



IIT Bombay  
Mumbai India

By: Shyam Kumar  
Supervisor : Prof Raghava Varma  
Date - 08/10/2015

HFCJ meeting

## **D<sup>+</sup>-hadron azimuthal correlations at 13 TeV**

analysis status



PWGHF  
PAG-HFCJ

### **Outline:**

- First look for D<sup>+</sup>-hadron correlations at 13 TeV
- Analysis status and future plan



## Characteristics of correlation plots

| <b>D<sup>+</sup> Meson pT (GeV/c)</b> |               |                | <b>Hadron pT (GeV/c)</b> |                |                |
|---------------------------------------|---------------|----------------|--------------------------|----------------|----------------|
| <b>Low pT</b>                         | <b>mid pT</b> | <b>high pT</b> | <b>Th 1</b>              | <b>Th 2</b>    | <b>Th3</b>     |
| <b>3_5</b>                            | <b>5_8</b>    | <b>8_14</b>    | <b>&gt;0.3</b>           | <b>&gt;0.5</b> | <b>&gt;1.0</b> |

### Background Subtraction via SB Technique

w/ Side Band Subtraction



### Correction done for

w/ Mixed Event Correction



w/ Track Efficiency Correction

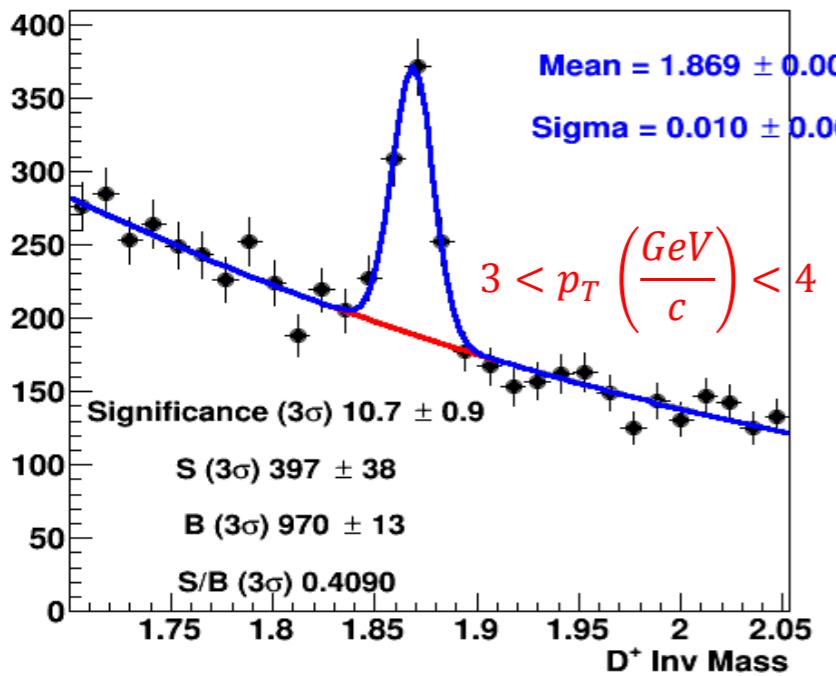
next

w/ D Efficiency Correction

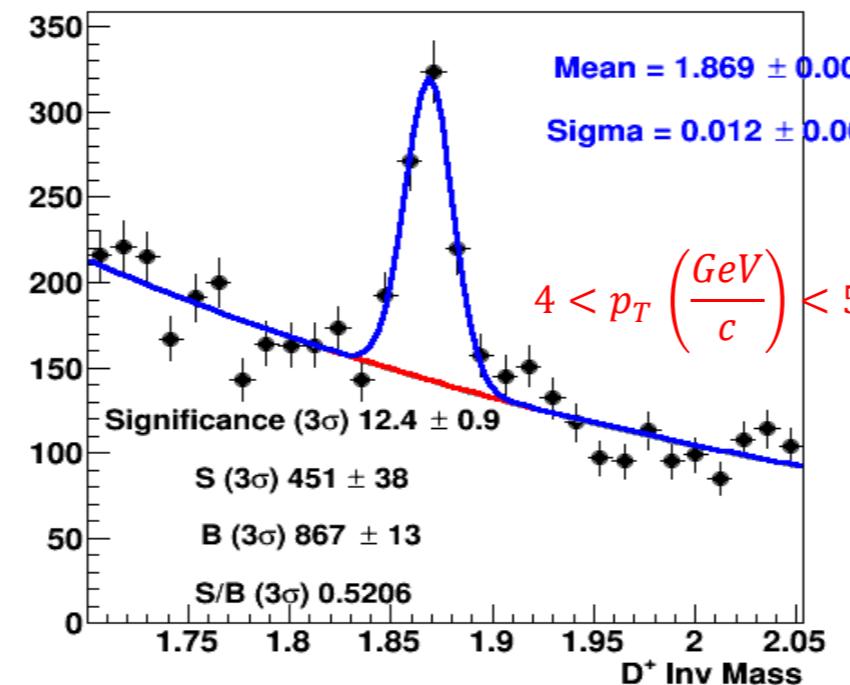
next

# D<sup>+</sup> Invariant Mass Plots at 7 TeV (TC)

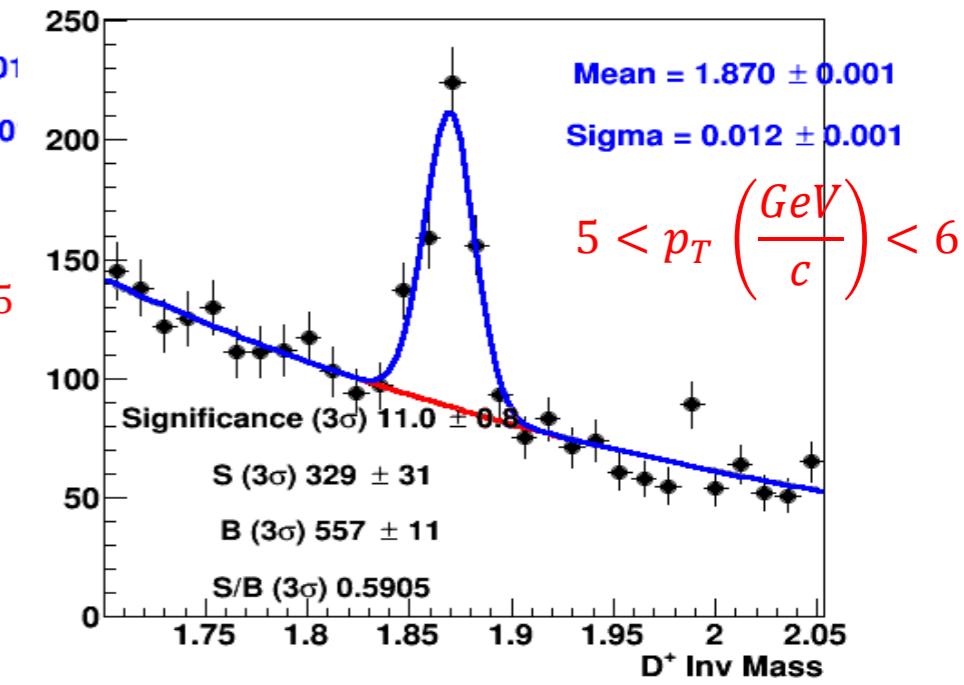
DplusMass\_pT\_bin3\_6



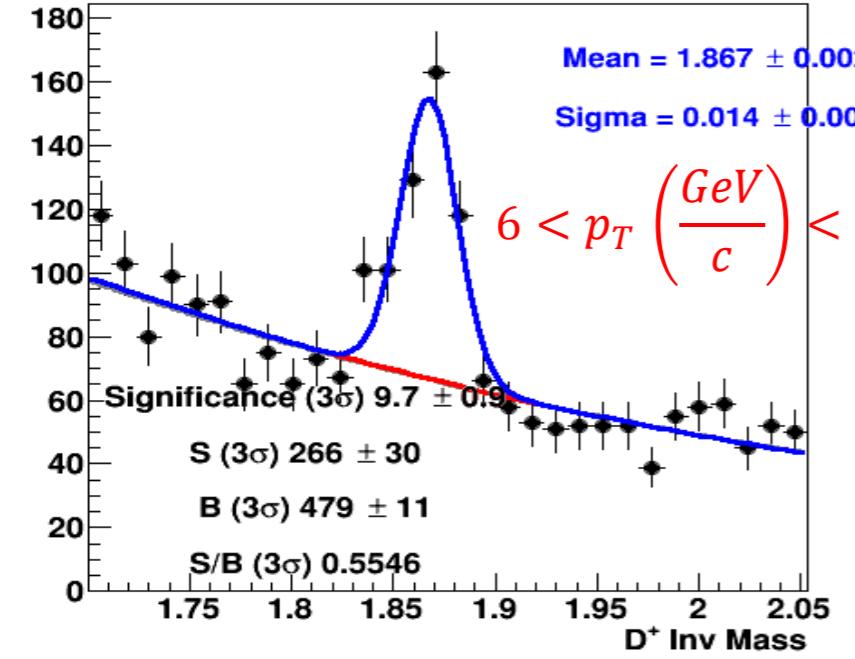
DplusMass\_pT\_bin4\_6



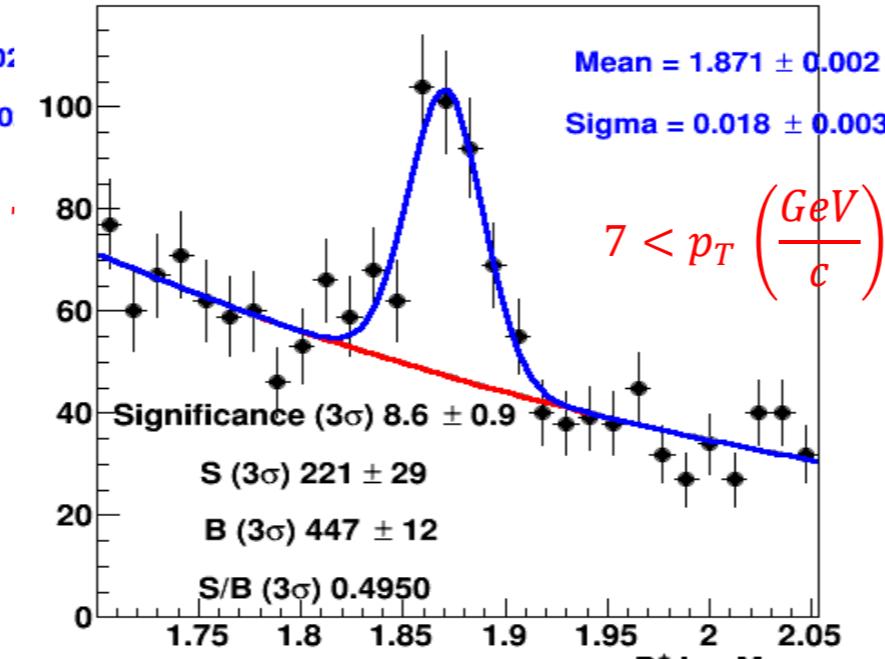
DplusMass\_pT\_bin5\_6



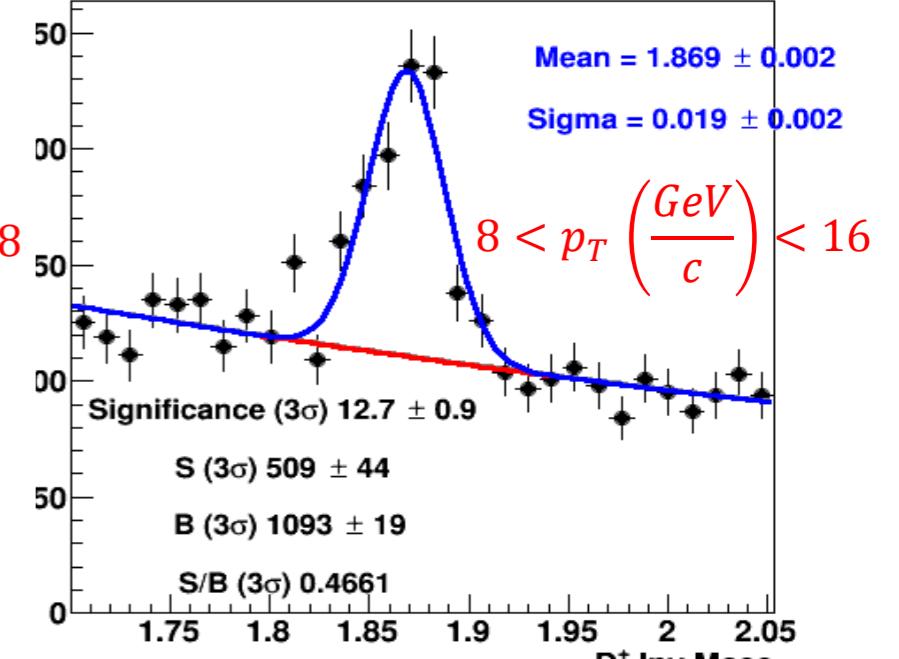
DplusMass\_pT\_bin6\_6



