

T8 - CHARM beam steering joint activities

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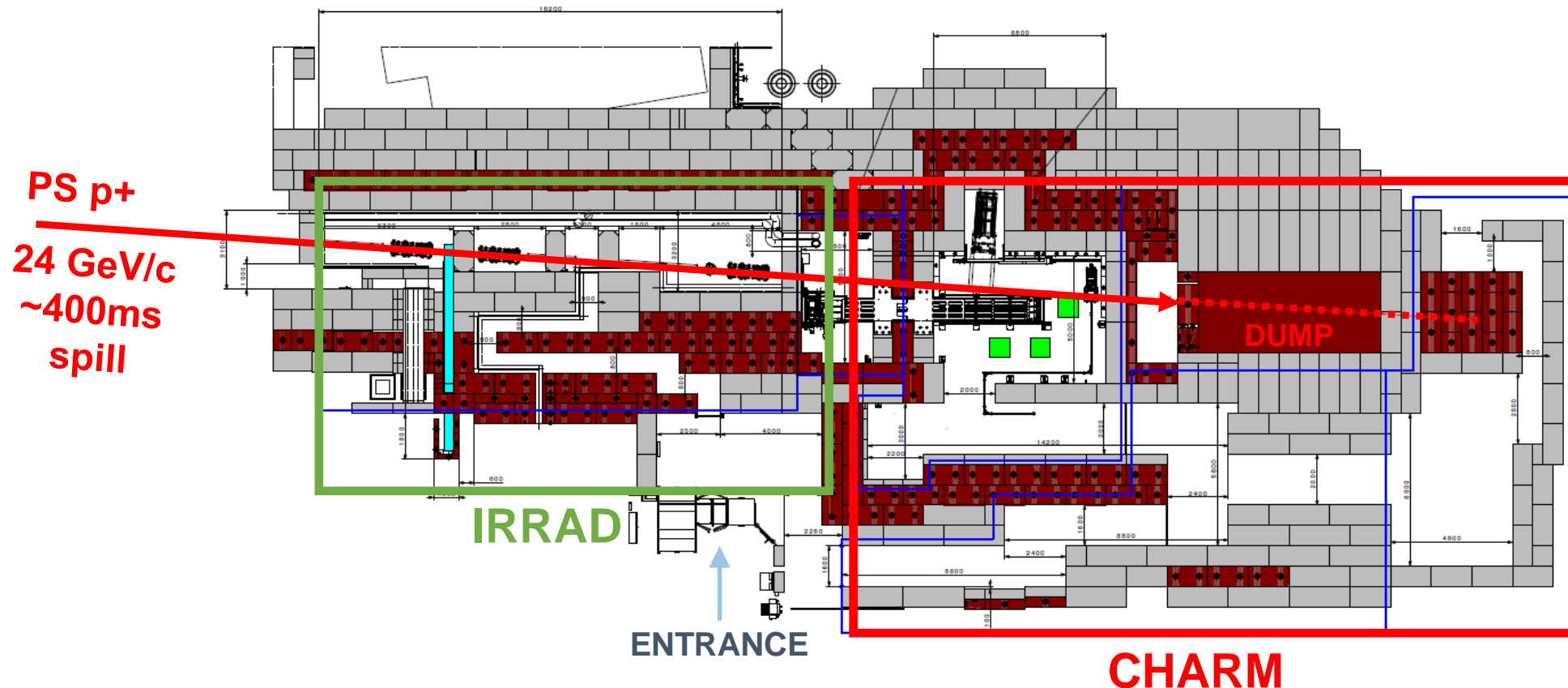
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East Area Irradiation Facilities

