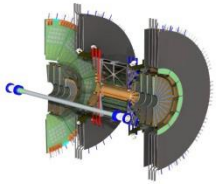
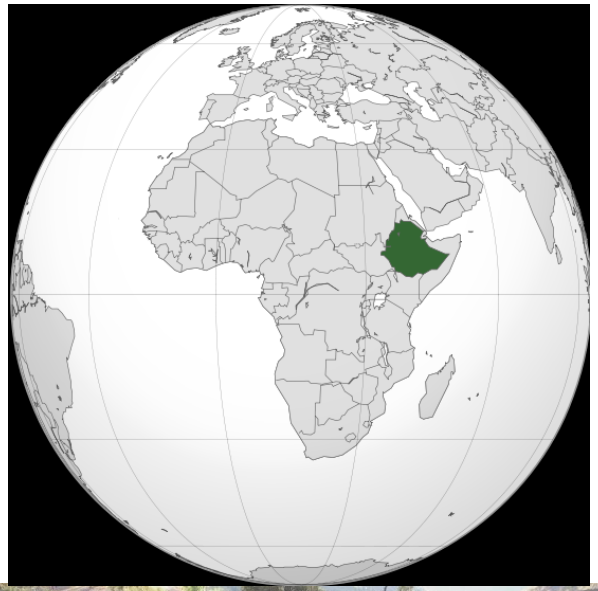


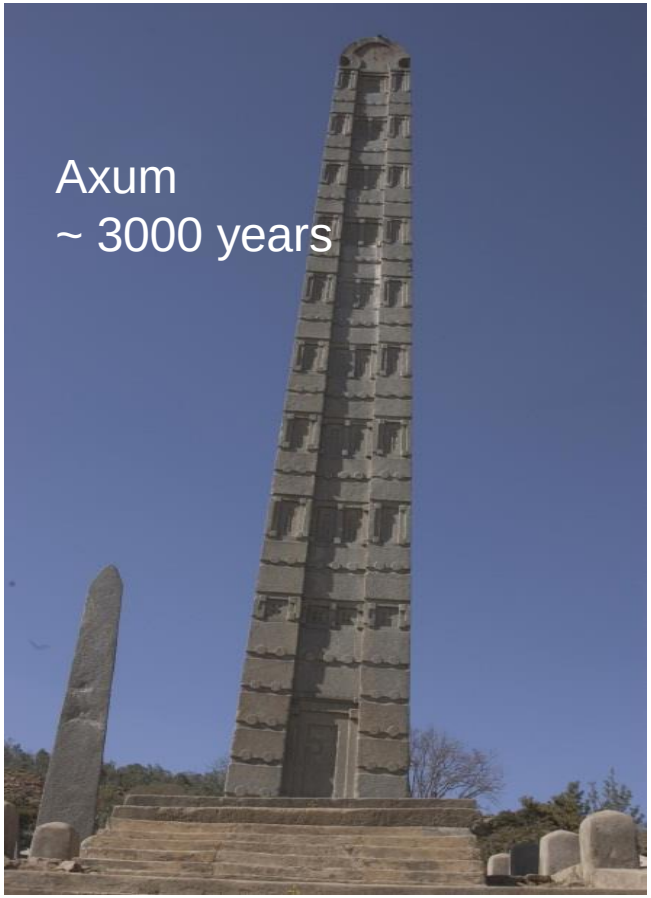
W -> mu study using FVTX
Phenix SpinFest 2014

Abraham Meles
New Mexico State University
29-Jul-2014

Advisor: Xiaorong Wang (NMSU)
Work with:
J. Huang (BNL),
Forward Analyzers:
M.Beaumier (UCR), D. Jumper(UIUC), F. Giordano(UIUC), R.Hollis(UCR), R.Seidl(RIKEN)

Ethiopia





Education

- Msc in Theoretical High Energy Phy at AAU
- PhD candidate in Experimental Particle Phy at NMSU
- Also Interested in Accelerator Phy- at USPAS

