BES Reconstruction Check at PC/Linux

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History

Why PC/Linux ?

- Can do all BES computings
- Cheaper
- Powerful

— *BES-Software Migration to PC/Linux*

YANG Wei, HE Kanglin, ZHANG Lei, RONG Gang, ... did lots of hard works and made BES software work at PC/Linux.

— *Comparison of Reconstruction between PC/Linux and HP/UX*

At last BES annual meeting, RONG Gang and MAO Zepu each gave a presentation, but their conclusions look **contradicting** !

What is the matter ?

How To Check

Data sample: *run12054.flt*
Recon-Version: v101
Platforms: HP/UX and PC/Linux both
Subtypes compared:

- subtype-3: MDC One-Track Fit
- subtype-4: TOF
- subtype-5: BSC
- subtype-6: Muon Chamber
- subtype-7: dE/dx
- subtype-11: MDC Projection
- subtype-13: VC One-Track Fit
- subtype-15: VC Projection

Differences between PC/Linux and HP/UX

1. dE/dx: about 10% tracks with difference larger than 1%, see dEdx-7 of figure-2
2. MDC Projection: completely different on some items, see "from MDC-11" of figure-3
3. VC Projection: similar with above, see "from MDC-15" of figure-3
4. MDC one-track Fit: a fraction of events with obvious difference($> 1\%$), see MDC-3 of figure-1
5. Other subtypes also with some minor differences, see figure-1,2,3

Events were traced down to fix the problems:

- Many events with different dEdx were traced
- One event with different PZ in MDC was traced

Problems found

- "*ring leader*" for difference on dE/dx

For the difference in dE/dx, the "*ring leader*" was fixed. It arises from the statement