Primary beam line from PS (T08): 24 GeV/c proton beam

CHARM irradiation area is placed downstream to **IRRAD** on the T8 line



Irradiation Room

PRIMARY PROTONS IMPINGE THE TARGET: A SECONDARY RADIATION FIELD IS CREATED

3 KEY ELEMENTS:

1. Target

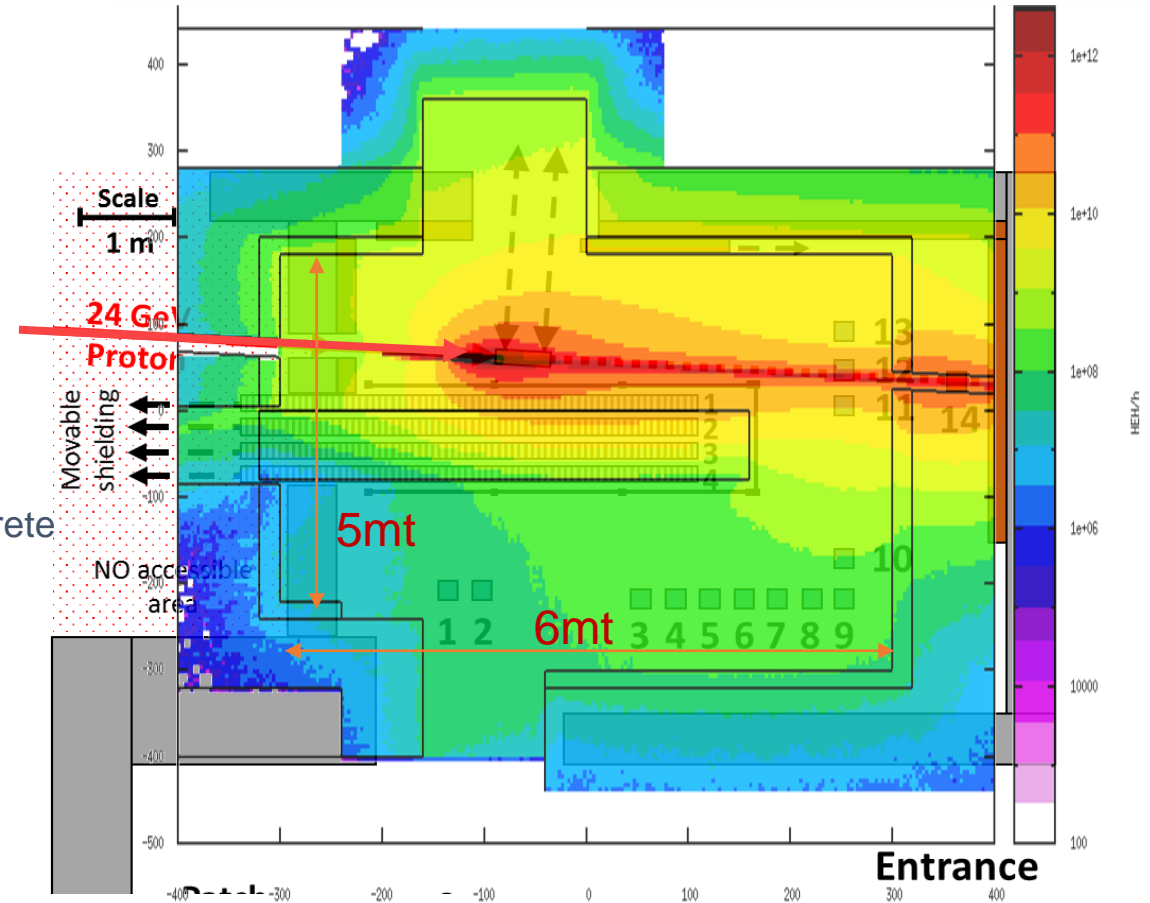
Target

2. Movable Shielding

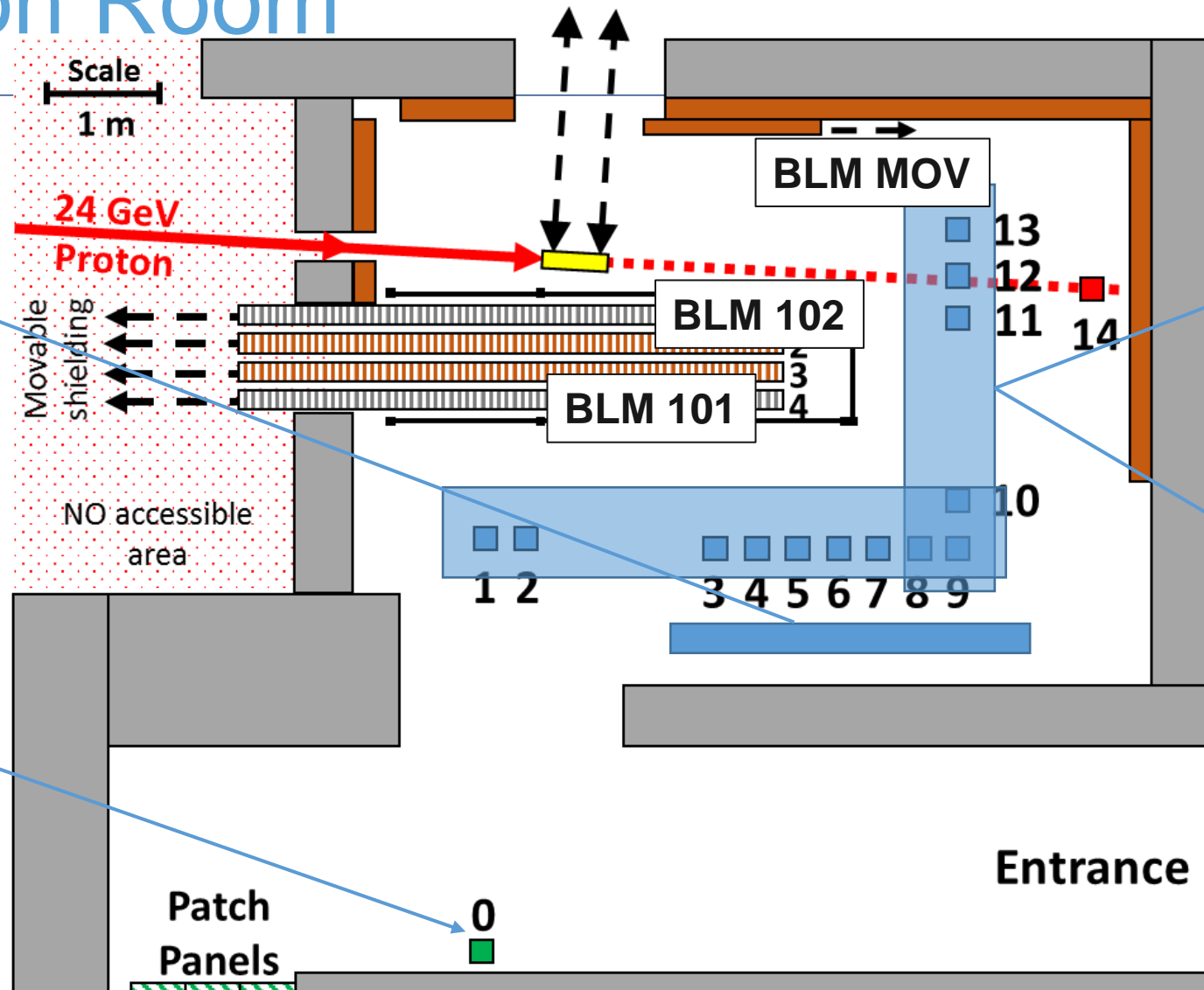
Concrete
Iron

3. Positions

Conveyer
Montrac



Irradiation Room



CHARM irradiation zone



Testing procedure

On 18/3/2024, starting 13h30:

T8 beam extracted with nominal intensity ($8E11$) and slow extraction

