

# Discussion and request for run 17 pp 510GeV st\_fms MuDst files reproduce

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# Requirement and current situation for run 17 FMS data

- Goal: diffractive EM-jet  $A_N$  for run 15 and run 17 FMS
  - Already got preliminary approval for run 15 FMS data set.
- Requirement: the events must include FMS detector and Roman Pot (RP) detector information.
- Current situation for run 17 pp 510GeV data:
  1. No RP information in FMS stream data.
  2. Very few events with FMS information in RP stream data.
- Reason:
  1. RP detector option not turned on in MuDst data production for st\_fms stream
  2. FMS trigger detector on not included in RP triggers for RP stream.

Current run 17 st\_fms data production chain

|       |         |       |         |  |  |
|-------|---------|-------|---------|--|--|
| P18ic | rawData | SL18c | ry2017a | DbV20171001 pp2017a StiCA btof mtd mtdCalib PicoVtxDefault fmsDat fmsPoint fpsDat BEmcChkStat OSpaceZ2 OGridLeak3D | pp 510GeV run 2017 st_fms stream data production |
|-------|---------|-------|---------|--|--|

# Run 17 fms stream

- We require the events contain both FMS and RP information.

## Information for run: 18109033

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| Trigger Info  |  |                   |         |        |         |            |            |              |                    |
|---|--|-------------------|---------|--------|---------|------------|------------|--------------|--------------------|
| Run Info  |  |                   |         |        |         |            |            |              |                    |
| Thresholds  |  |                   |         |        |         |            |            |              |                    |
| All Details   |  |                   |         |        |         |            |            |              |                    |
| No Details  |  |                   |         |        |         |            |            |              |                    |
| main  |  |                   |         |        |         |            |            |              |                    |
| Requirements  |  |                   |         |        |         |            |            |              |                    |
| Detectors   |  |                   |         |        |         |            |            |              |                    |
| Overlaps  |  |                   |         |        |         |            |            |              |                    |
| PS Setup  |  |                   |         |        |         |            |            |              |                    |
| Emulation   |  |                   |         |        |         |            |            |              |                    |
| FMS-JP2 ( <a href="#">history</a> )                   |  | 48                | 570828  | 329.92 | 3.45K   | 3.67K      | 1.0000     | 0.1250       | fms                |
| FMS-JP2 ( <a href="#">history</a> ) --> Requirements: |  | +FMS-JP2          |         |        |         | L1: Accept | L2: Accept | L4: Accept   |                    |
|   |  | -Laser-protection |         |        |         |            |            |              |                    |
|   |  | Detector          | Require | Live   | Require | Dead       | Fire       | Fire If Live | Disable If Present |
|   |  | ETOF              | 0       | 0      | 0       | 0          | 0          | 0            | 0                  |
|   |  | PP2PP             | 0       | 0      | 0       | 0          | 1          | 0            | 0                  |
|   |  | ETOW              | 1       | 0      | 1       | 0          | 0          | 0            | 0                  |
|   |  | BTOW              | 1       | 0      | 1       | 0          | 0          | 0            | 0                  |
|   |  | BSMD              | 0       | 0      | 0       | 0          | 0          | 0            | 0                  |
|   |  | TOF               | 1       | 0      | 1       | 0          | 0          | 0            | 0                  |
|   |  | ESMD              | 1       | 0      | 1       | 0          | 0          | 0            | 0                  |
|   |  | TPX               | 0       | 0      | 0       | 0          | 0          | 0            | 0                  |
|   |  | FCS               | 0       | 0      | 0       | 0          | 0          | 0            | 0                  |
|   |  | RHICF             | 0       | 0      | 0       | 0          | 0          | 0            | 0                  |
|   |  | GMT               | 0       | 0      | 0       | 0          | 0          | 0            | 0                  |
|   |  | MTD               | 0       | 0      | 0       | 0          | 0          | 0            | 0                  |
| FMS-JP2 ( <a href="#">history</a> ) --> Detectors:    |  | Trigger Detector  |         |        |         |            | Require    |              |                    |
|   |  | trg-zdc           |         |        |         |            |            | 0            |                    |
|   |  | trg-bbc           |         |        |         |            |            | 0            |                    |
|   |  | trg-vpd           |         |        |         |            |            | 0            |                    |
|   |  | trg-tof           |         |        |         |            |            | 0            |                    |
|   |  | trg-epd           |         |        |         |            |            | 0            |                    |
|   |  | trg-mtd           |         |        |         |            |            | 0            |                    |
|   |  | trg-bemc          |         |        |         |            |            | 0            |                    |
|   |  | trg-eemc          |         |        |         |            |            | 0            |                    |
|   |  | trg-rp            |         |        |         |            |            | 0            |                    |
|   |  | trg-fms           |         |        |         |            |            | 1            |                    |
|   |  | fps               |         |        |         |            |            | 1            |                    |
|   |  | trg-fcal          |         |        |         |            |            | 0            |                    |

Possible to get Roman Pot information in fms stream.