*Nft = Ifix(0.70*Ncharg)*

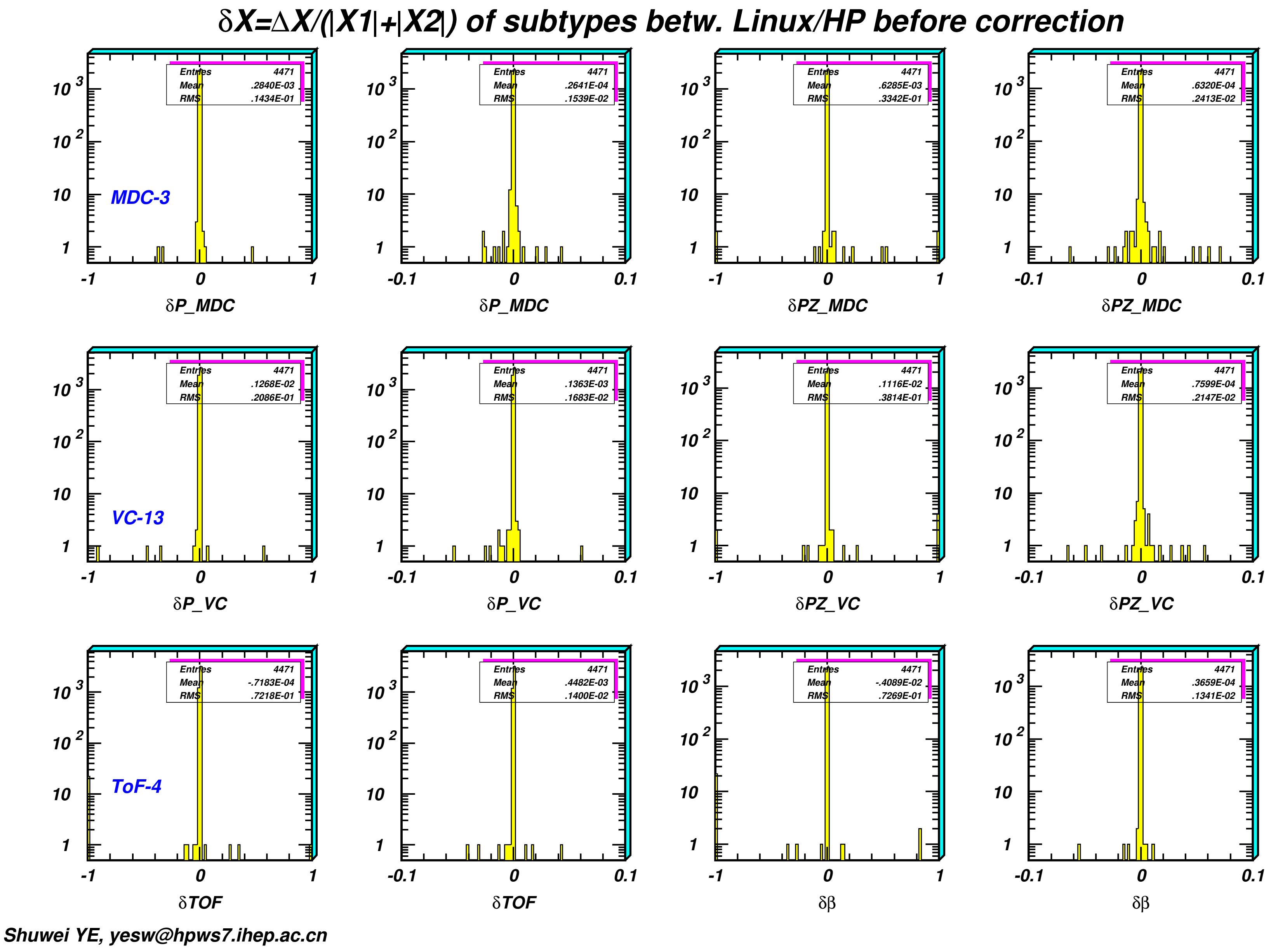

Figure 1: Relative differences of subtype-3(MDC), 13(VC) and 4(TOF) before correction