DplusMass\_pT\_bin7\_6



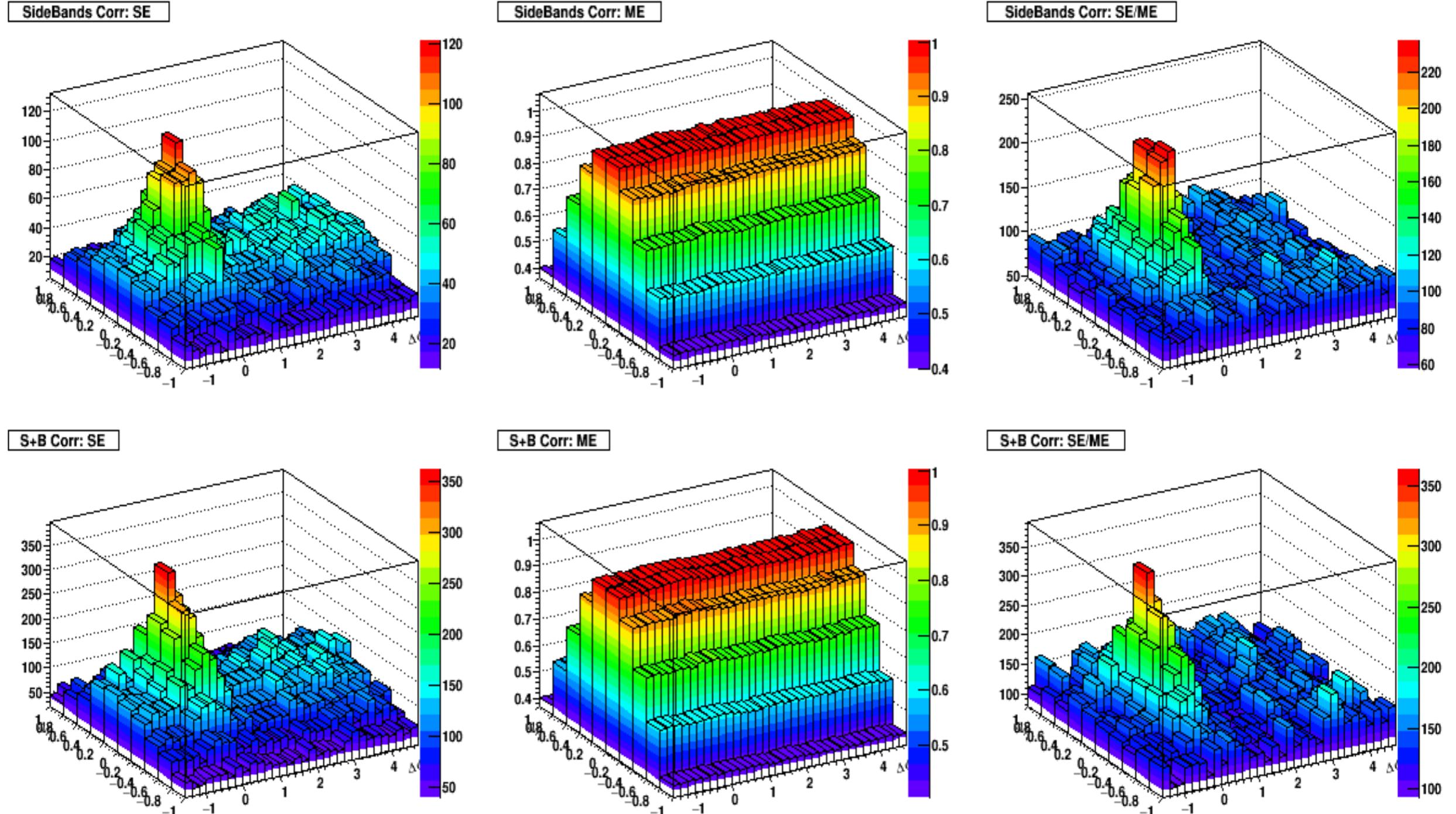
plusMass\_pT\_bin8\_6



# D+-h correlations || Low pT

SB subtracted + Mix Event corrected

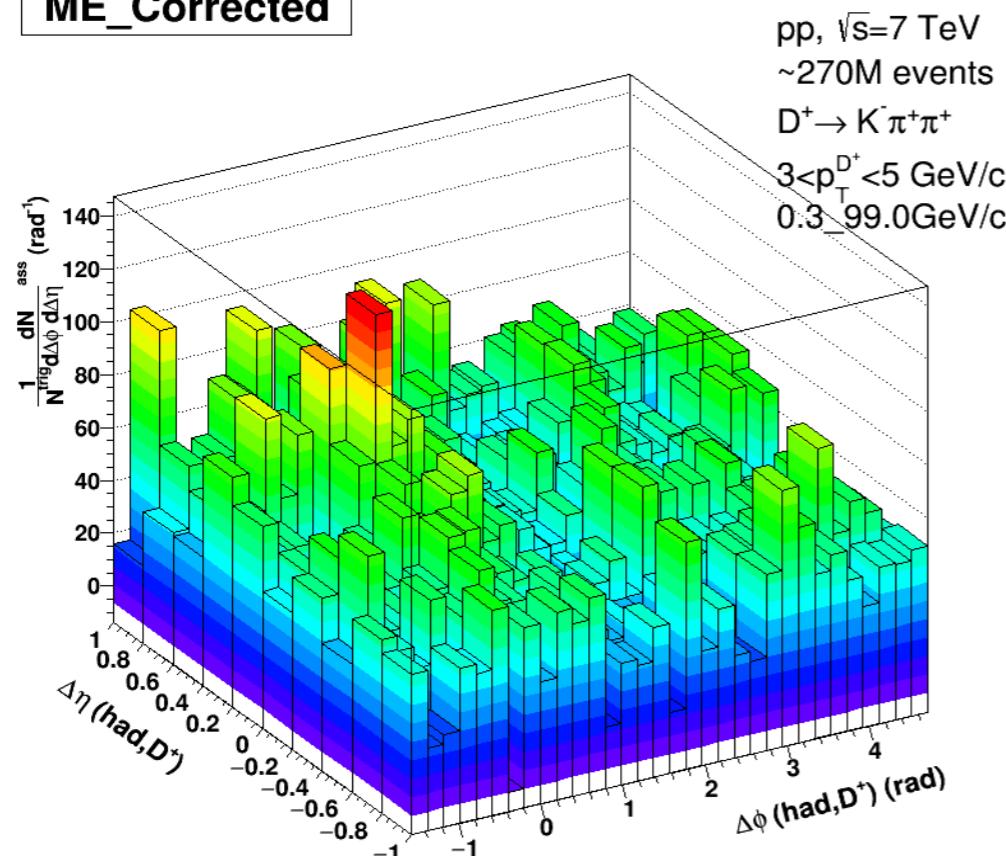
| D Meson pT (GeV/c) |        |         | Hadron pT (GeV/c) |
|--------------------|--------|---------|-------------------|
| Low pT             | mid pT | high pT | Th 1              |
| 3_5                | 5_8    | 8_16    | >0.3 GeV/c        |



## D+-h correlations || Low pT

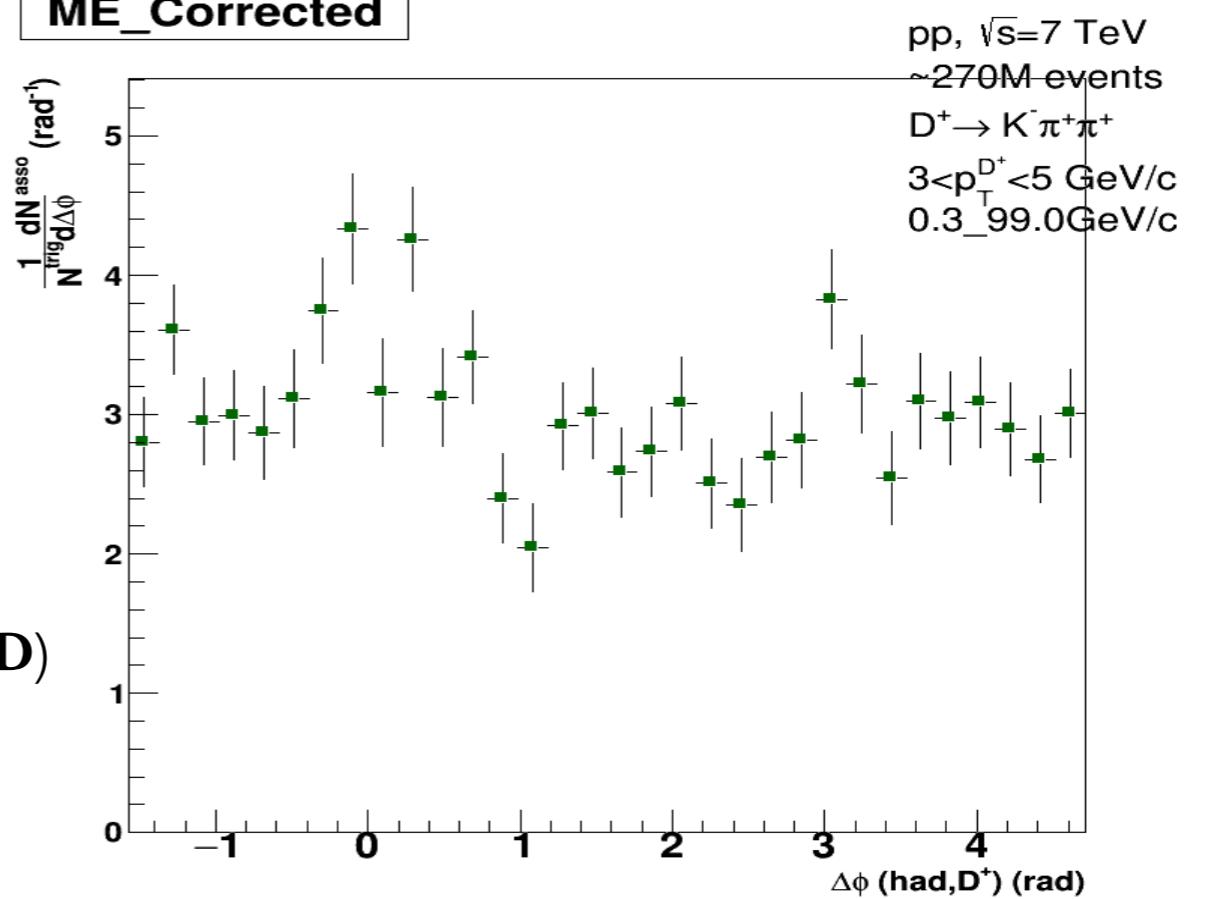
| D Meson pT (GeV/c) |        |         | Hadron pT (GeV/c) |
|--------------------|--------|---------|-------------------|
| Low pT             | mid pT | high pT | Th 1              |
| 3_5                | 5_8    | 8_16    | >0.3 GeV/c        |