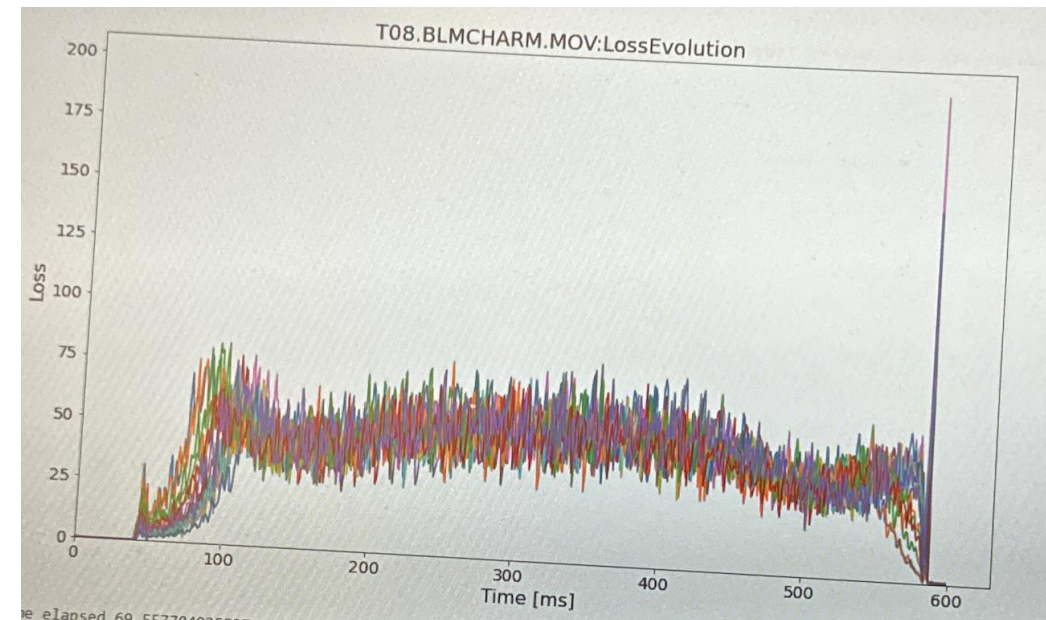
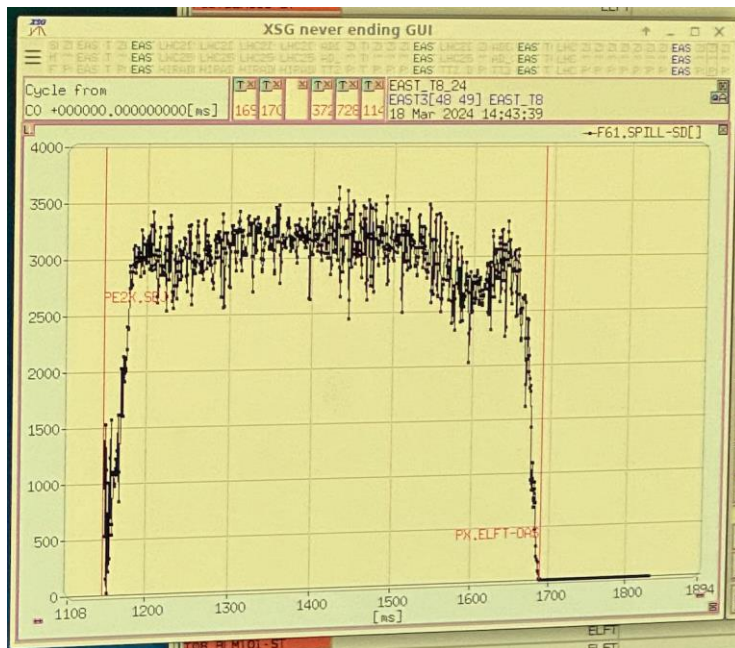
- Marc in CCC changed beam extraction parameters, monitoring the extracted beam by the scintillator placed along the line
- Salvatore and Roberta monitored the effect on the secondary field emitted by the CHARM target, by the BLMs located on top and on the side of the target
- BLM were seeing a ~orthogonal-to-the-beam radiation, on top of the target, plus a BLM at beam height on the left of the beam line, downstream the target