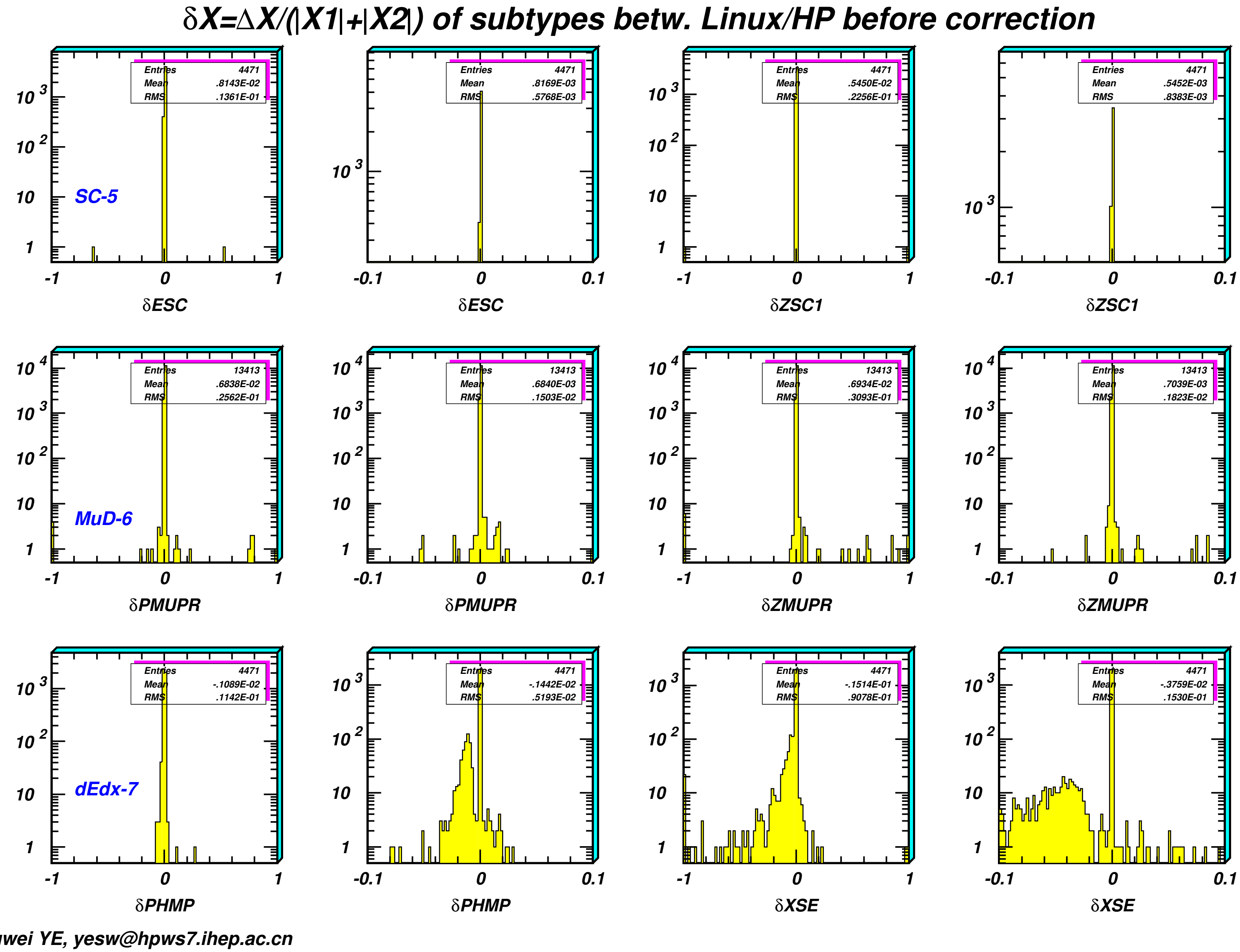

Figure 2: Relative differences of subtype-5(SC), 6(MuD), 7(dEdx) before correction

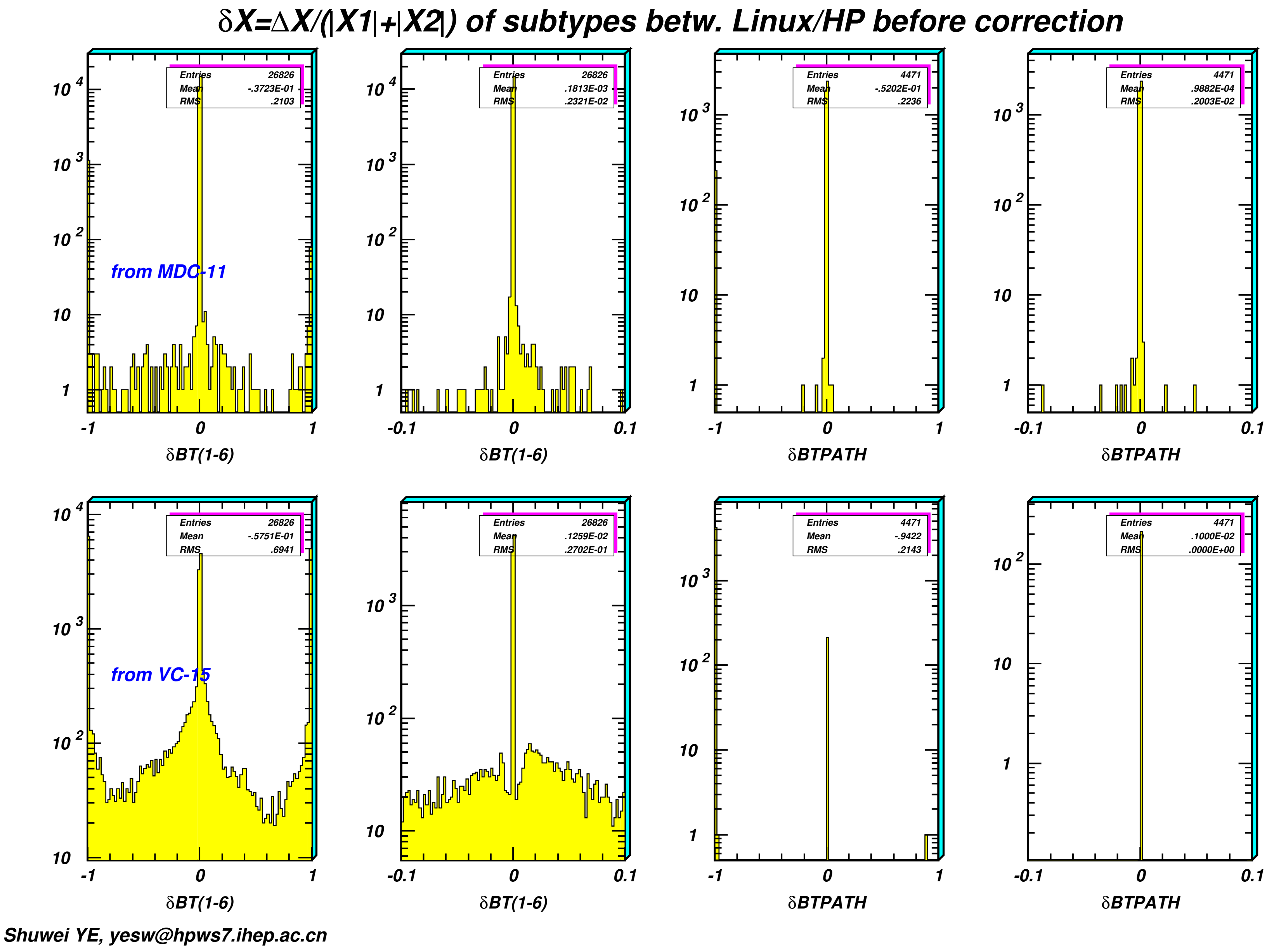

Figure 3: Relative differences of subtype-11(MDC Projection), 15(VC Projection) before correction

