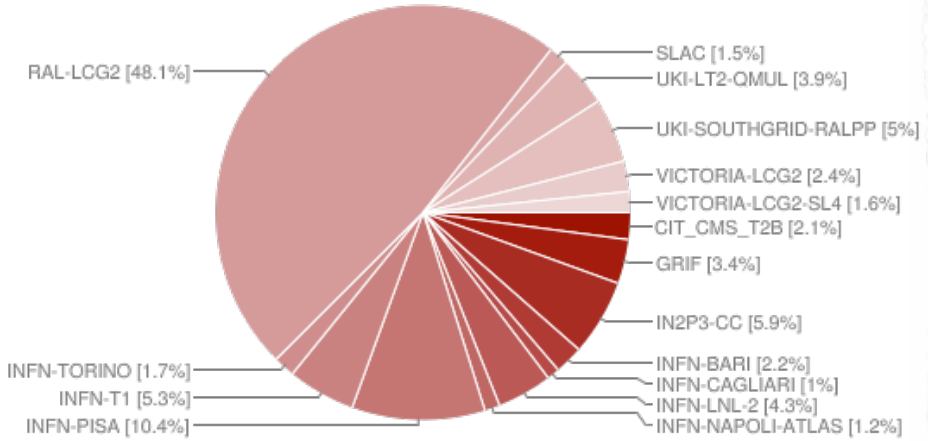


Total wct run: **1 794 873 370** s (56.915 yr)

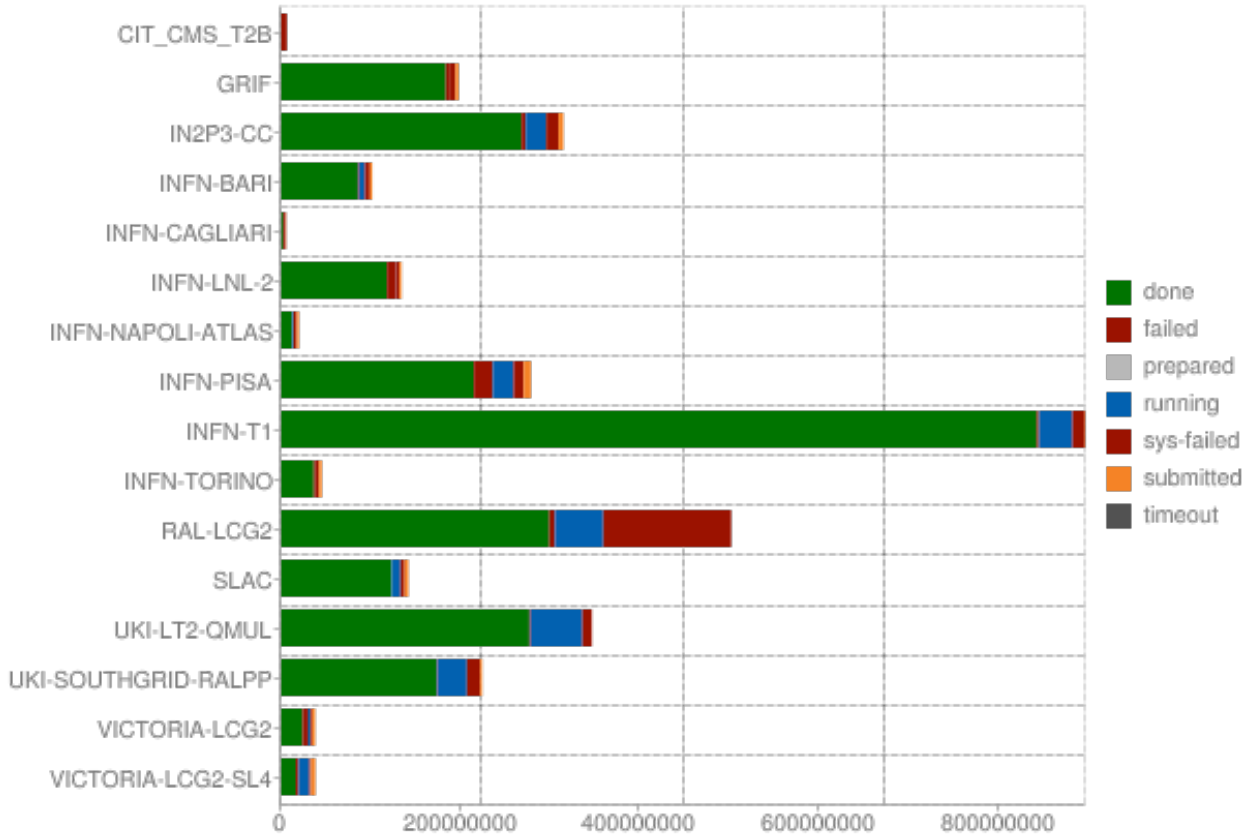
done



failures



2010_September



R&D program

- Topics:
  - Impact of new CPU architecture, software architecture and framework
  - Code development: languages, tools, standards and QA
  - Persistence, data handling models and Databases
  - User tools and interfaces
  - Distributed computing, GRID
  - Performance and efficiency of large storage systems

09:00->*10:30* **Parallel - Computing: R&D 1** (Aula Seminari) Wednesday 29th

09:00->*10:30* **Parallel - Computing: R&D 2** (Aula Seminari) Thursday 30th

2 sessions during this meeting devoted to discuss future activities

Conclusions I

- Production infrastructure goals of “Summer” production were met
- Fastsim code significantly improved
- DG studies requests almost fullfilled
- Validation and analysis in progress

Analysts:
you are warmly invited to the next Computing - Production parallel session!

Conclusions II

- More manpower for software development and computing is needed!
- “Summer” production demonstrates that we are able to deal with an huge amount of computing power:
  - DG studies requests need 10 days
  - Most demanding Physics Requests should take 20-30 days

Production Team

- A. Fella (INFN-PI)
- M. Manzali (INFN-FE)
- M. Ronzano (INFN-FE)
- L. Tomassetti (INFN-FE)