Motivation

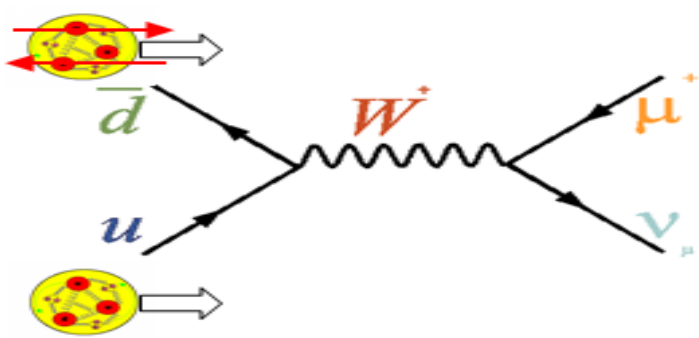
Spin dependent quark distribution
➔by the QCD analysis of (SI)DIS data

Polarized Parton distribution function (pPDF)

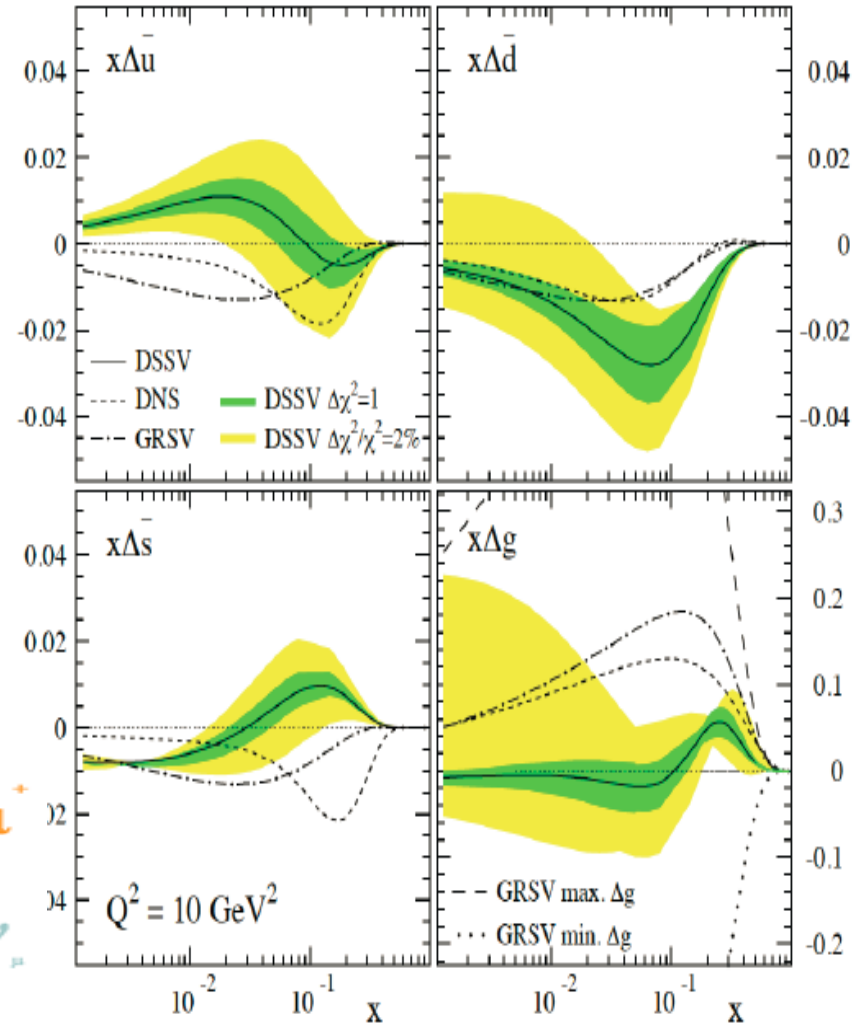
$\Delta q(x)$: well known,

$\Delta\bar{q}(x)$: not well known

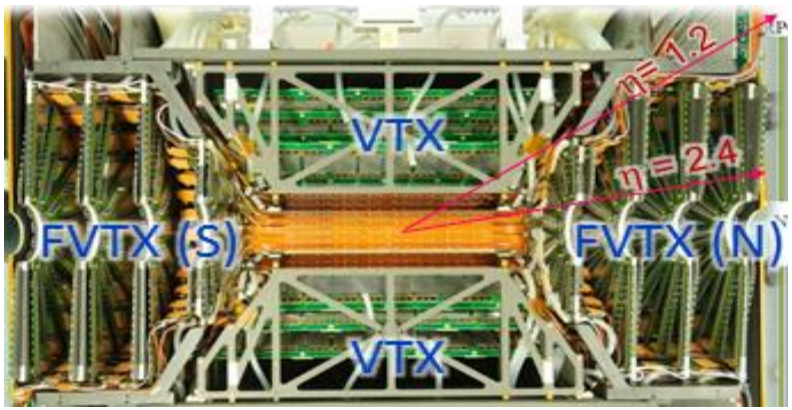
➔also, the Weak Interaction (flavor selection coupling) can be used to constrain sea quark distribution.

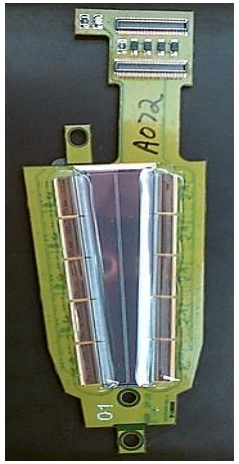


DSSV Global Fit -- arXiv:1112.0904v1 [hep-ph.]

