

TTT simulation for Bs to J/Psi Phi analysis

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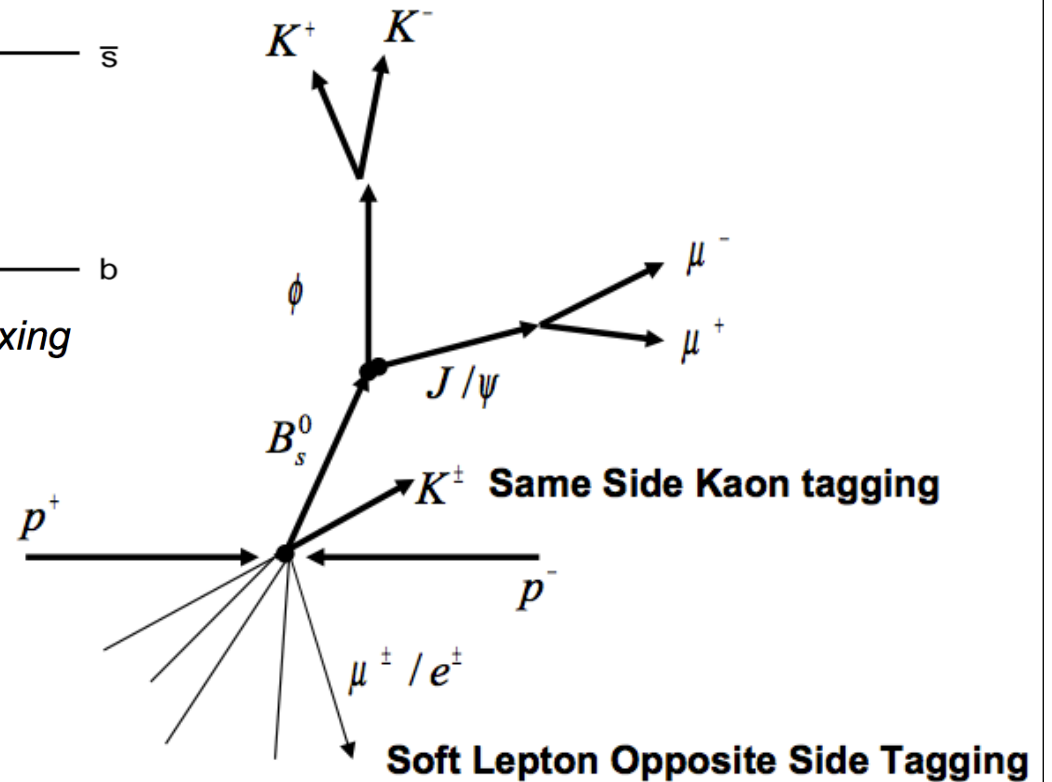
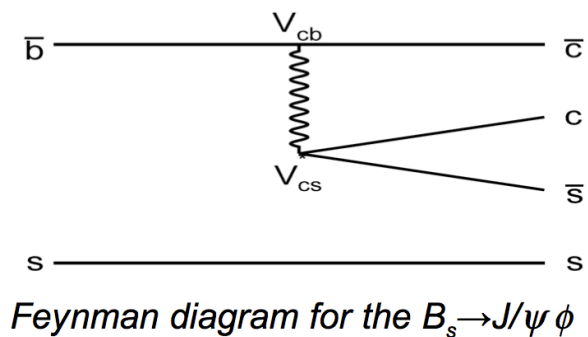
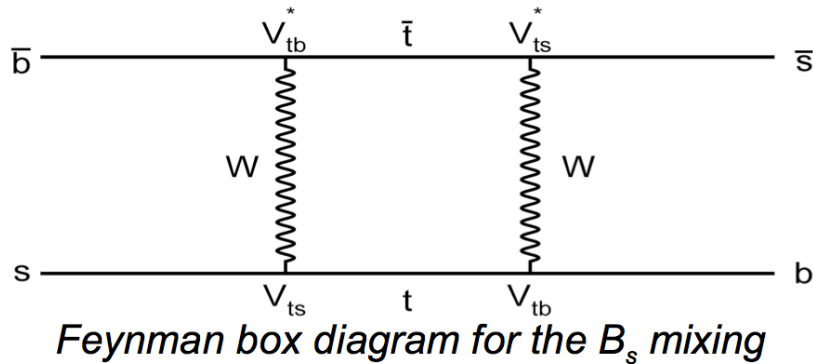
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2011/04/26 BPD Meeting