Same situation for all other FMS triggers.

# Run 17 rp stream

- We require the events contain both FMS and RP information.

## Information for run: 18109033

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No FMS trigger detector for RP triggers.

Same issue for all RP triggers.

| Trigger Info                                       |  |  |                  |   |   |   |   |   |         |
|--|--|--|------------------|---|---|---|---|---|---------|
| Run Info   |  |  |                  |   |   |   |   |   |         |
| Thresholds   |  |  |                  |   |   |   |   |   |         |
| All Details  |  |  |                  |   |   |   |   |   |         |
| No Details   |  |  |                  |   |   |   |   |   |         |
| main   |  |  |                  |   |   |   |   |   |         |
| Requirements                                       |  |  |                  |   |   |   |   |   |         |
| Detectors  |  |  |                  |   |   |   |   |   |         |
| Overlaps   |  |  |                  |   |   |   |   |   |         |
| PS Setup   |  |  |                  |   |   |   |   |   |         |
| Emulation  |  |  |                  |   |   |   |   |   |         |
| RP_CPT2 ( <a href="#">history</a> ) --> Detectors: |  |  | TOF              | 1 | 0 | 1 | 0 | 0 | 1       |
|  |  |  | ESMD             | 1 | 0 | 1 | 0 | 0 | 0       |
|  |  |  | TPX              | 1 | 0 | 1 | 0 | 0 | 0       |
|  |  |  | FCS              | 0 | 0 | 0 | 0 | 0 | 0       |
|  |  |  | RHICF            | 0 | 0 | 0 | 0 | 0 | 0       |
|  |  |  | GMT              | 0 | 0 | 0 | 0 | 0 | 0       |
|  |  |  | MTD              | 1 | 0 | 1 | 0 | 0 | 0       |
|  |  |  | Trigger Detector |   |   |   |   |   | Require |
|  |  |  | trg-zdc          |   |   |   |   |   | 1       |
|  |  |  | trg-bbc          |   |   |   |   |   | 1       |
|  |  |  | trg-vpd          |   |   |   |   |   | 1       |
|  |  |  | trg-tof          |   |   |   |   |   | 1       |
|  |  |  | trg-epd          |   |   |   |   |   | 1       |
|  |  |  | trg-mtd          |   |   |   |   |   | 1       |
|  |  |  | trg-bemc         |   |   |   |   |   | 1       |
|  |  |  | trg-eemc         |   |   |   |   |   | 1       |
|  |  |  | trg-rp           |   |   |   |   |   | 1       |
|  |  |  | trg-fms          |   |   |   |   |   | 0       |
|  |  |  | fps              |   |   |   |   |   | 0       |
|  |  |  | trg-fcal         |   |   |   |   |   | 1       |

# Test for adding RP detector option in st\_fms MuDst generation

- Follow the chain production from fast offline production.
  - Include both FMS and RP detector options.

|     |         |     |        |   |  |
|-----|---------|-----|--------|---|--|
| DEV | rawData | DEV | ry2017 | pp2017 btof mtd pp2pp fmsDat fmsPoint fpsDat BEmcChkStat CorrX<br>OSpaceZ2 OGridLeak3D -hitfilt | Fastoffline chain for pp 500GeV run 2017 |
|-----|---------|-----|--------|---|--|

- Use st\_fms\_18118002\_raw\_3000008.daq file as test.
  - We can see some events with both FMS and RP detector information.
  - Possible to consider reproducing st\_fms stream MuDst files adding RP detector option.
  - Files for the test: /star/data01/pwg/liangxl/test\_fmsMuDst/
- Check for the MuDst generation results

|   |              |
|---|--------------|
| Total number of events for this file            | 126,622      |
| Total number of events with RP response         | 7,060 (5.6%) |
| Number of events satisfying diffractive process | 277 (0.2%)   |

# Possibility for using run 17 FMS stream

- From Production MuDst Summary on Distributed Disk:

| Trigger setup name    | Stream name | Collision | Year of data taken | Production Tag | Number of Events on DD | Number of Events on HPSS | Size of MuDst on DD (GB) | Number of MuDst files on DD | Number of MuDst files on HPSS | % of production saved on DD |
|-----------------------|-------------|-----------|--------------------|----------------|------------------------|--------------------------|--------------------------|-----------------------------|-------------------------------|-----------------------------|
| pp500_production_2017 | st_fms      | pp510     | year2017           | P18ic          | 7470577569             | 7909845375               | 152494                   | 81194                       | 87821                         | 92.5                        |
|                       | st_fms_adc  | pp510     | year2017           | P18ic          | 83385                  | 95698                    | 63.2                     | 2118                        | 2450                          | 86.4                        |

- There are about 7910 M event for this data set (fms stream).
- Should be feasible for diffractive EM-jet  $A_N$  analysis.