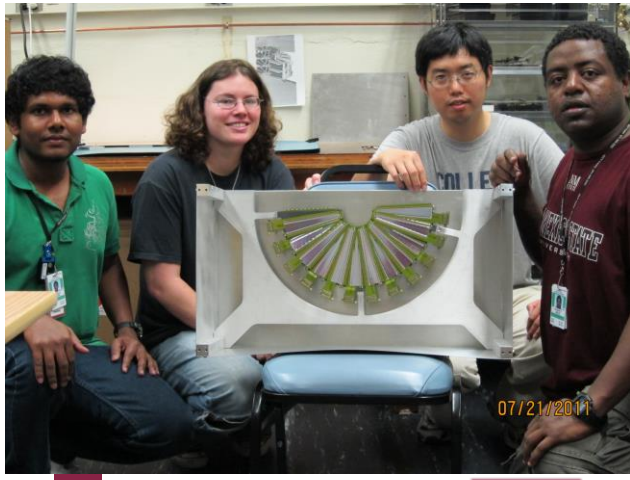


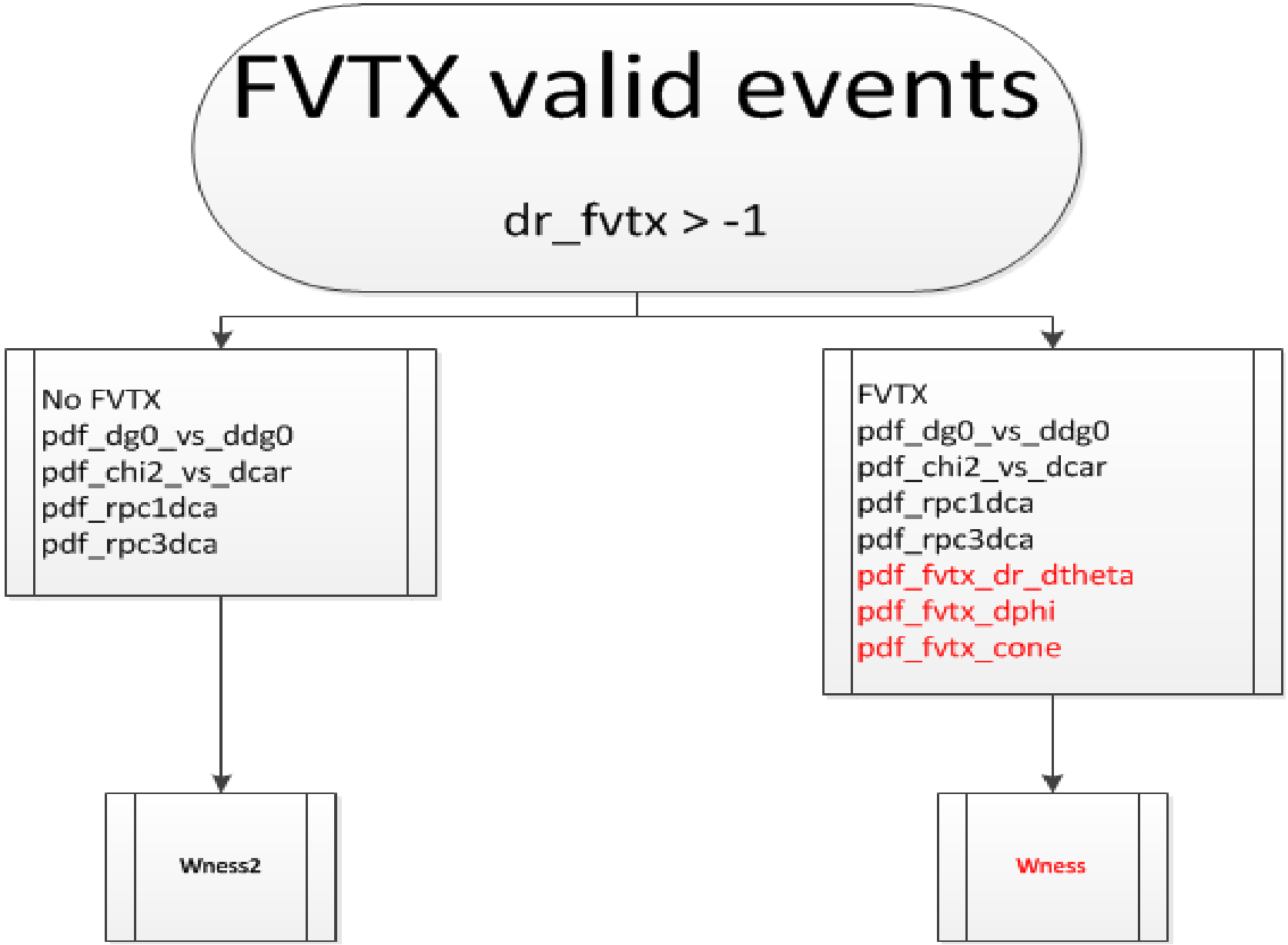
Silicon Forward Vertex Detector (FVTX)