**ME\_Corrected**



**SideBand+with eff corr. (2D)**

**ME\_Corrected**

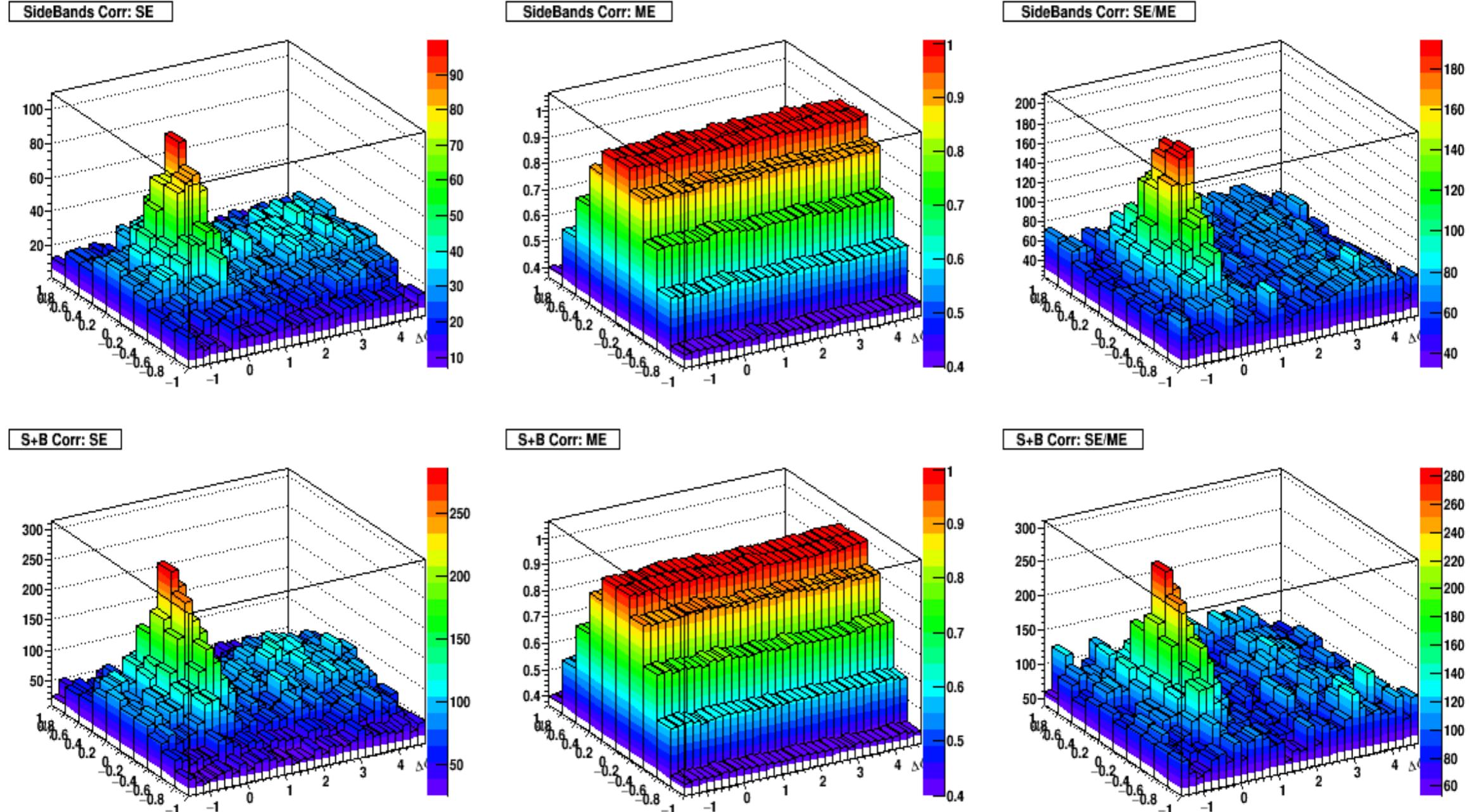


**SideBand+with eff corr. (1D)**

# D+-h correlations || Low pT

SB subtracted + Mix Event corrected

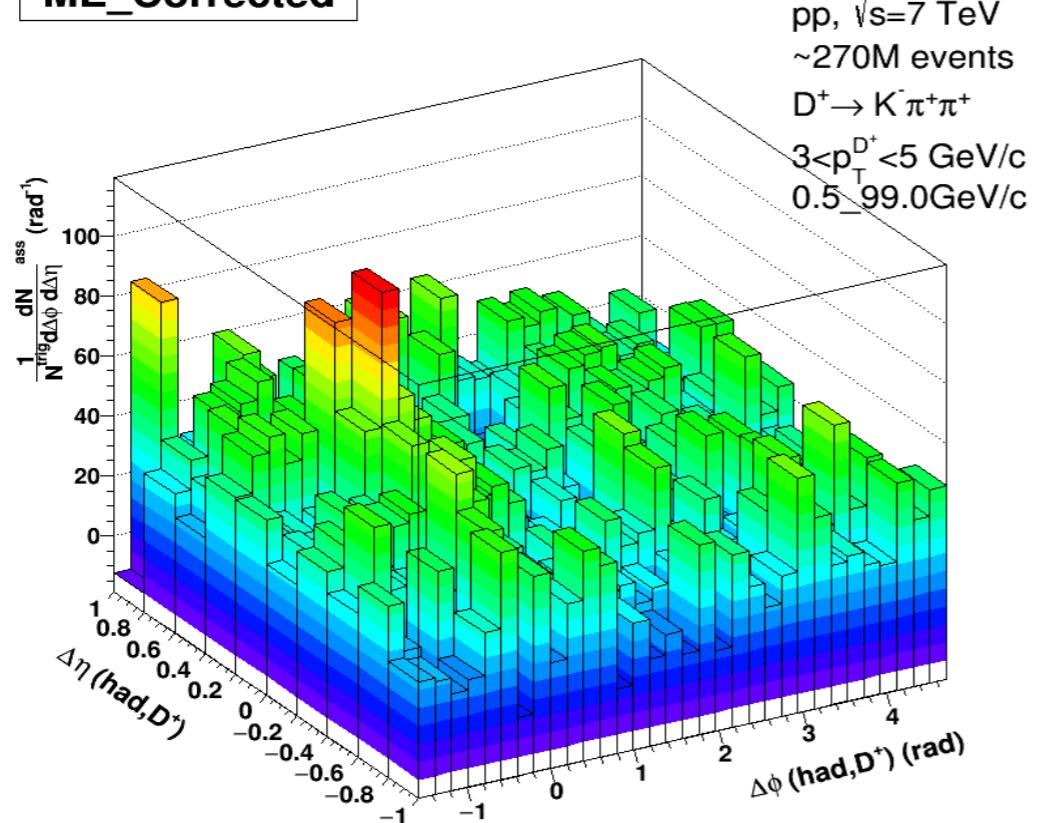
| D Meson pT (GeV/c) |        |         | Hadron pT (GeV/c) |
|--------------------|--------|---------|-------------------|
| Low pT             | mid pT | high pT | Th 1              |
| 3_5                | 5_8    | 8_16    | >0.5 GeV/c        |



## D+-h correlations || Low pT

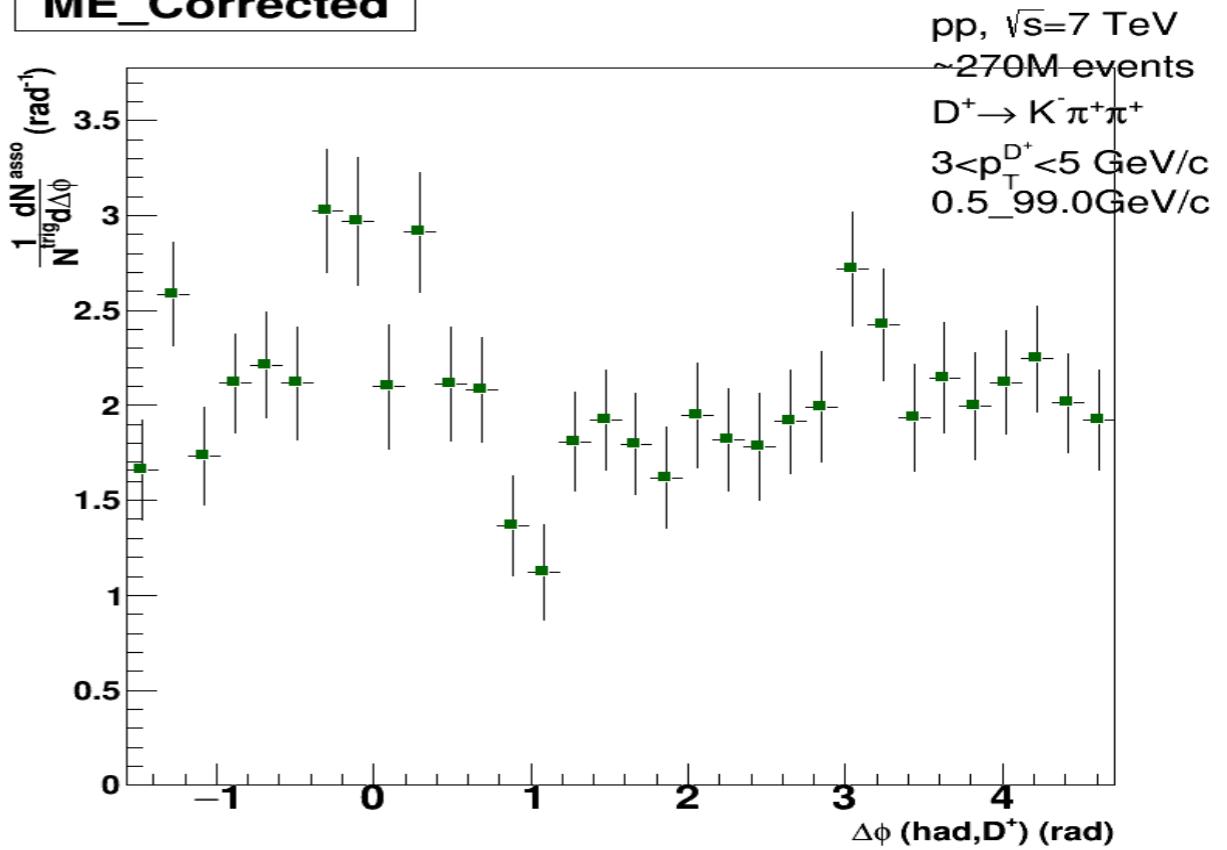
| D Meson pT (GeV/c) |        |         | Hadron pT (GeV/c) |
|--------------------|--------|---------|-------------------|
| Low pT             | mid pT | high pT | Th 1              |
| 3_5                | 5_8    | 8_16    | >0.5 GeV/c        |