Analysis : B_s to $J/\psi \phi$



Kinematics of an event

Measurement of β_s and $\Delta\Gamma$



Introduction for this study



1. Our team is carrying on the analysis of the process $B_s \rightarrow J/\psi \pi^0$, based on a new filter, ROOTFitter and including also the TTT data.
2. We showed that the TTT data set indeed is bringing an even larger amount of additional events wrt the dimuon triggered sample than previously estimated:

The Two track trigger brings an additional amount indeed of about 70% data wrt dimuon trigger sample.

See newly posted Internal Note 10484 and presentation by V. Saveliev at the BMLCPV meeting, April 13.

3. One main ingredient to carry on this analysis is the TTT MC full simulation. This presentation gives a brief status where we stand concerning this topic.



MC Production & BST Ntupling



1. MC Production

MCPProd_v6_1_4mc_t_strip_maxopt (patched-t version)
Event list : selected 10,000 events from goodrunlist e11-e13
checked for change Filter_TCL and PREREQ_TCL

2. Make B-Standard Ntuple file using MC generation output file

```
# Setup environment
export CDFSoftRelease=6.1.4.m
export Executable=CandsExe-v80-6.1.4.m
export MasterTcl=mymaster.tcl
export TclFile=cvs_hadr.tcl
export DataSet=MC

# Setup CDFSoft
setup neurobayes_expert v2_3 -f Linux+2.4
```

Compare with different condition



```
#-----  
DSID          sbot00  
BOOK          cdfpbot  
DSNAME        BGenerator_BsJpsiPhi_614mc_runlist  
GENERATION_MODE 0  
MC_PROCESS_TCL bmc_BGenerator_standard.tcl  
FILTER_TCL    bmc_postgen_partfilter.tcl or bmc_postgen_svtfilter.tcl  
MINBIAS_TCL  
MC_TRIGSIM_TCL bmc_trigsim_newxftsvt.tcl  
GEN_PARTICLE  3  
MC_DECAY_TCL  bmc_EvtGen_BMeson.tcl  
USER_DECAY_FILE Bs_Jpsi_Phi.DEC  
BMC_SAMPLE_NUM 235  
PREREQ_TRIG_TCL bmc_prereq_bcharm.tcl (apply or not)  
NEV_PER_INV_NB 0.9  
NEV_PER_SECTION 2000  
FIRST_RUN      233133  
LAST_RUN       241664  
RUN_LIST       runlist_bmc_p11_13.txt  
N_SECTIONS     416  
FILTER_EFF     100  
EVENT_SIZE     300  
SEGMENT_SIZE   1000  
#-----
```

FILTER_TCL **bmc_postgen_svtfilter.tcl**
-> **Require TTT on generator level quantities**
This script applies below cuts,
- 2 tracks, $|\eta| < 1.3$
- Pair: $\text{OppQ}, \text{sumPt} > 5.0, 0.02 < \text{dPh}$

PREREQ_TRIG_TCL **bmc_prereq_bcharm.tcl**
-> **To select two-track trigger events based on level-2 bits.**