In the subroutine MDCPID.

$$Nft = Ifix(0.70 * 10) = \begin{cases} 7 & at \quad HP/UX \\ 6 & at \quad PC/Linux \end{cases}$$

Hence, whenever Ncharg is dividable by 10, the value of Nft will have a difference of 1.

Solution: compilation option of "**-O2**" (thanks to HeKL)

Similar problem in the floating-integer conversion occurs in language C.

- "ring leader" for difference on the projection of MDC/VC

It comes from the inconsistence of source code *"blkvcj.f"* between the two platforms

- Others minor differences in MDC

In the subroutine LFTRGT, the comparison between two real values will yield not the same result between the two platforms in some cases
Further study is needed (If I had time at both HP-UX and PC/Linux)

The differences after corrections of dE/dx and "blkvcj.f"

- Major differences disappear, see figure-5,6
- Still some minor differences found, see figure-4,5,6
- And it looks the left difference arise from MDC, see figure-7,8

Conclusions

- Some differences between the reconstruction at HP/UX and that at PC/Linux, and even quite large on some items for some events.
- Differences arise from the inconsistence of source code, and mostly the difference default behavior of floating-integer conversion between platforms.
- Major differences gone after the corrections above.
- Still some minor differences after the corrections (some problem untouched such as the subroutine LFTRGT).
- Mostly the left differences come from MDC momentum.

Further study is needed to solve the difference completely
(If I had time at both HP/UX and PC/Linux)