**ME\_Corrected**



**SideBand+with eff corr. (2D)**

**ME\_Corrected**



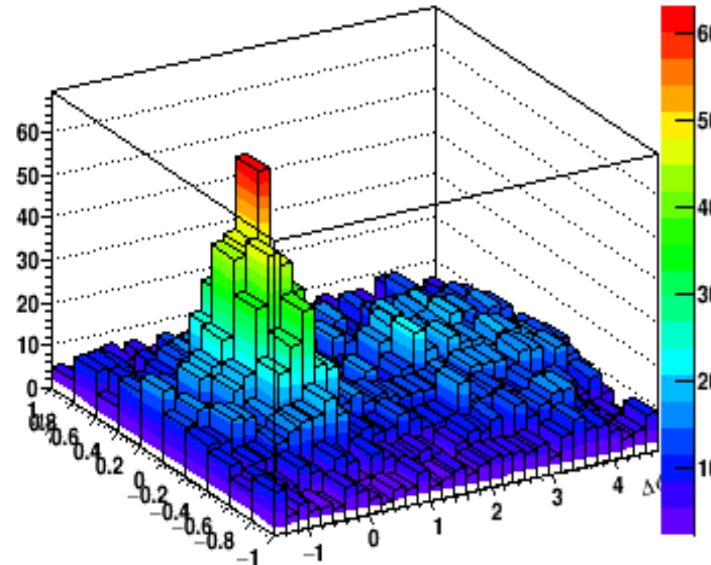
**SideBand+with eff corr. (1D)**

# D+-h correlations || Low pT

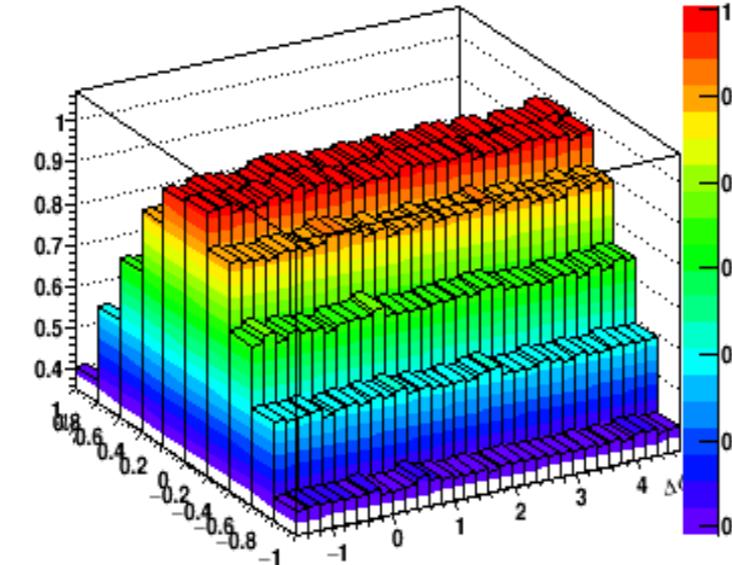
SB subtracted + Mix Event corrected

| D Meson pT (GeV/c) |        |         | Hadron pT (GeV/c) |
|--------------------|--------|---------|-------------------|
| Low pT             | mid pT | high pT | Th 1              |
| 3_5                | 5_8    | 8_16    | >0.5 GeV/c        |