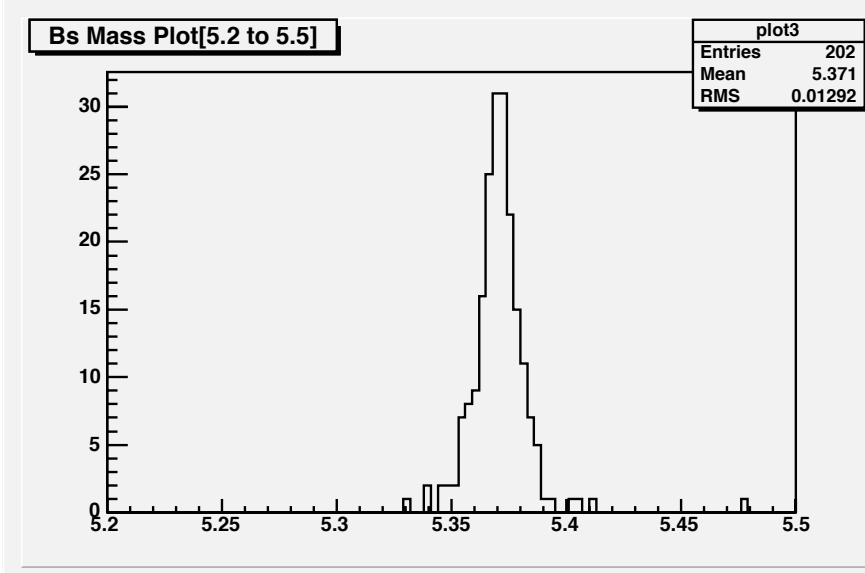
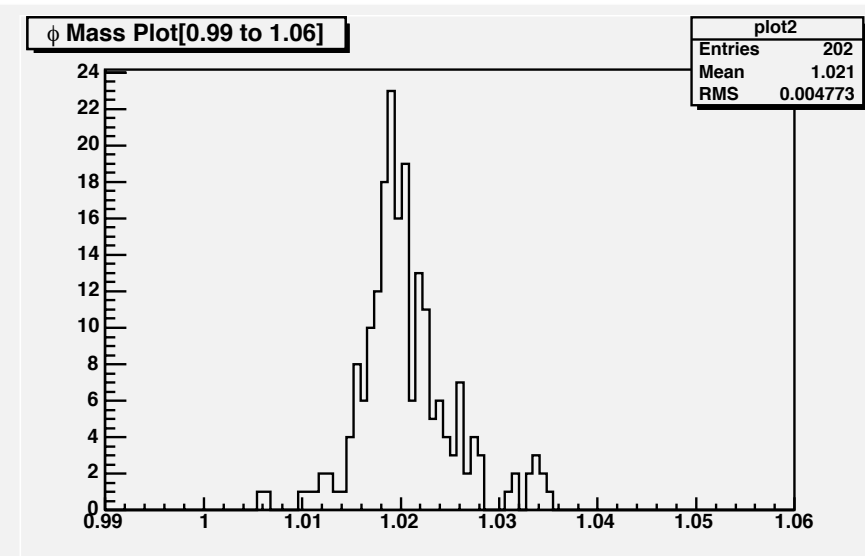
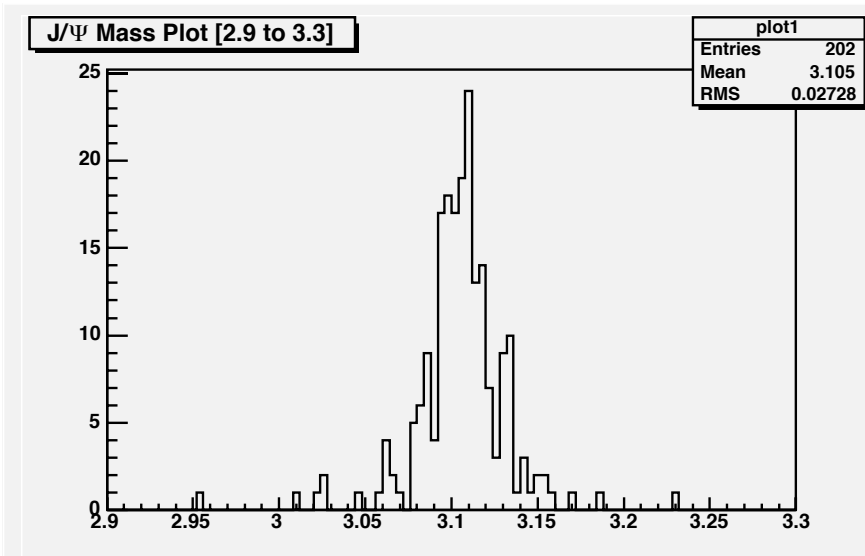