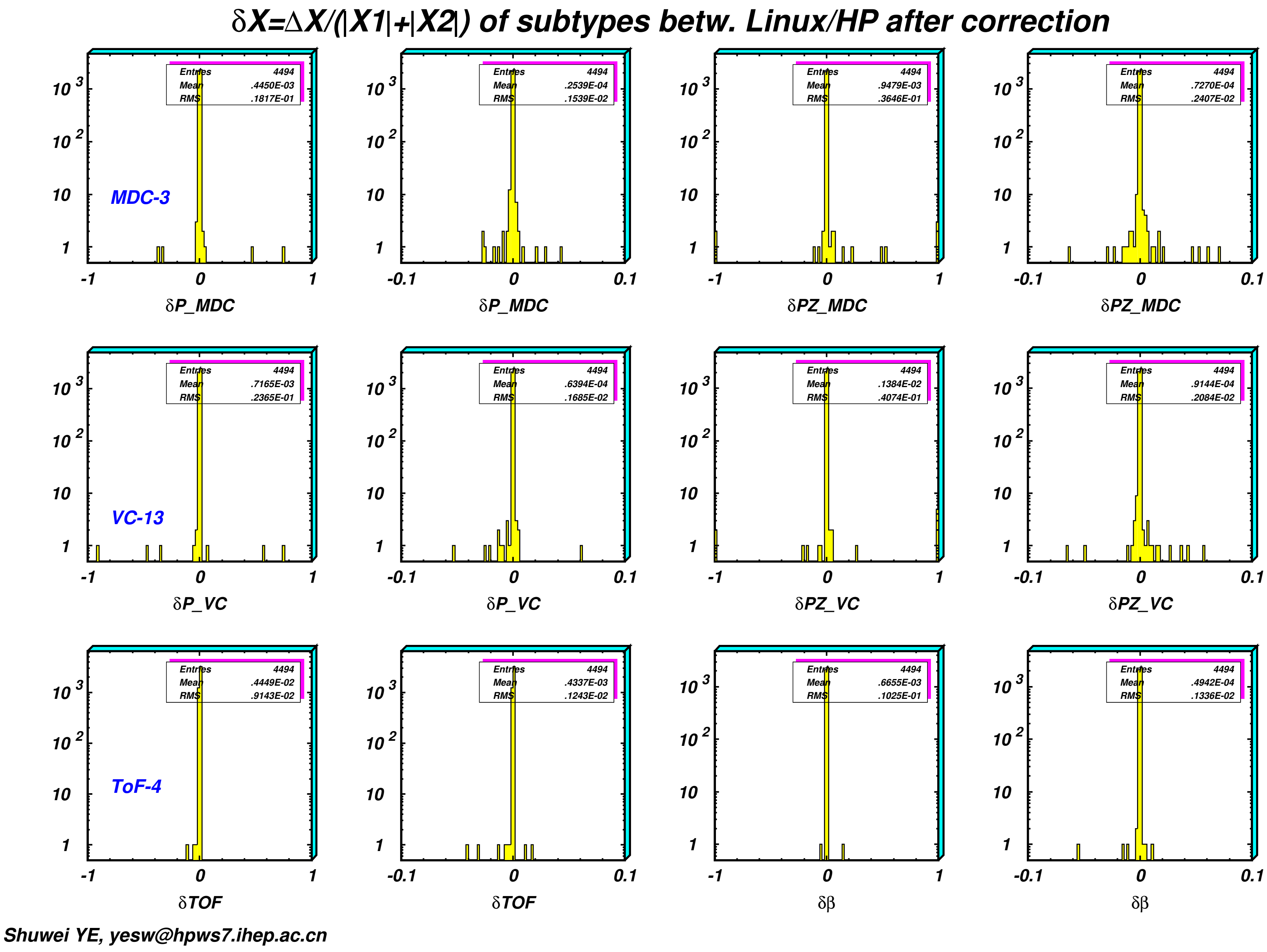

Figure 4: Relative differences of subtype-3(MDC), 13(VC) and 4(TOF) after correctoion