Spill shape change

- Change of beam shape at extraction
- → we see the enhanced head or tail of the time profile on the CHARM BLMs

Spill “overflow”

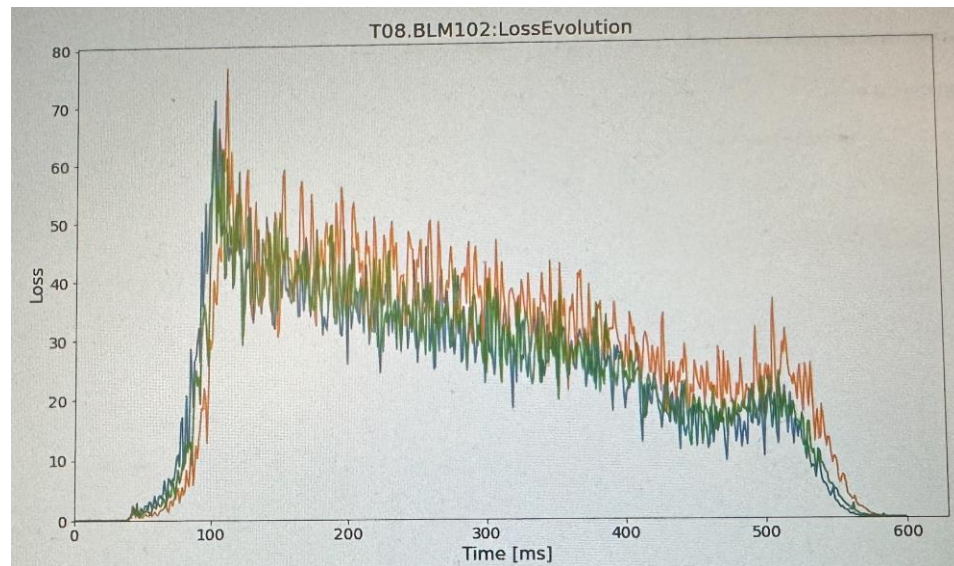
- T8 line activation (kickers and magnets) lasts 540 ms
- If the spill extraction is not centered in this window, head and/or tail are mis-steered
- Extraction shift was intentionally provoked
- We saw spikes in the radiated field by the target