Decay table for $B_s \rightarrow J/\psi\phi$



```
#####  
# EvtGen Decay file for Bs -> J/Psi Phi  
#           |   ` - K+ K-  
#           ` - mu+ mu-  
#####  
Decay anti-B_s0  
1.000 J/psi phi SVV_HELAMP 1.0 0.0 1.0 0.0 1.0 0.0;  
Enddecay  
  
Decay B_s0  
1.000 J/psi phi SVV_HELAMP 1.0 0.0 1.0 0.0 1.0 0.0;  
Enddecay  
  
Decay J/psi  
1.000 mu+ mu- PHOTOS VLL;  
Enddecay  
  
Decay phi  
1.000 K+ K- VSS;  
Enddecay  
  
End
```


3. PARTFILTER and W/ PREREQ

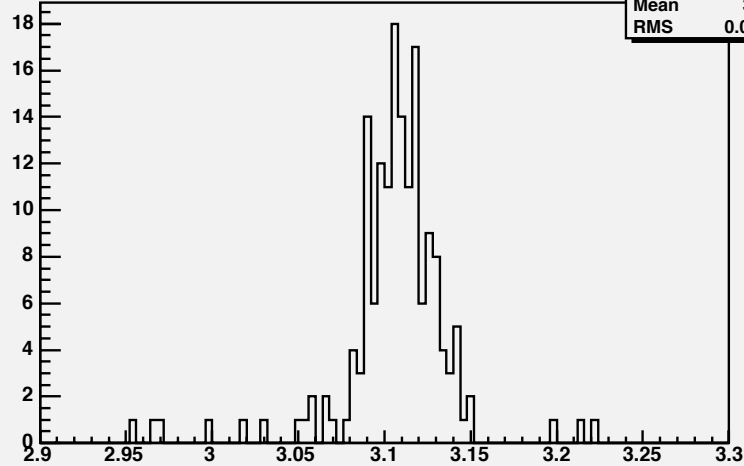


- 1. FILTER_TCL `bmc_postgen_partfilter.tcl`
- 2. PREREQ_TRIG_TCL `bmc_prereq_bcharm.tcl`

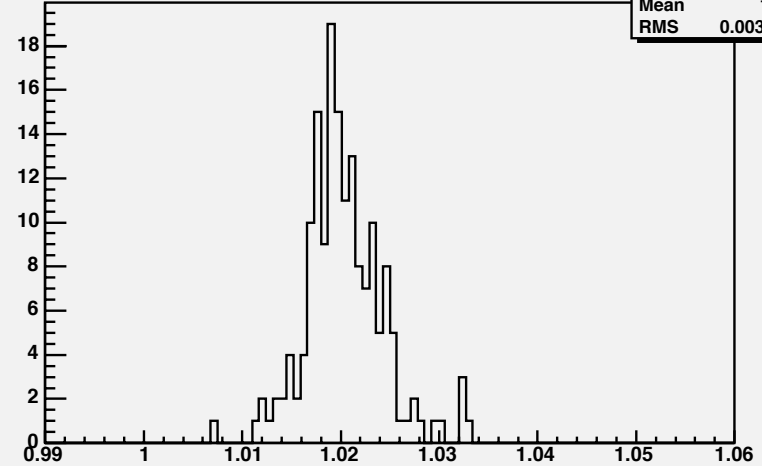
B-MC generate : **10,000** events (run period 11-13)
Passed events after preselection for MC is **381** events.
Passed events after B-Standard Ntupling is **200** events.