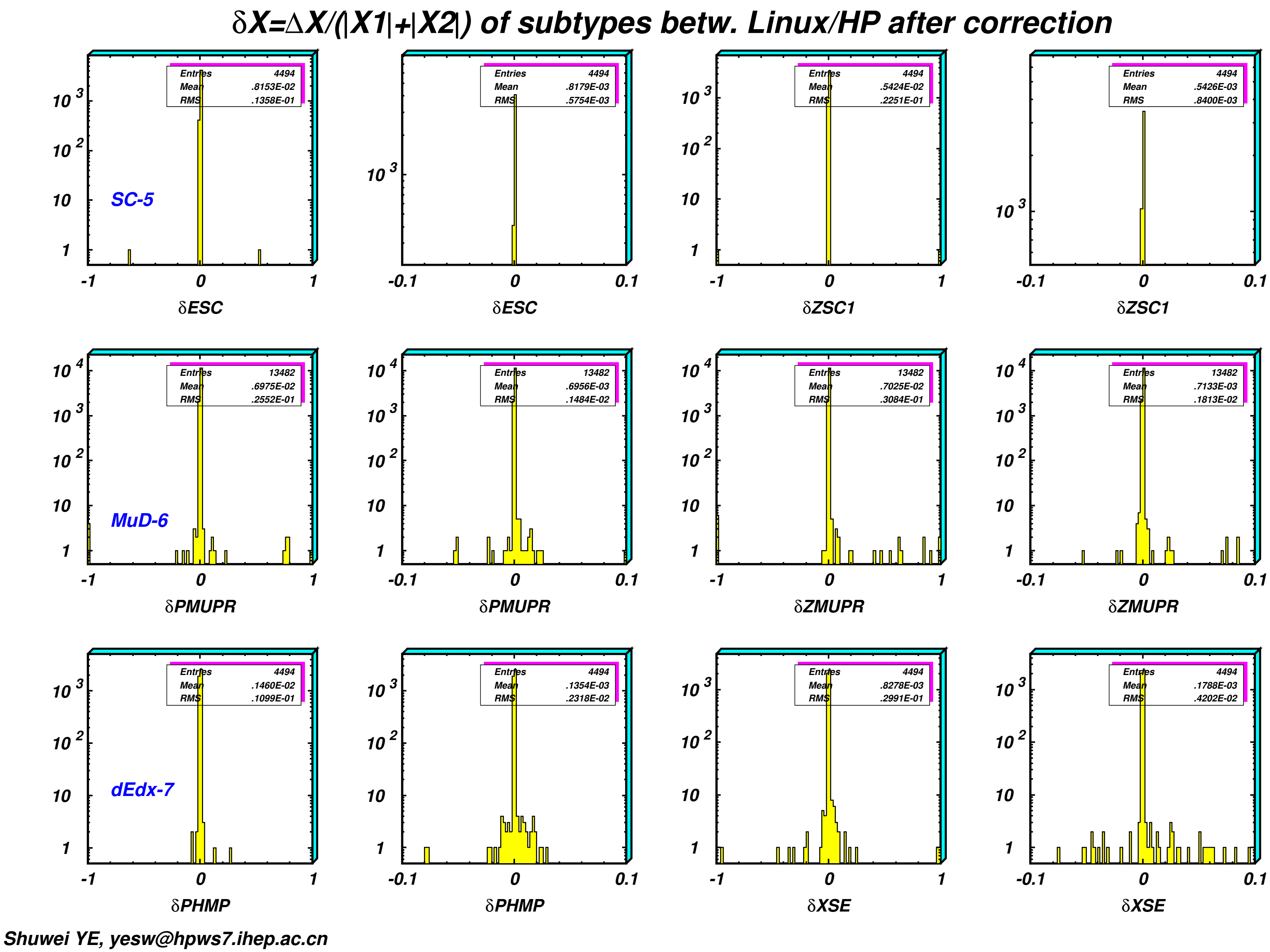

Figure 5: Relative differences of subtype-5(SC), 6(MuD),7(dEdx) after correctoion