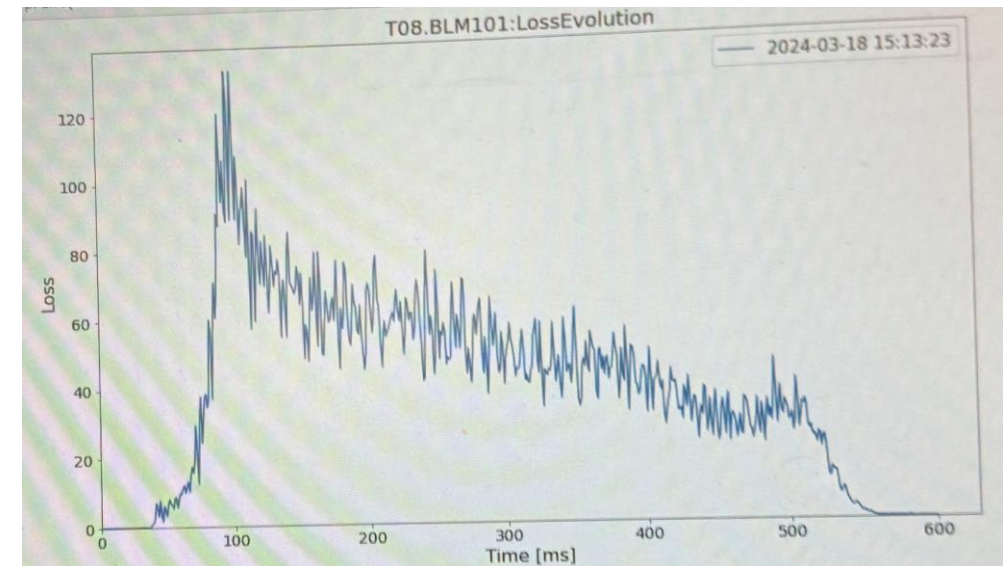
Steering out of CHARM target

Spill was intentionally steered steadily out of target in horizontal plane

- 40 mm sx



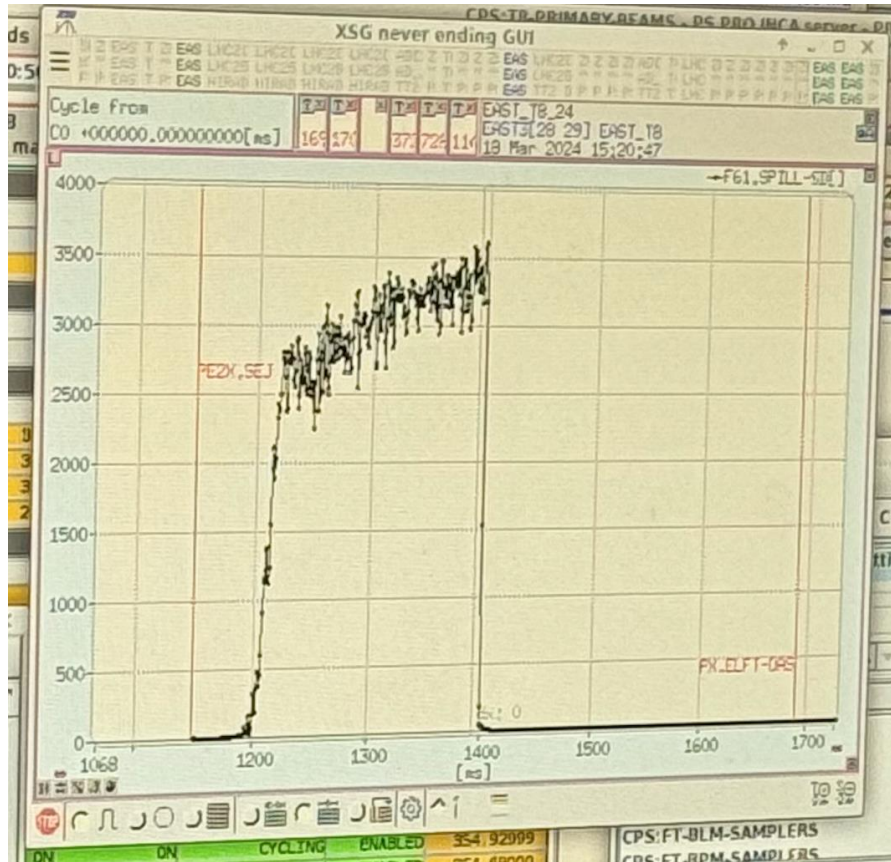
- 20 mm dx