4. SVTFILTER and W/ PREREQ

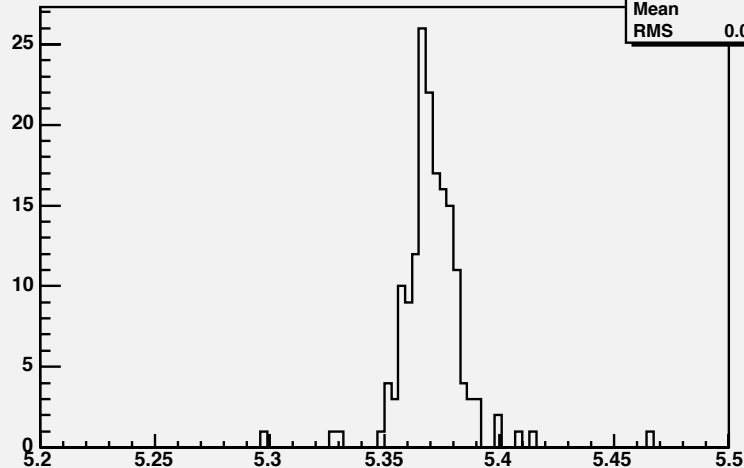
J/ ψ Mass Plot [2.9 to 3.3]



ϕ Mass Plot[0.99 to 1.06]



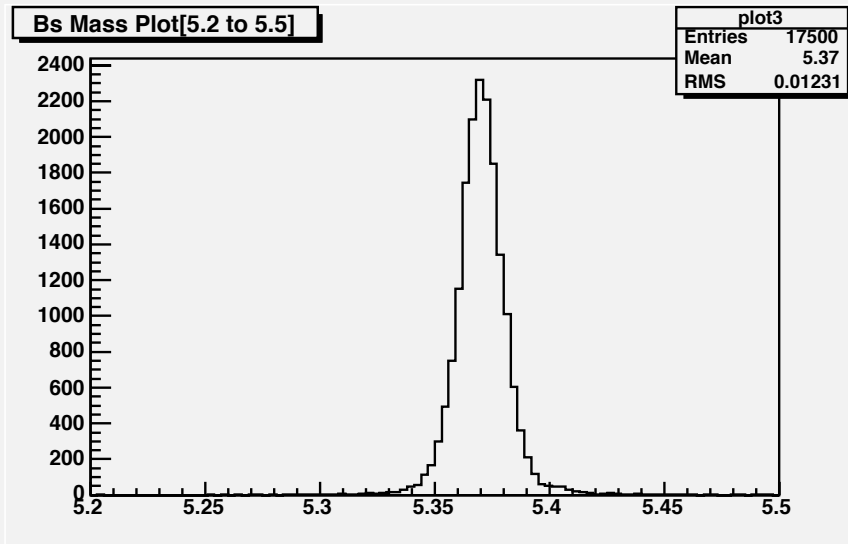
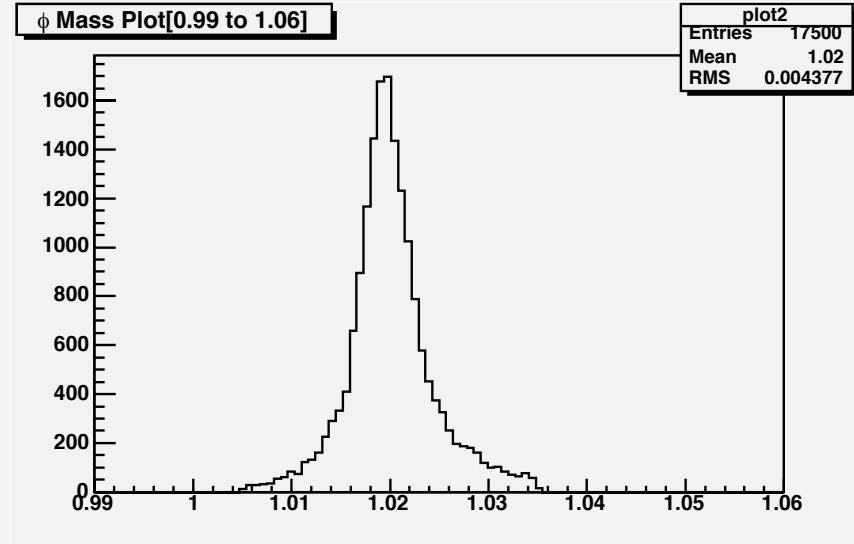
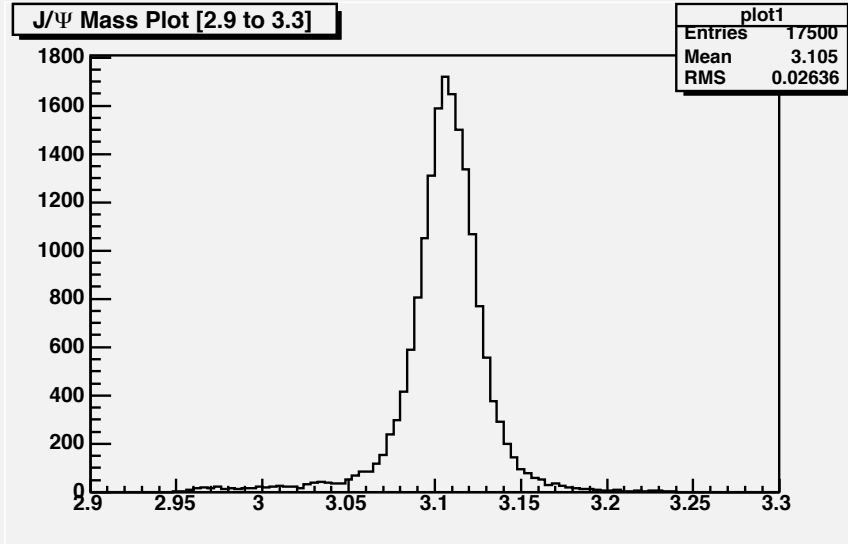
Bs Mass Plot[5.2 to 5.5]