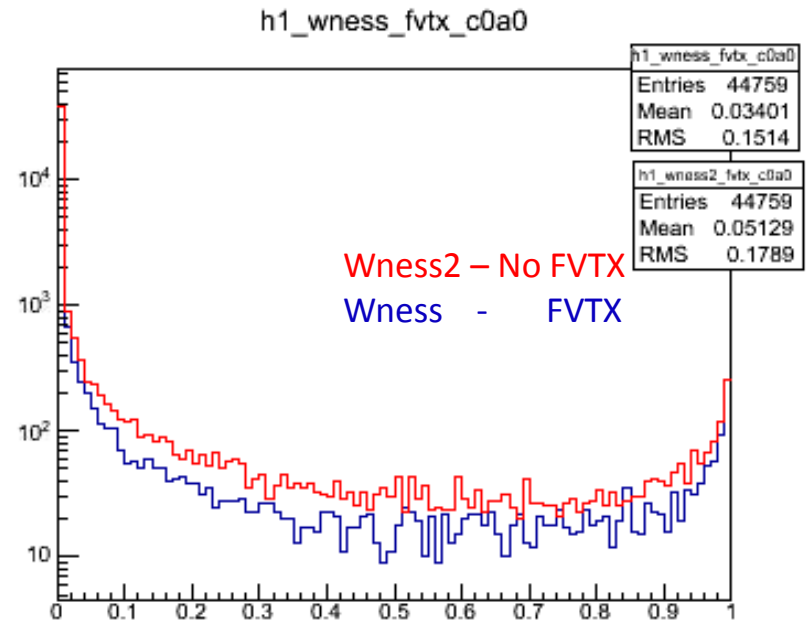


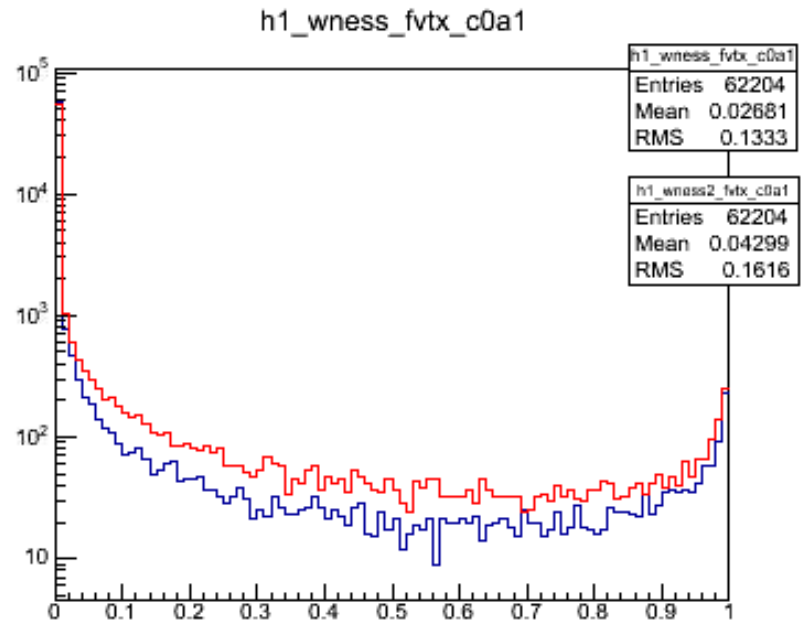


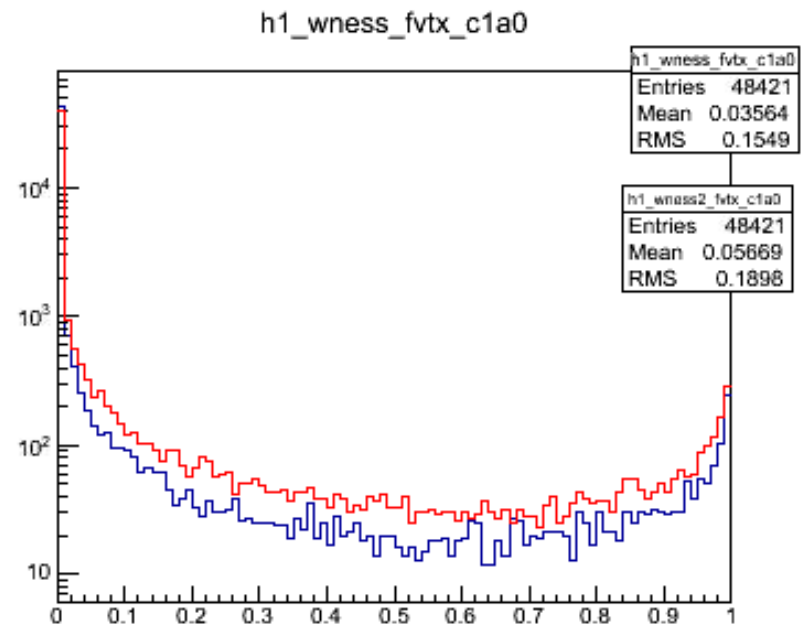
- **FVTX covers 1.2 < |η| < 2.4, 2π in φ**
- **Each arm contains 4 discs, Each disc contains 96 "wedges" made of Silicon mini-strips.**
- **1.1 Million strips (75 μm pitch in radial, 3.75° in φ).**