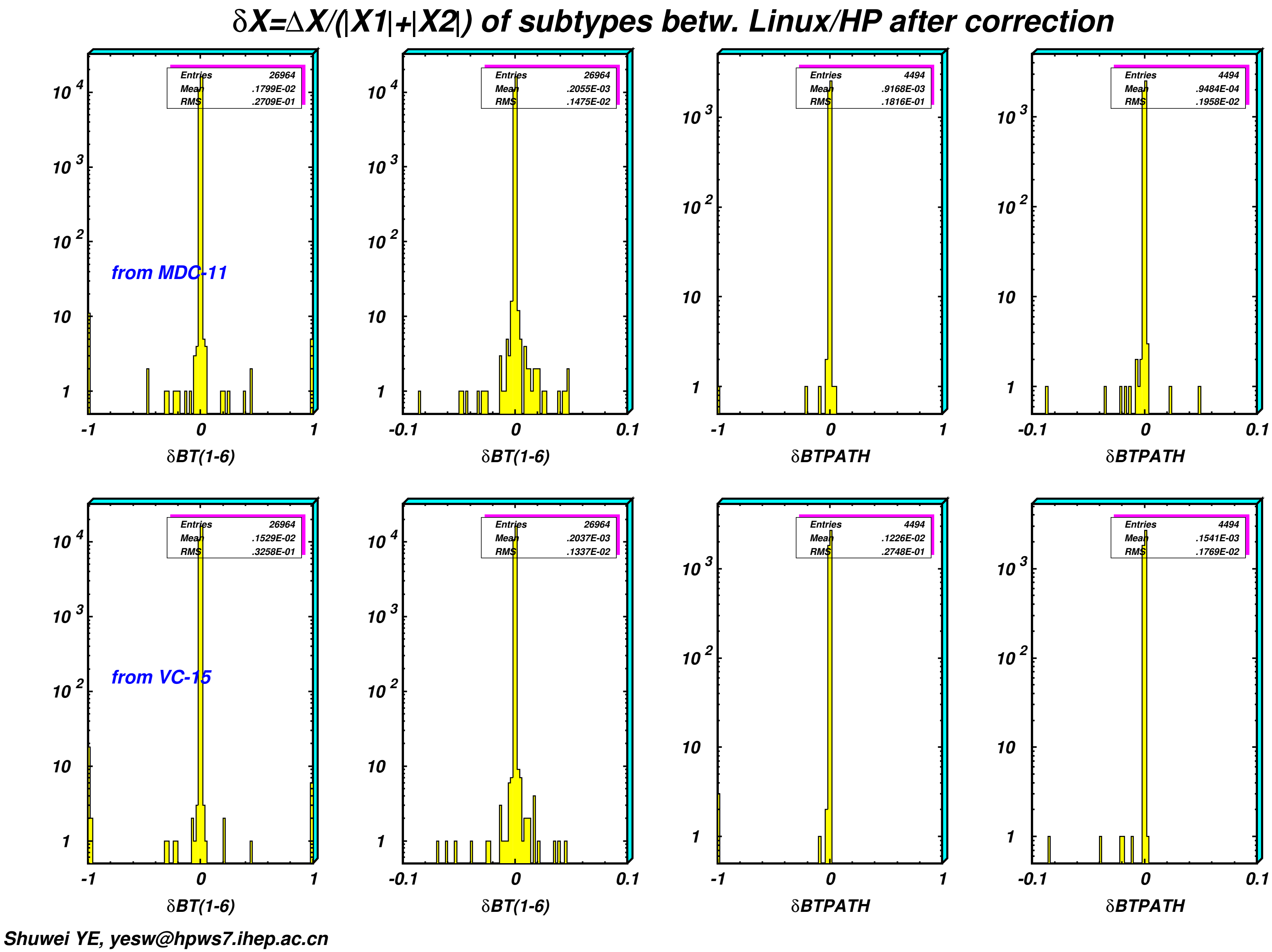

Figure 6: Relative differences of subtype-11(MDC Projection), 15(VC Projection) after correctoion

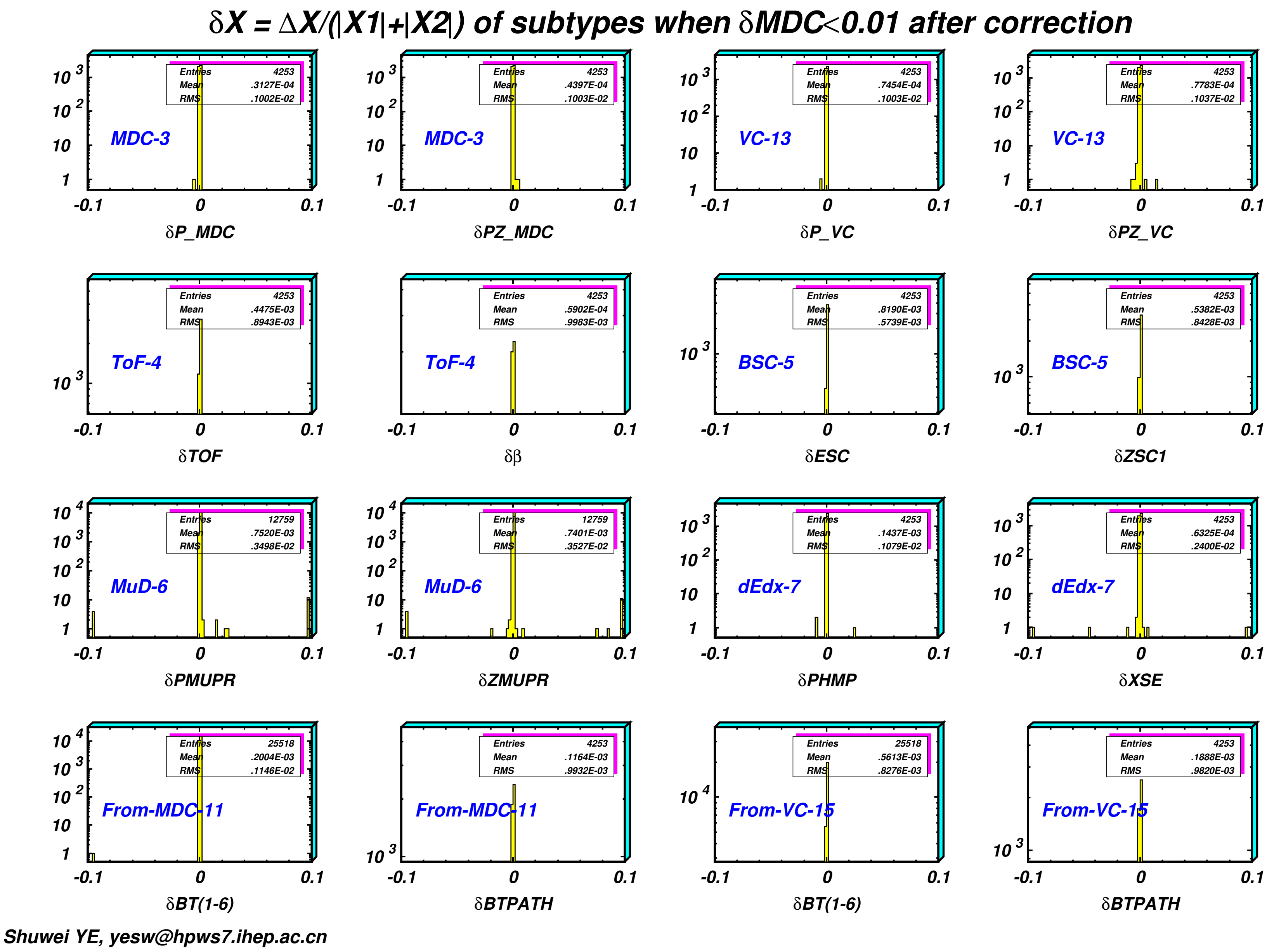

Figure 7: Relative differences of other subtypes when $|\delta MDC| < 0.01$ after correction