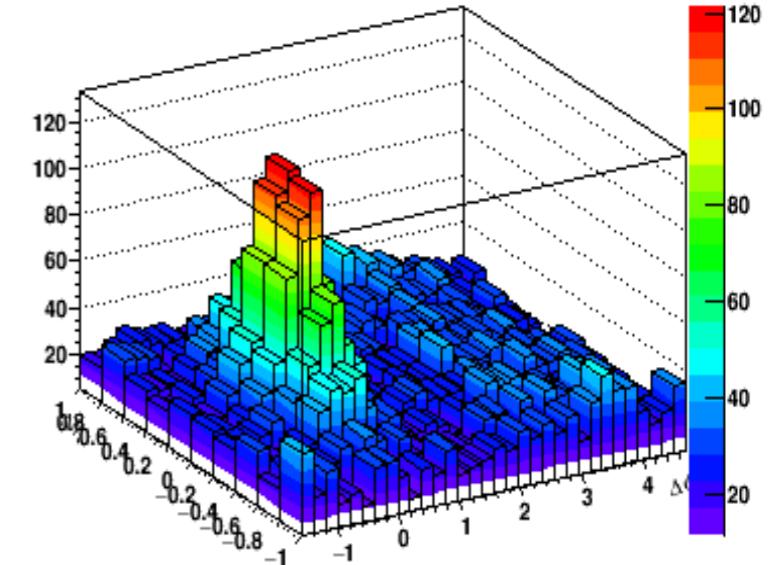
SideBands Corr: SE



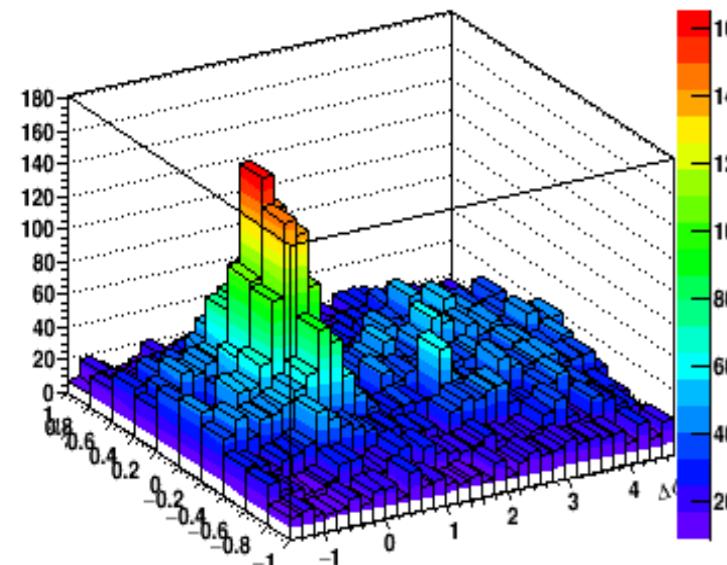
SideBands Corr: ME



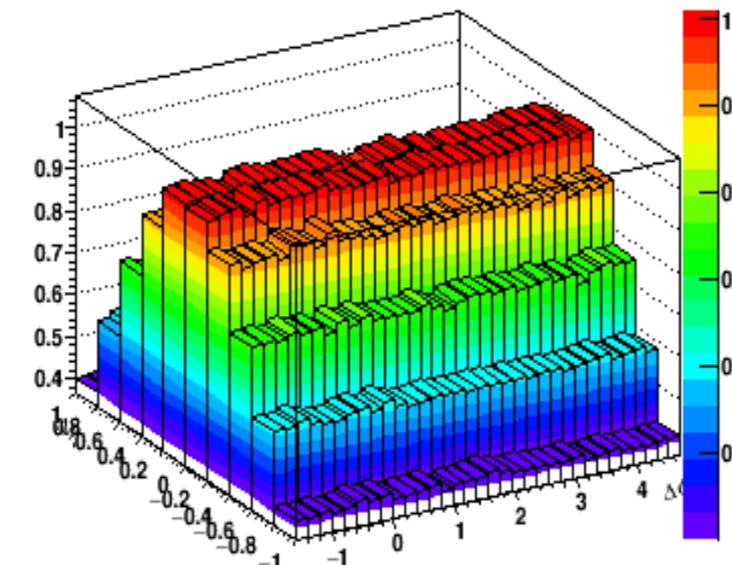
SideBands Corr: SE/ME



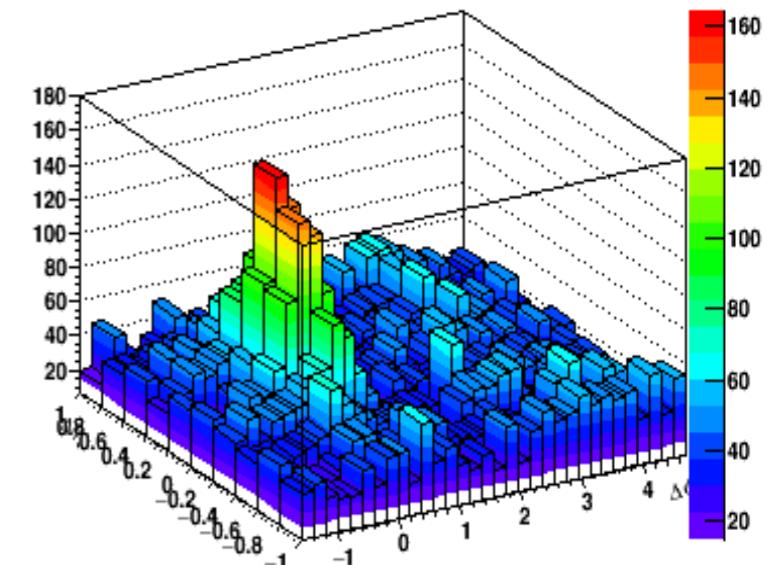
S+B Corr: SE



S+B Corr: ME



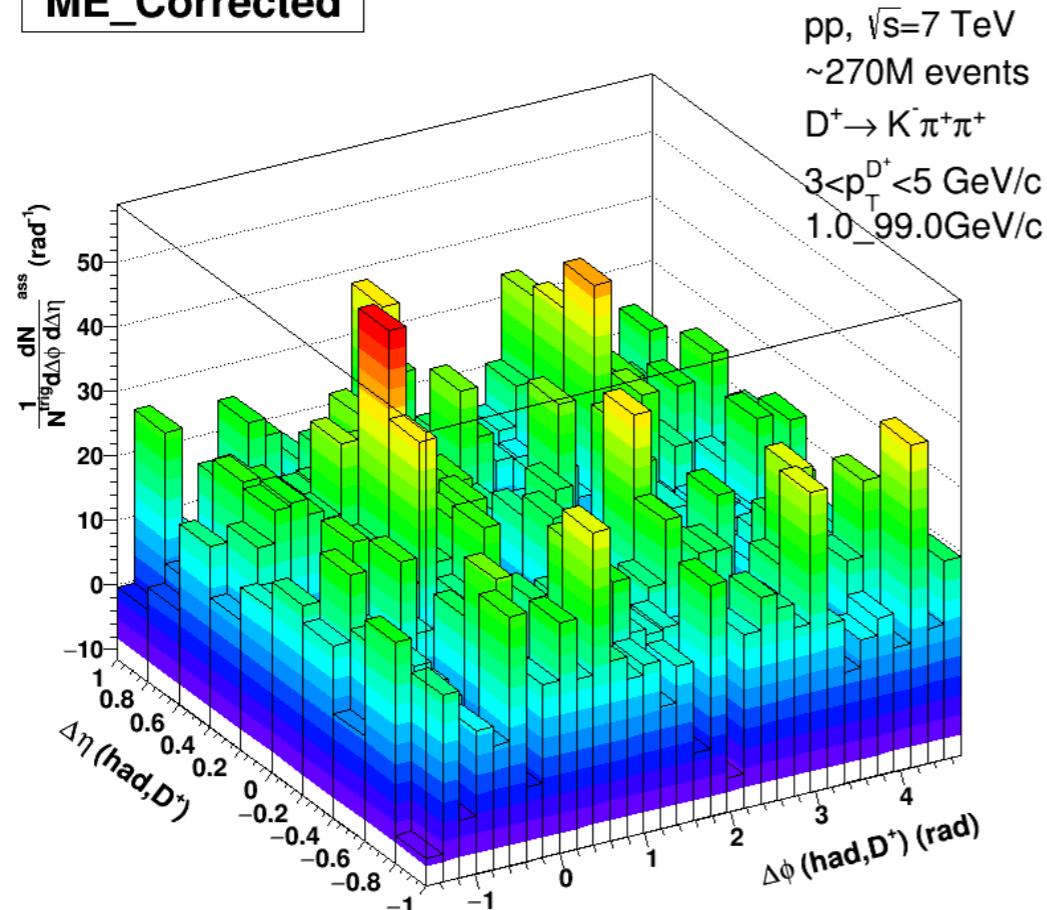
S+B Corr: SE/ME



## D+-h correlations || Low pT

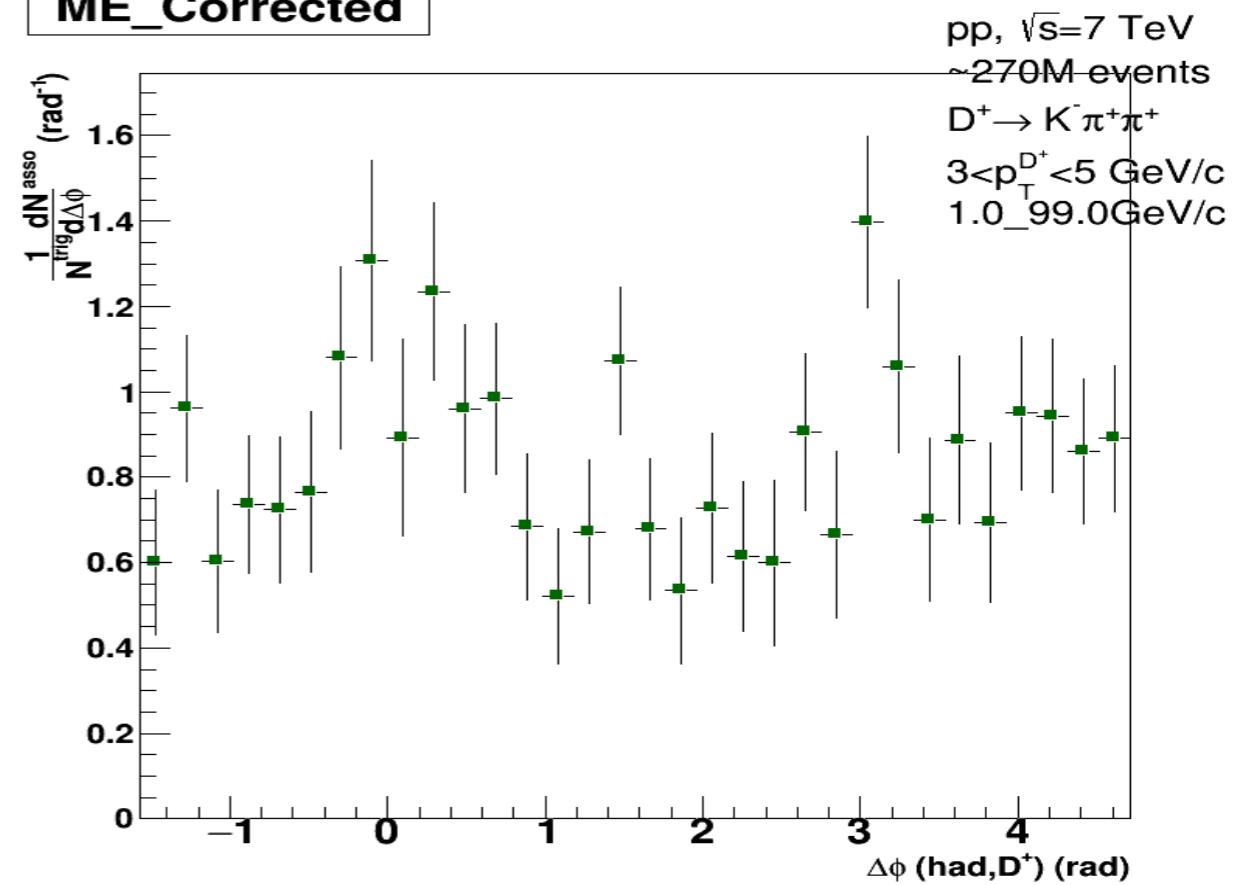
| D Meson pT (GeV/c) |        |         | Hadron pT (GeV/c) |
|--------------------|--------|---------|-------------------|
| Low pT             | mid pT | high pT | Th 1              |
| 3_5                | 5_8    | 8_16    | >1.0 GeV/c        |