# Discussion and Request

- Run 17 rp stream data do not contain FMS detector information.
- Run 17 fms stream data contain RP detector information. There are reasonable fraction of events with both FMS and RP detector information in the test MuDst file.
- We request to reproduce the MuDst files for st\_fms stream with adding the RP detector (possibly add “pp2pp” option and turn on RP detector option when generating MuDst files).

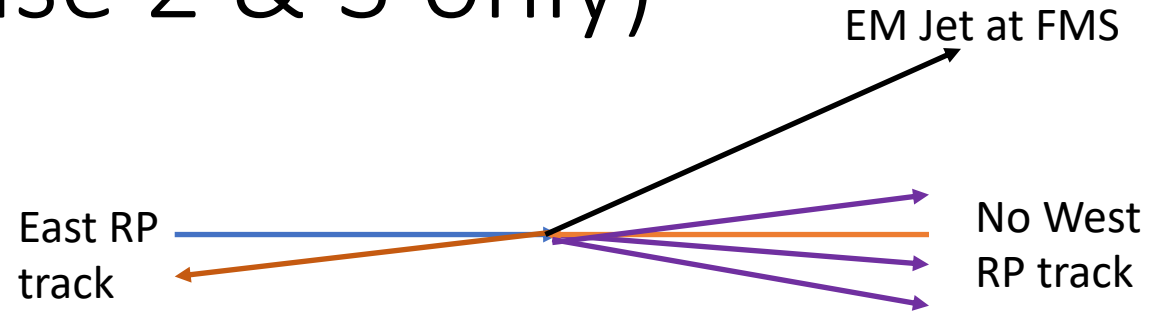
Back up



# Diffraction process (case 2 & 3 only)

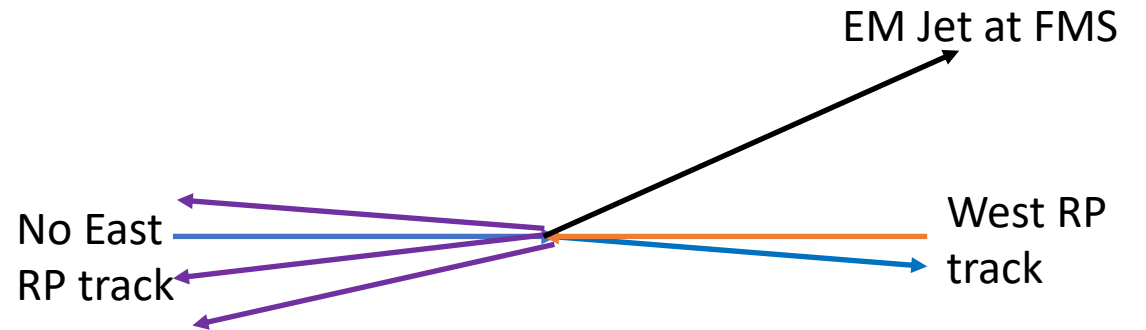
Case 1:

Single diffractive event: Only 1 proton track on east side RP.



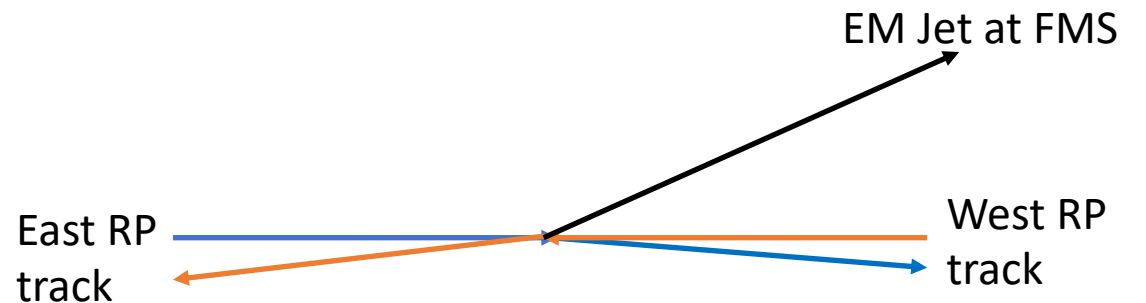
Case 2:

Single diffractive event: Only 1 proton track on west side RP.



Case 3:

Double diffractive event: Only 1 proton track on east side RP and only 1 proton track on west side RP.



# Run 15 FMS stream data

- The fraction of events with RP track in FMS stream data for run 15 and run 17 (from sample) is similar.