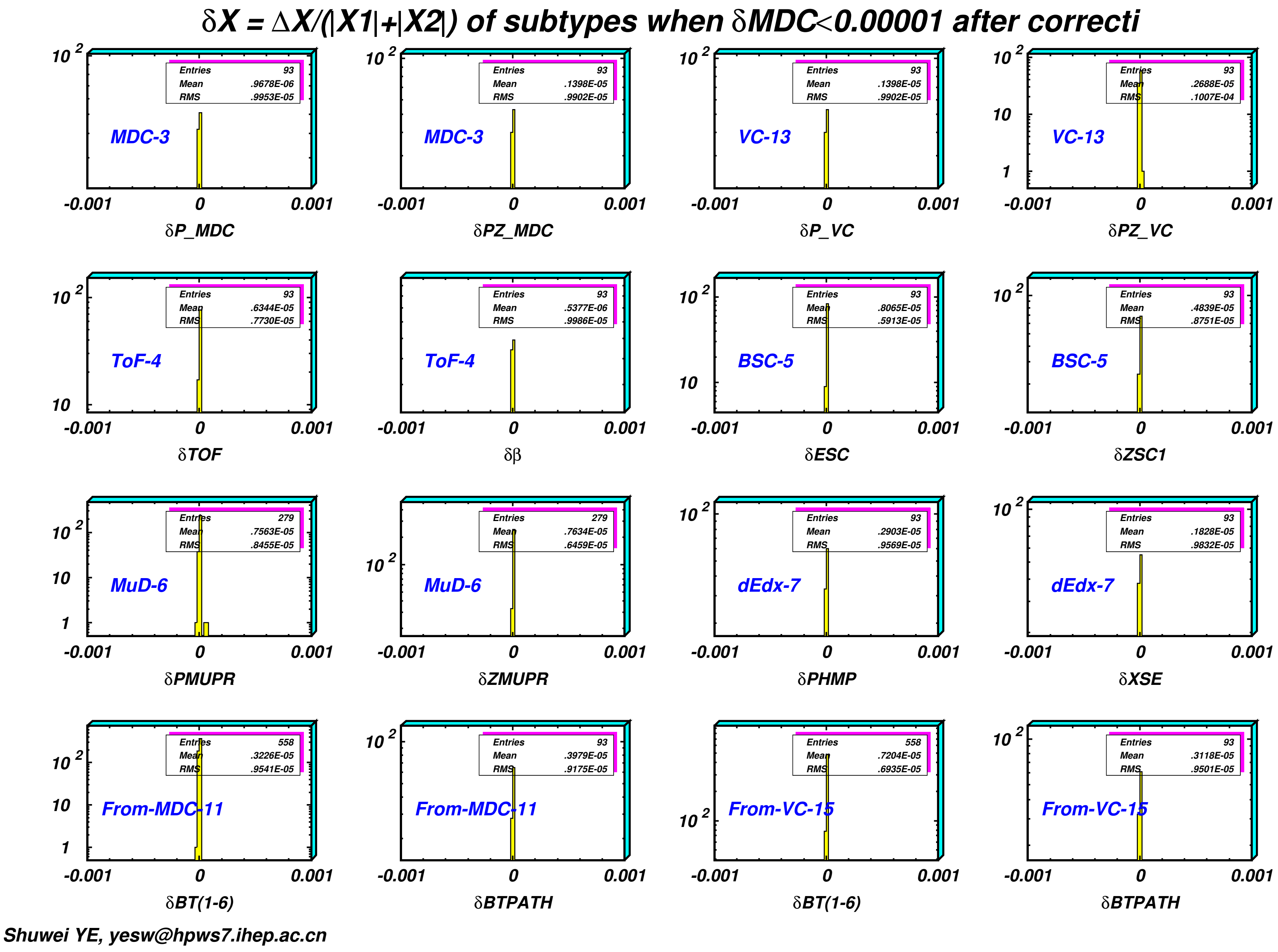

Figure 8: Relative differences of other subtypes when $|\delta MDC| < 0.00001$ after correction