1. FILTER_TCL `bmc_postgen_svtfiler.tcl`
2. PREREQ_TRIG_TCL `bmc_prereq_bcharm.tcl`

B-MC generate : **10,000** events (run period 11-13)
Passed events after preselection for MC is **316** events.
Passed events after B-Standard Ntupling is **163** events.

SVTFILTER and W/ PREREQ (more events)



1. FILTER_TCL `bmc_postgen_svtfiler.tcl`
2. PREREQ_TRIG_TCL `bmc_prereq_bcharm.tcl`

B-MC generate : **1.5M** events
Passed events after preselection for MC is **36334** events.
Passed events after B-Standard Ntupling is **17391** events.



Summary



1. We checked 4 conditions mixing with SVTFILTER.TCL and PREREQ_BCHARM.TCL files.
Each TCL file is defined by
 - bmc_postgen_svtfilter.tcl
 - > Require TTT on generator level quantities
 - 2 tracks, $|\eta| < 1.3$
 - Pair: OppQ, $\text{sumPt} > 5.0$, $0.02 < \text{dPh}$
 - PREREQ_TRIG_TCL bmc_prereq_bcharm.tcl
 - > To select two-track trigger events based on level-2 bits.
2. We selected condition with SVTFILTER.TCL and PREREQ_BCHARM.TCL
Total Number of Events : 10,000
Passed events after preselection for MC : 316
Passed events after reconstruction (B-Standard Ntupling) : 163
3. We fully developed and checked the TTT MC simulation and BSTNtupling procedure needed to produce the MC data that reproduce the physics process we are studying and the corresponding background as well.
4. We are now ready to run the production of needed MC data. This was the missing piece for completing our Bs- \rightarrow J/PsiPhi analysis.
5. We will continue report on the progress of our analysis over the next weeks.