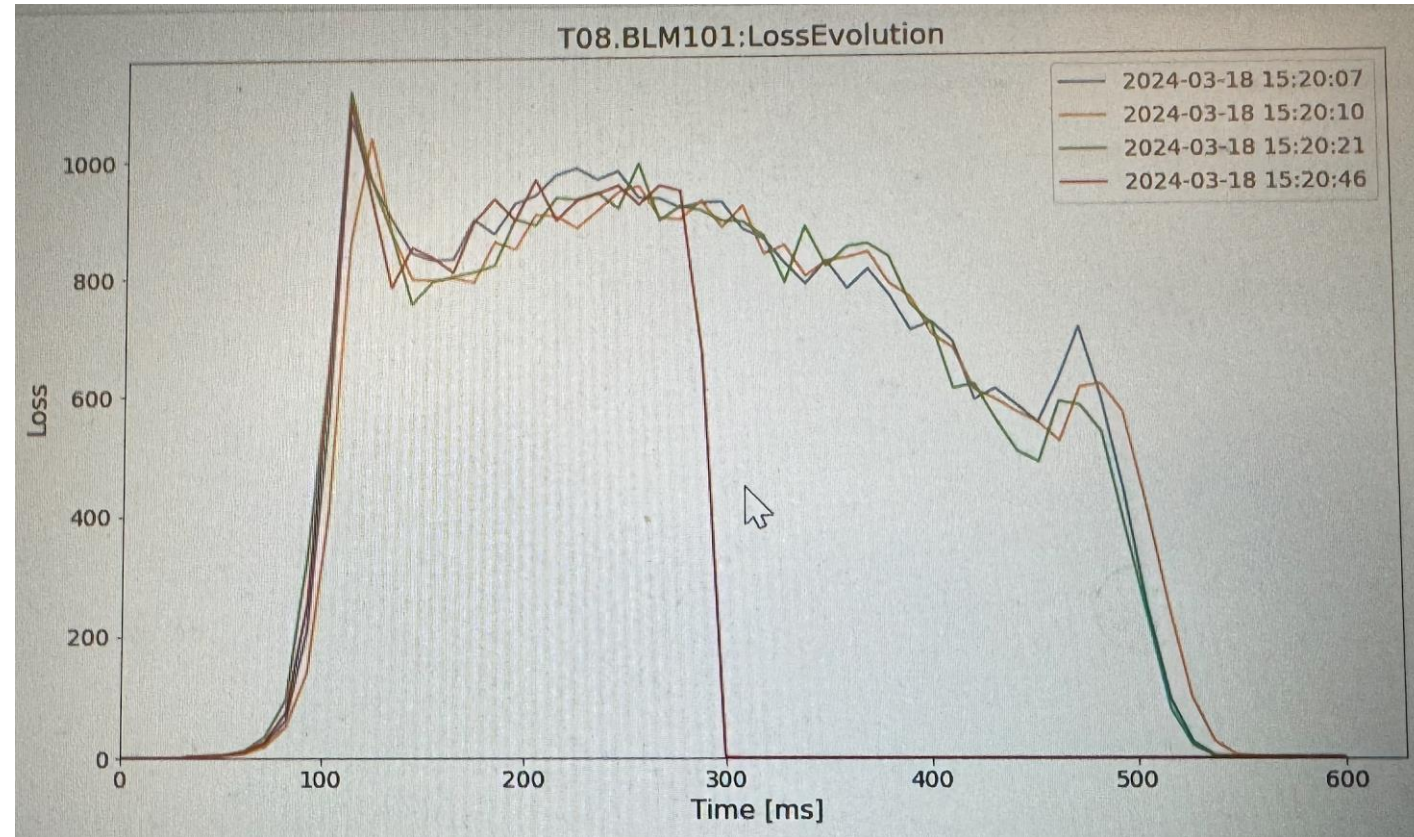
- Effect is not clear, a distorted time profile is present but similar in two cases
- Hp: intrinsic momentum spread plus displacement may cause dynamic effect due to parasitic dipole effect of quads