**ME\_Corrected**



**SideBand+with eff corr. (2D)**

**ME\_Corrected**



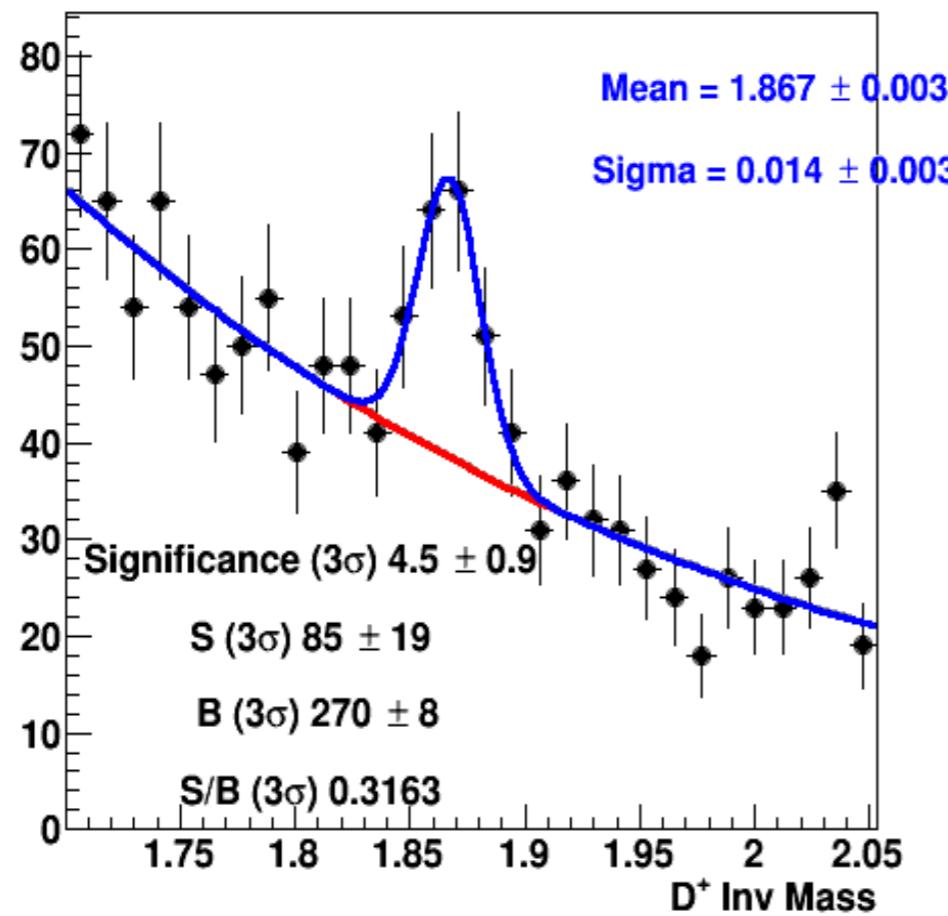
**SideBand+with eff corr. (1D)**

# D+ invariant mass at 13 Tev

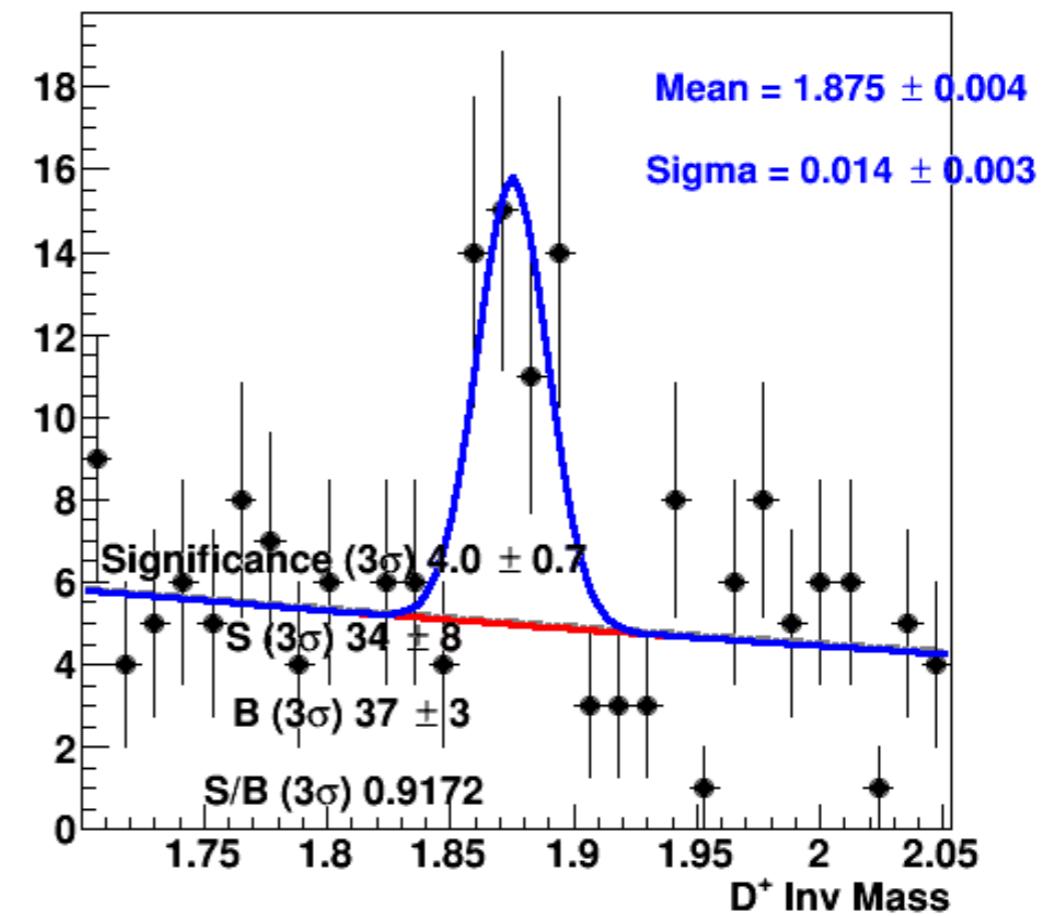
LHC15f\_Pass1 data at 13 TeV CM Energy  
 Event Analyzed: 39M Events  
 Physics Selection -Off

Good Runs [23]= {226468, 226466, 226445, 226444, 226115, 225716, 225709, 225587, 225586, 225582, 225580, 225579, 225578, 225576, 225106, 225052, 225051, 225050, 225035, 225031, 225026, 225011, 225000};

**DplusMass\_pT\_bin3\_6**  $3 < p_T \left( \frac{GeV}{c} \right) < 8$



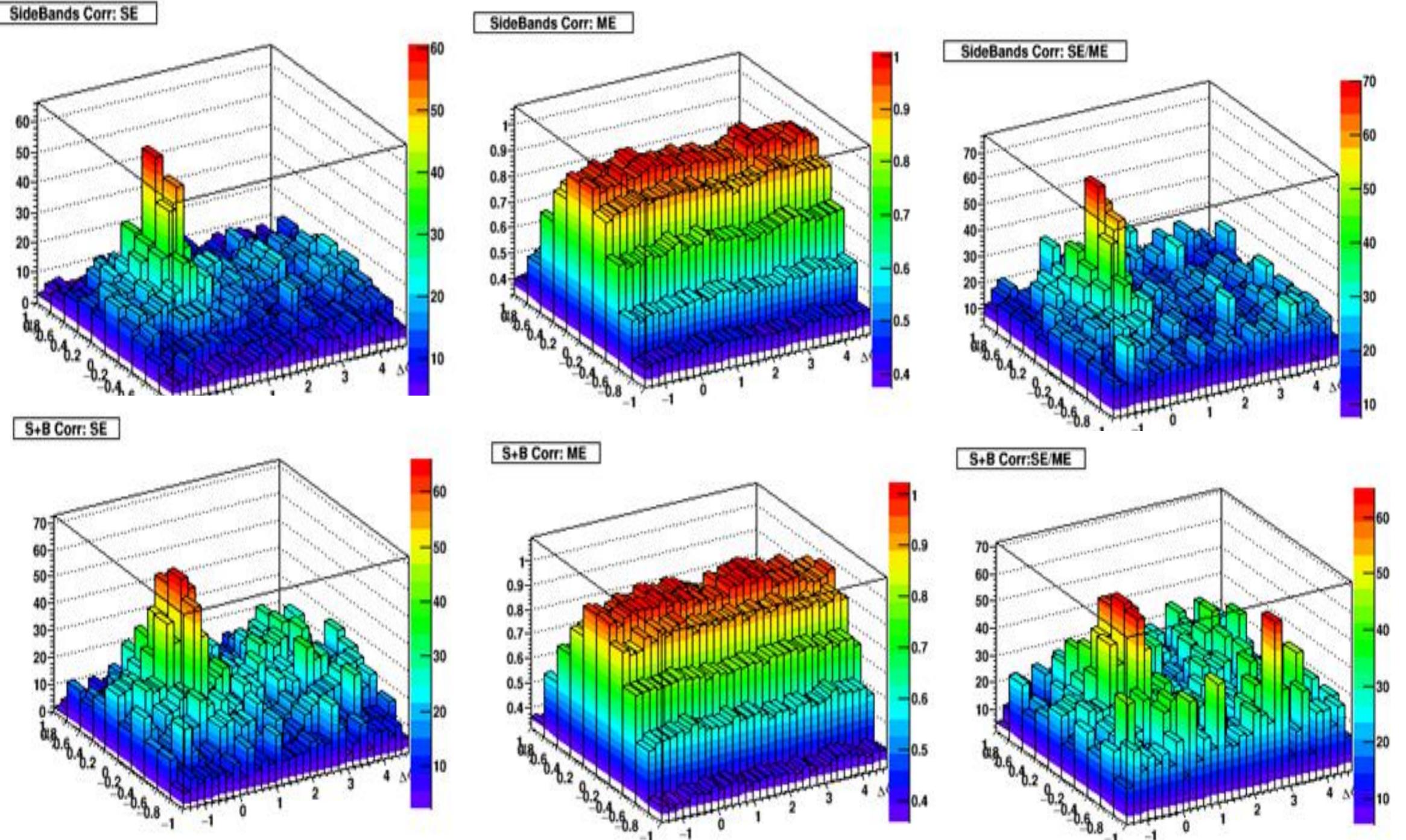
**DplusMass\_pT\_bin8\_6**  $8 < p_T \left( \frac{GeV}{c} \right) < 16$