BACK UP

bmc_postgen_partfilter.tcl



```
#
# Filter at HEPG level using PartFilter module
#
# S.Behari May-2010> Filter B0s -> J/psi Phi events

module disable HepgFilter
module disable GenTrigBFilter

#-- Setup PartFilter (defaults are given within brackets)
module enable PartFilter
module talk PartFilter
  #-- Print level: [0]
  printLevel set 2

  #-- Selects an AND of 3 particle groups, Particle1-3, where each
  #-- group can set an OR of up to 12 particles, idhepCode1-12.
  #-- If no cuts in a particle menu, filter doesn't cut on particle.

  #-- stdhep level: [1]=final state stable; 2=final state ancestor;
  #--                3=initial state or hard scatter
  #-- Particles w/ istdhep code <= istdhepLevel are selected.
  istdhepLevel set 2
```

```
#-- Choose Bs0 || Bs0bar
Particle1 menu
  idhepCode1 set 531
  Et1      set 5.0
  Eta1     set 3.0
  idhepCode2 set -531
  Et2      set 5.0
  Eta2     set 3.0
exit
#-- ... and J/Psi
Particle2 menu
  idhepCode1 set 443
  #Et1      set 0
  #Eta1     set 3.0
exit
#-- ... and Phi
Particle3 menu
  idhepCode1 set 333
  #Et1      set 0
  #Eta1     set 3.0
exit

#-Dump set 1
show
exit
```



bmc_postgen_svtfilter.tcl



```
# Require TTT on generator level quantities
#
# This script applies:
# - 2 tracks, |eta| < 1.3
# - Pair: OppQ, sumPt > 5.0, 0.02 < dPhi < 2.5

module enable svtfilter
module talk svtfilter
RequireL1Bit      set f
verbosity          set 0
runNumber          set $env(RUN_NUMBER)
L1Bit              set 10
L2Bit              set 10

GenTrackMenu
  GenTrackEta      set 1.3
exit

SVTMenu
  SVTRealFlag      set 0
exit

BeamMenu
X0                  set 0
Y0                  set 0

useBarrelWiseBeam  set t
X0b0                set 0.
Y0b0                set 0.
X0b1                set 0.
Y0b1                set 0.
```

```
X0b2                set 0.
Y0b2                set 0.
X0b3                set 0.
Y0b3                set 0.
X0b4                set 0.
Y0b4                set 0.
X0b5                set 0.
Y0b5                set 0.
exit

#-- Track IDs ([4]:SVT tracks, 7:Generator level stable tracks)
track1Id            set 7
track2Id            set 7

PairMenu
  ApplyTrivialityCheck set true
  OppQ                  set true
  DPhiLow               set 0.02
  DPhiUp                set 2.5
  SumPtLow              set 5.
  MassLow               set 0.
  MassUp                set 1e6
  PtXvLow               set -1.
  DOBLow                set 0.
  DOBUp                 set 10000
exit

show
exit
```



bmc_prereq_bcharm.tcl



```
#
# Filters B_CHARM events using SVT info. in level-2
#
# S.Behari 05/30/2010>
# Set PREREQ_TRIG_TCL env in the book definition
# file to use this.
#
module enable Prereq
module talk Prereq

databaseForTrigger set $dbname
bankType set "Simulated Trigger Bank"
bankType list
printTriggerMap set false
printTriggerSummary set true
UseUnprescaledBits set true
GetL1TriggerBitsFromTFRD set false
GetL1TriggerBitsFromTL2D set true

L1Accept set true
L1TriggerNames set L1_
#L1TriggerBits set 21 48
#L2Accept set true
#L2TriggerNames set L2_
L2Accept set false
L2TriggerNames set L2_TWO_TRK2_D100_L1_OPPQ_DPHI135_SUMPT5.5_L2_B_CHARM
L3Accept set true
production set false
debug set false
verbose set true
show
exit
```