Spill shortening

- Spill cut with internal dumps

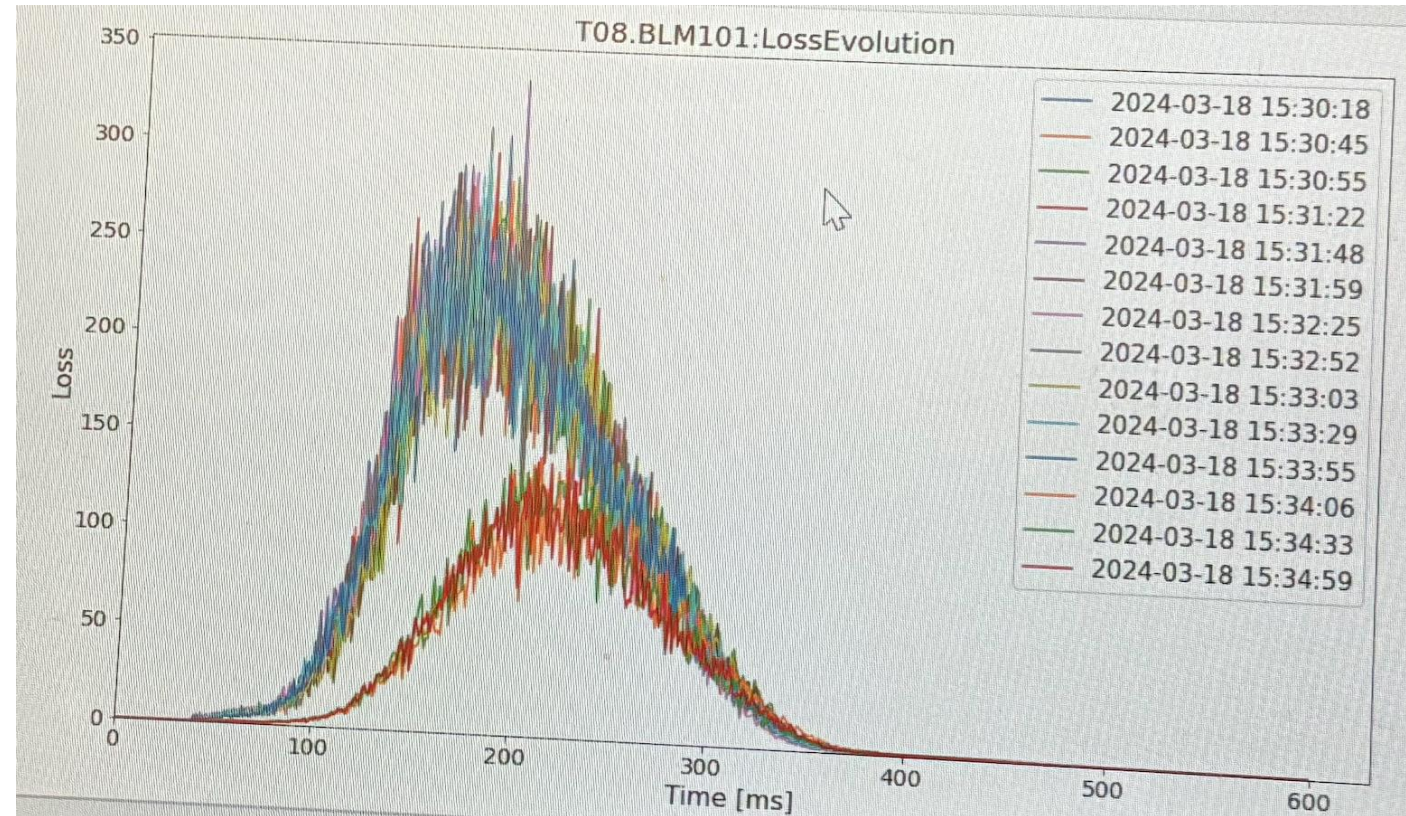
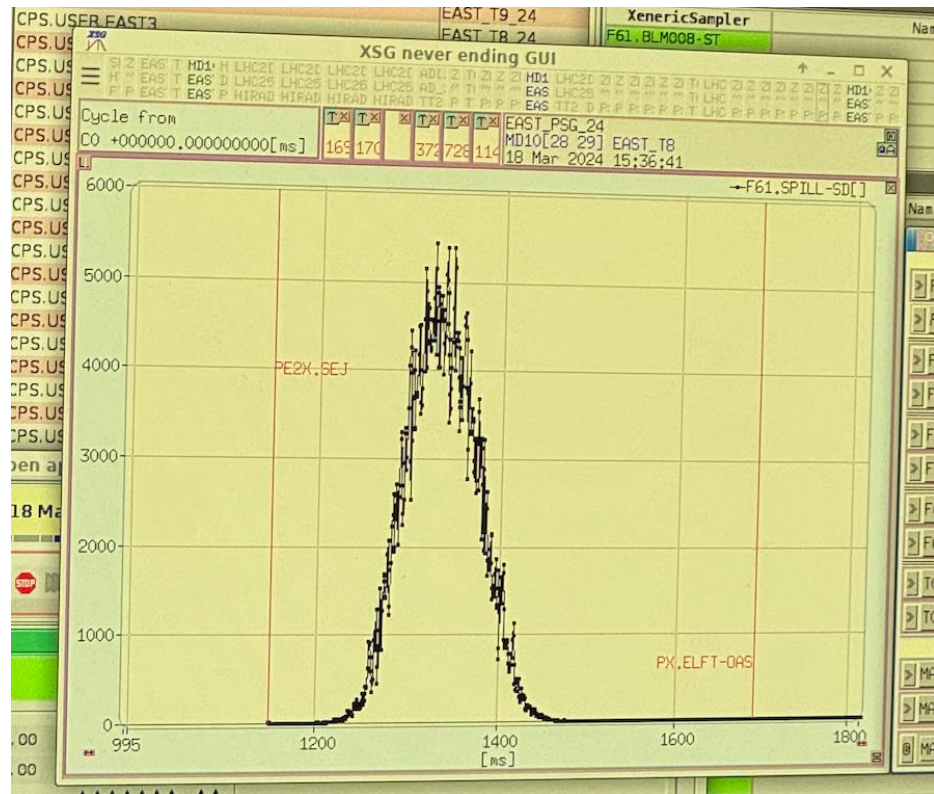