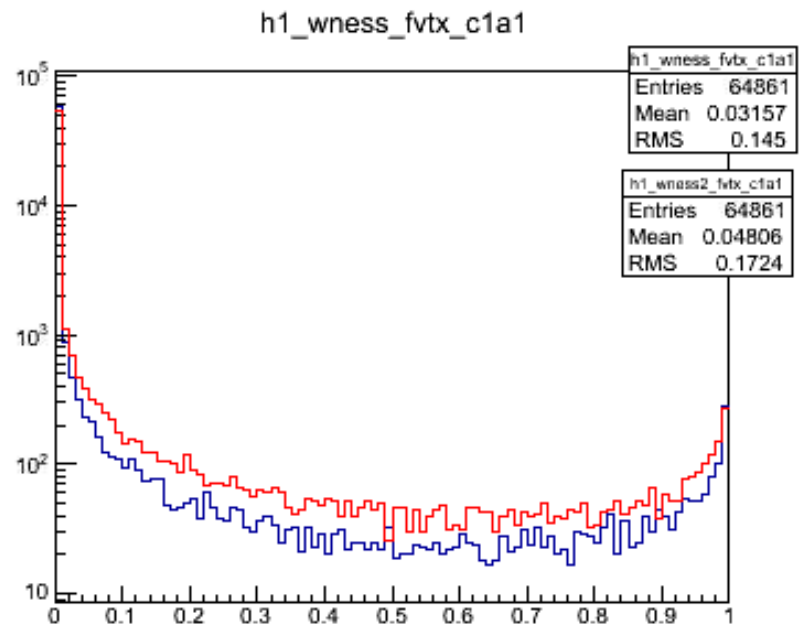



FVTX valid events
dr_fvtx > -1
No FVTX
pdf_dg0_vs_ddg0
pdf_chi2_vs_dcar
pdf_rpc1dca
pdf_rpc3dca
FVTX
pdf_dg0_vs_ddg0
pdf_chi2_vs_dcar
pdf_rpc1dca
pdf_rpc3dca
pdf_fvtx_dr_dtheta
pdf_fvtx_dphi
pdf_fvtx_cone
Wness2
Wness


h1_wness_fvtx_c0a0
h1_wness_fvtx_c0a0
Entries 44759
Mean 0.03401
RMS 0.1514
h1_wness2_fvtx_c0a0
Entries 44759
Mean 0.05129
RMS 0.1789
Wness2 – No FVTX
Wness - FVTX


h1_wness_fvtx_c0a1
h1_wness_fvtx_c0a1
Entries 62204
Mean 0.02681
RMS 0.1333
h1_wness2_fvtx_c0a1
Entries 62204
Mean 0.04299
RMS 0.1616


h1_wness_fvtx_c1a0
h1_wness_fvtx_c1a0
Entries 48421
Mean 0.03564
RMS 0.1549
h1_wness2_fvtx_c1a0
Entries 48421
Mean 0.05669
RMS 0.1898


h1_wness_fvtx_c1a1
h1_wness_fvtx_c1a1
Entries 64861
Mean 0.03157
RMS 0.145
h1_wness2_fvtx_c1a1
Entries 64861
Mean 0.04806
RMS 0.1724