# D+-h correlations || 3-8 pT

SB subtracted + Mix Event corrected

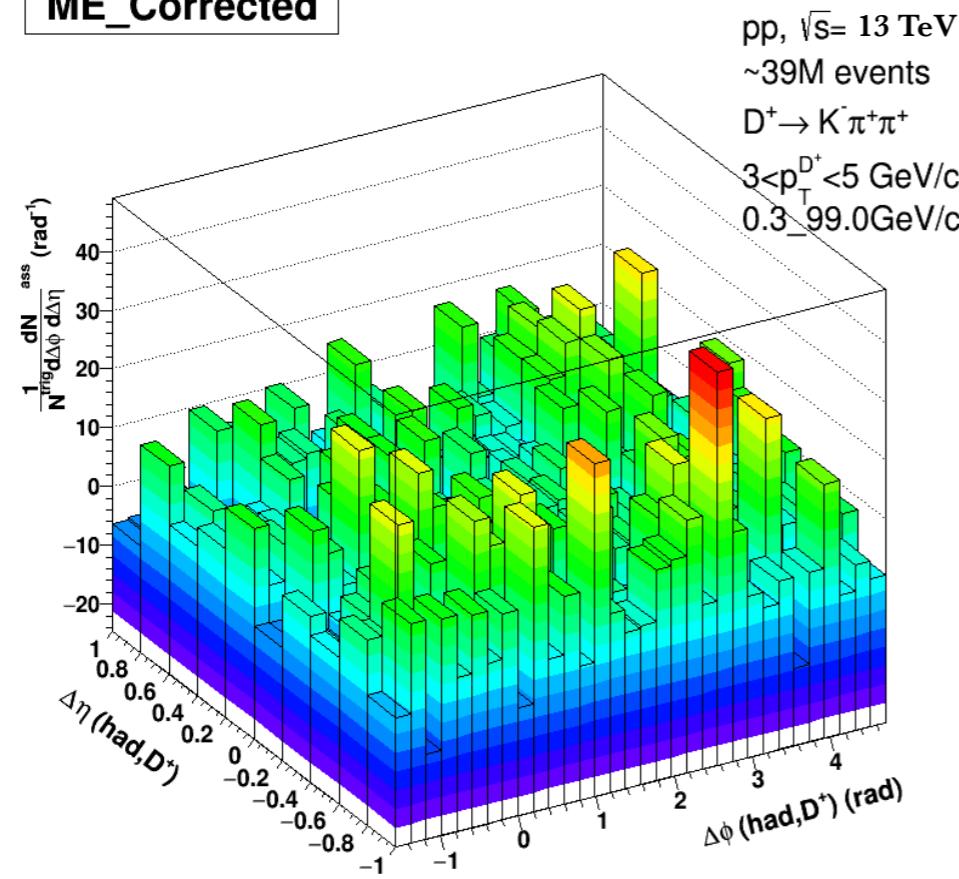
| D Meson pT (GeV/c) | Hadron pT (GeV/c) |
|--------------------|-------------------|
| pT                 | Th 1              |
| 3_8                | >0.3 GeV/c        |



## D+-h correlations || Low pT

| D Meson pT (GeV/c) | Hadron pT (GeV/c) |
|--------------------|-------------------|
| pT                 | Th 1              |
| 3_8                | >0.3 GeV/c        |

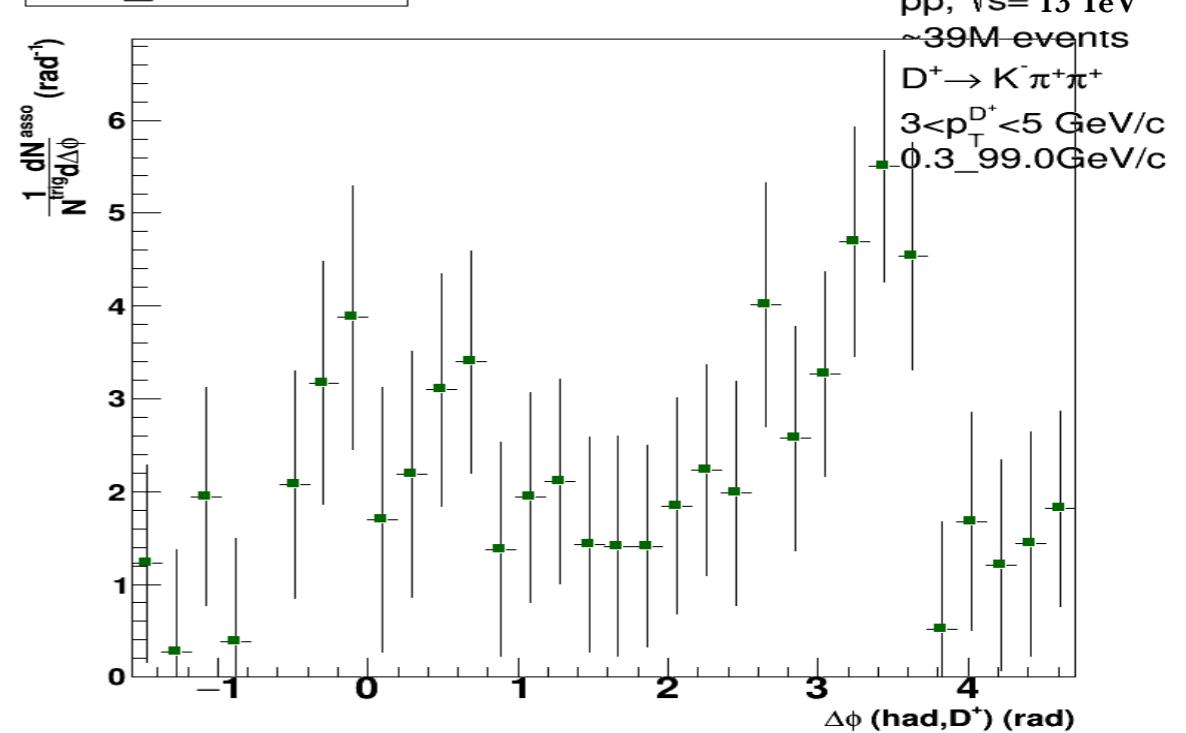
**ME\_Corrected**



**SideBand+with eff corr. (2D)**

**SideBand+with eff corr. (1D)**

**ME\_Corrected**



## Summary and future plan

Result from repetition of 7TeV data analysis and first look at 13 TeV data are obtained. At 13 TeV data, correlations are build for the particular D-pT range because of statistics issue.

Trying to understand HF/correlations analysis framework.

Repetition of same exercise with more upcoming data and further analysis corrections.

**Thanks ..**