Reproduced in CHARM field



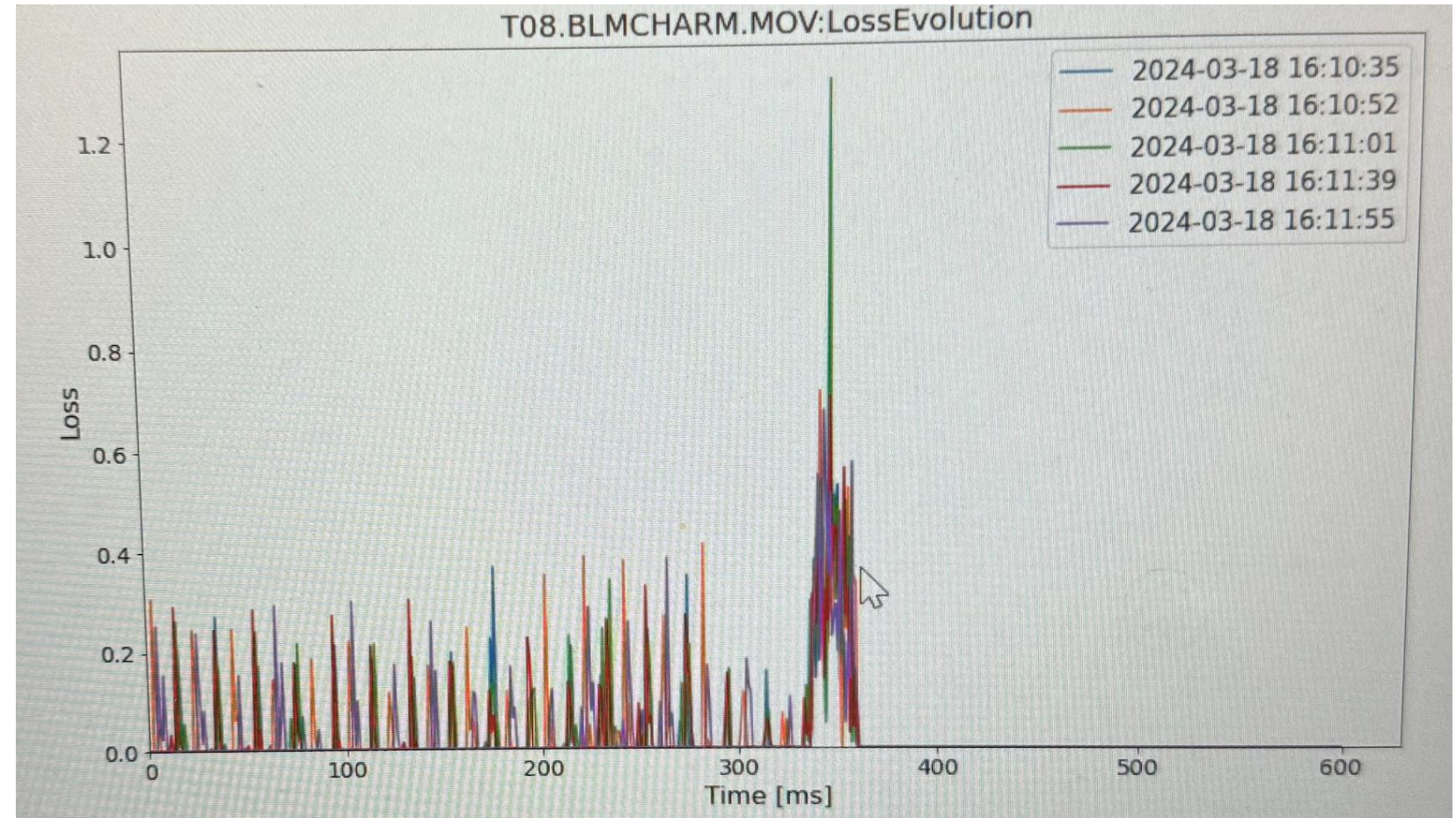
Short gaussian spill

- Extracted and reproduced in CHARM field



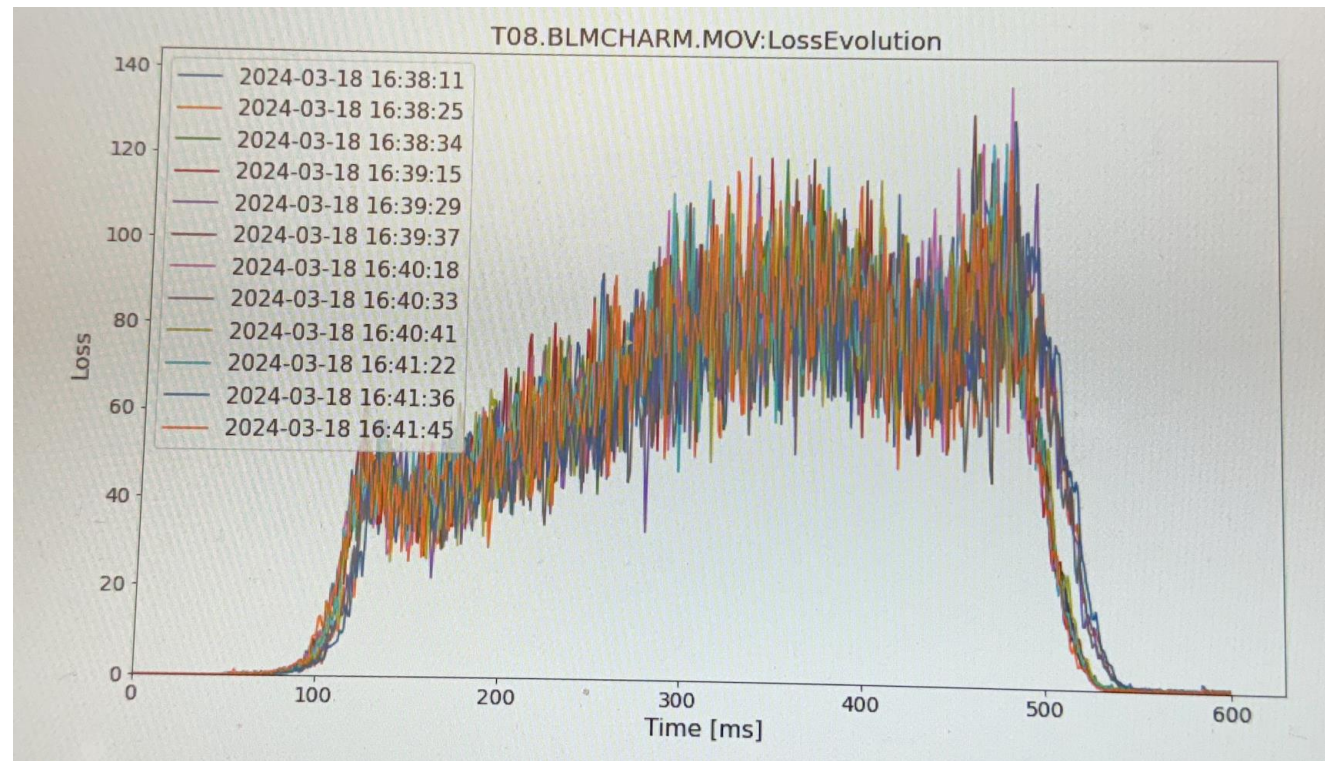
Fast extraction

- Extracted as fast, seen in CHARM as single peak anticipated by smaller ones. BLM resolution does not allow for such time resolution



Spill steering during extraction

- A sweep along X horizontal axis has been attempted (exploiting momentum spread plus a dipole sweep)
- Effect in CHARM is unclear, we see deformation but difficult to connect to a position sweep



First conclusions

- If the spill has non-geometric variations, that induce displacement on CHARM target due to e.g. beam momentum spread and parasitic dipole effect in quads, this is not seen at extraction but seen in CHARM
- If the spill has time profile properties at extraction, these are seen both at extraction and in CHARM
- Steering on CHARM target, either static or dynamic during extraction, is seen as deformation in CHARM but not directly reconducible to specific direction

Next actions

By exploiting the results we got, repeat the exercise done in March with:

- More detailed plan of beam variations,
- Acquisition of relevant beam setting parameters
- Acquisition of relevant BLM spectra
- Acquisition with new fast BPM in IRRAD to follow sweeps and record beam spot

Thank you for your
attention!



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