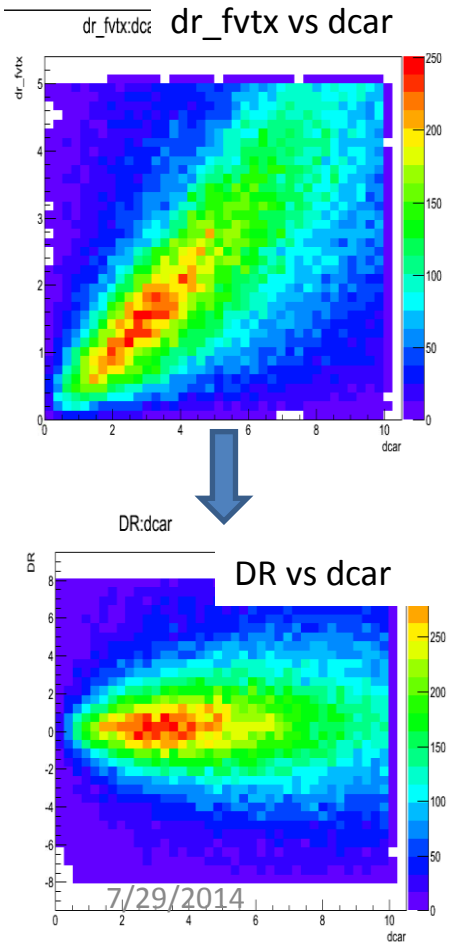
SBG before ->after FVTX

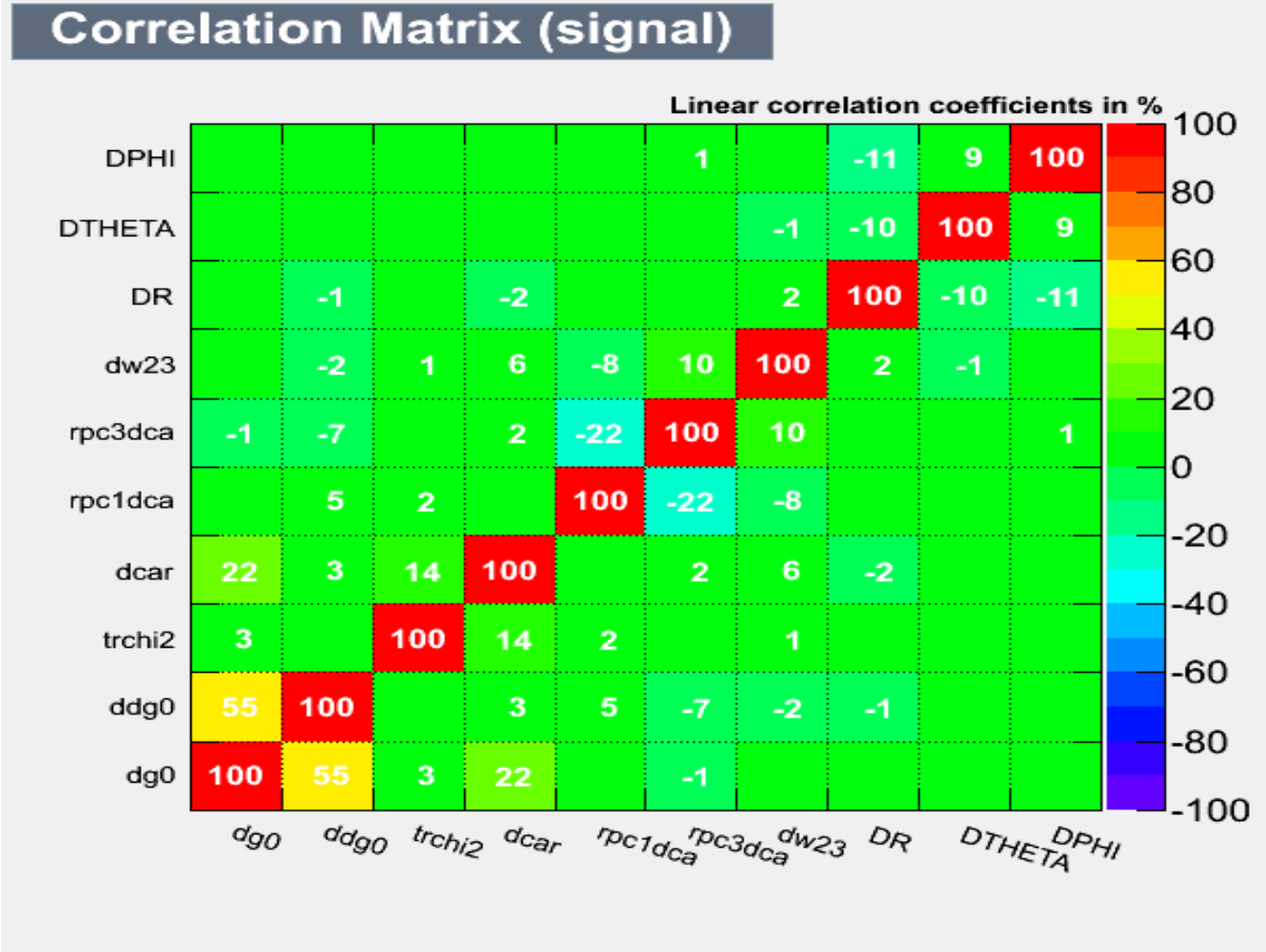
For different arm/charge combinations

- South Minus 0.093 -> 0.173
- South Plus 0.193 -> 0.122
- North Minus 0.175 -> 0.195
- North Plus 0.314 -> 0.259

Other activities in progress

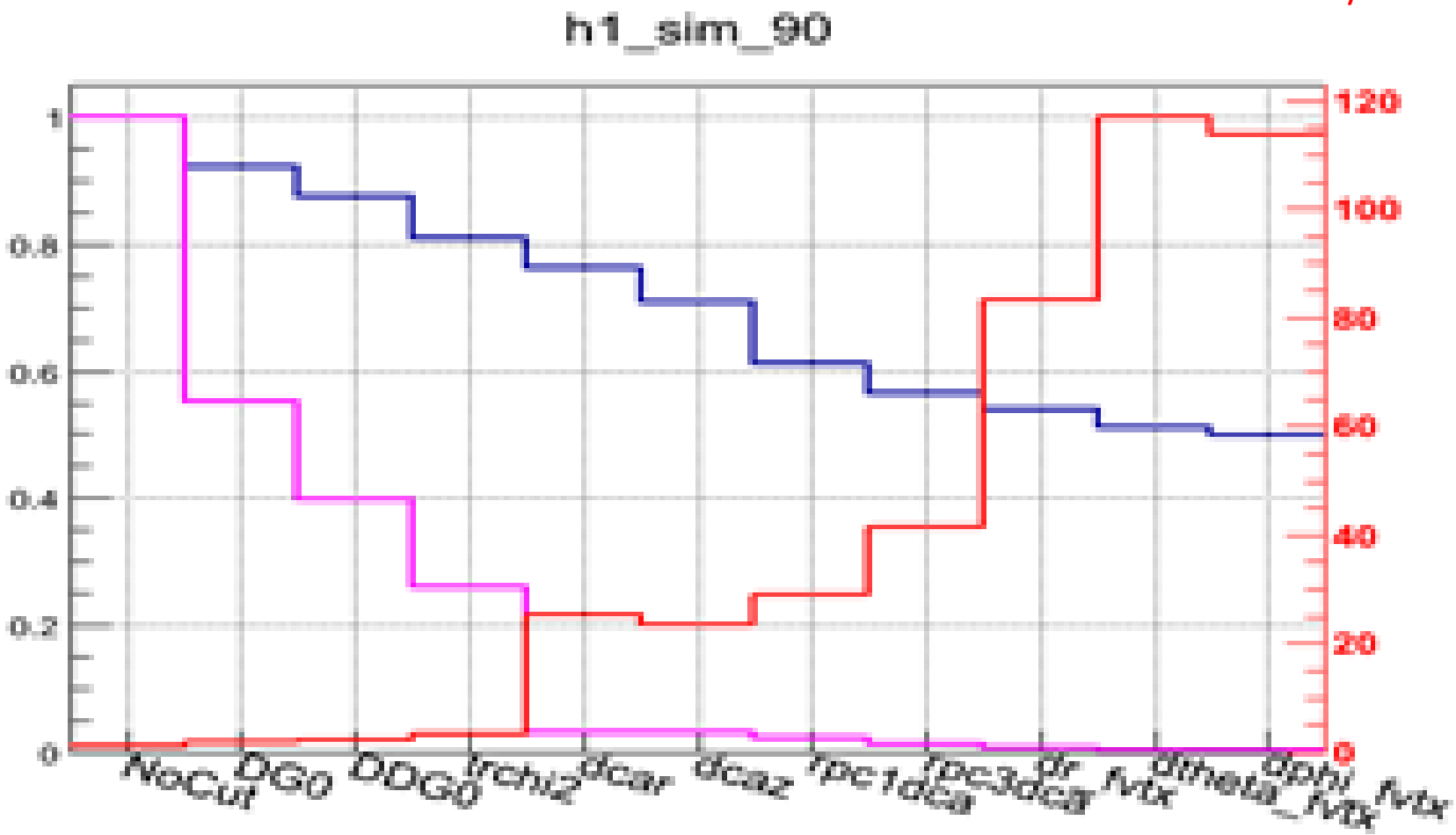
1) Introducing modified fvtx matching variables which are less correlated with other variables. (Feng)





2)Other activities in progress
Successive cuts study.

Sig Simulation
Run13 data
Relative S/B ratio



Summary

- Optimize sbg by manuplating how dr_fvtx, dtheta_fvtx and dphi_fvtx are used
- Introducing modified fvtx matching variables which are not correlated with other variables.
  - Check for consistancy
  - Check for sbg improvement

backup

SBG before ->after FVTX

Ralf

- 0.076 -> 0.154
- 0.178 -> 0.162
- 0.207 -> 0.226
- 0.242 -> 0.254

Abraham

- 0.093 -> 0.173
- 0.193 -> 0.122
- 0.175 -> 0.195
- 0.314 -> 0.259