

MD 2186: New Method to Measure Margins between IP6 Absorbers and TCTs/Triplets

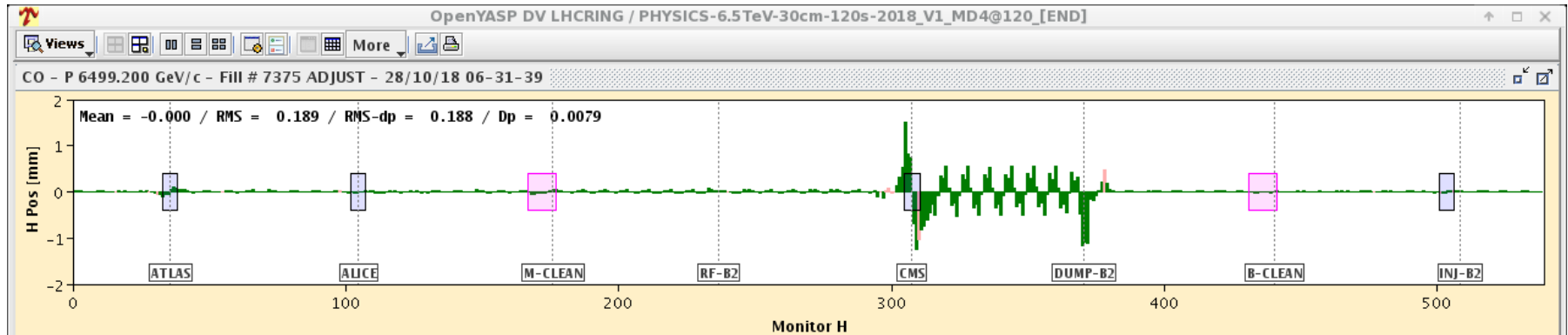
R. Bruce, James Molson, Yuancun Nie, Matthieu Valette, [Christoph Wiesner](#), Daniel Wollmann

Introduction

- Goal:
 - Beam-based measurement of aperture margin between TCDQ (IR6) and TCTs in IP5 to validate protection in case of an asynch. dump (Beam 2).
- Method:
 - Simulate asynchronous MKD kick with a closed corrector bump between IR6 and IP5
 - Blow-up the beam to define aperture at TCDQ
 - For a given TCDQ position: move TCTPH (IP5) in until beam losses are observed to measure aperture at TCT
- MD performed on 28.10.2018

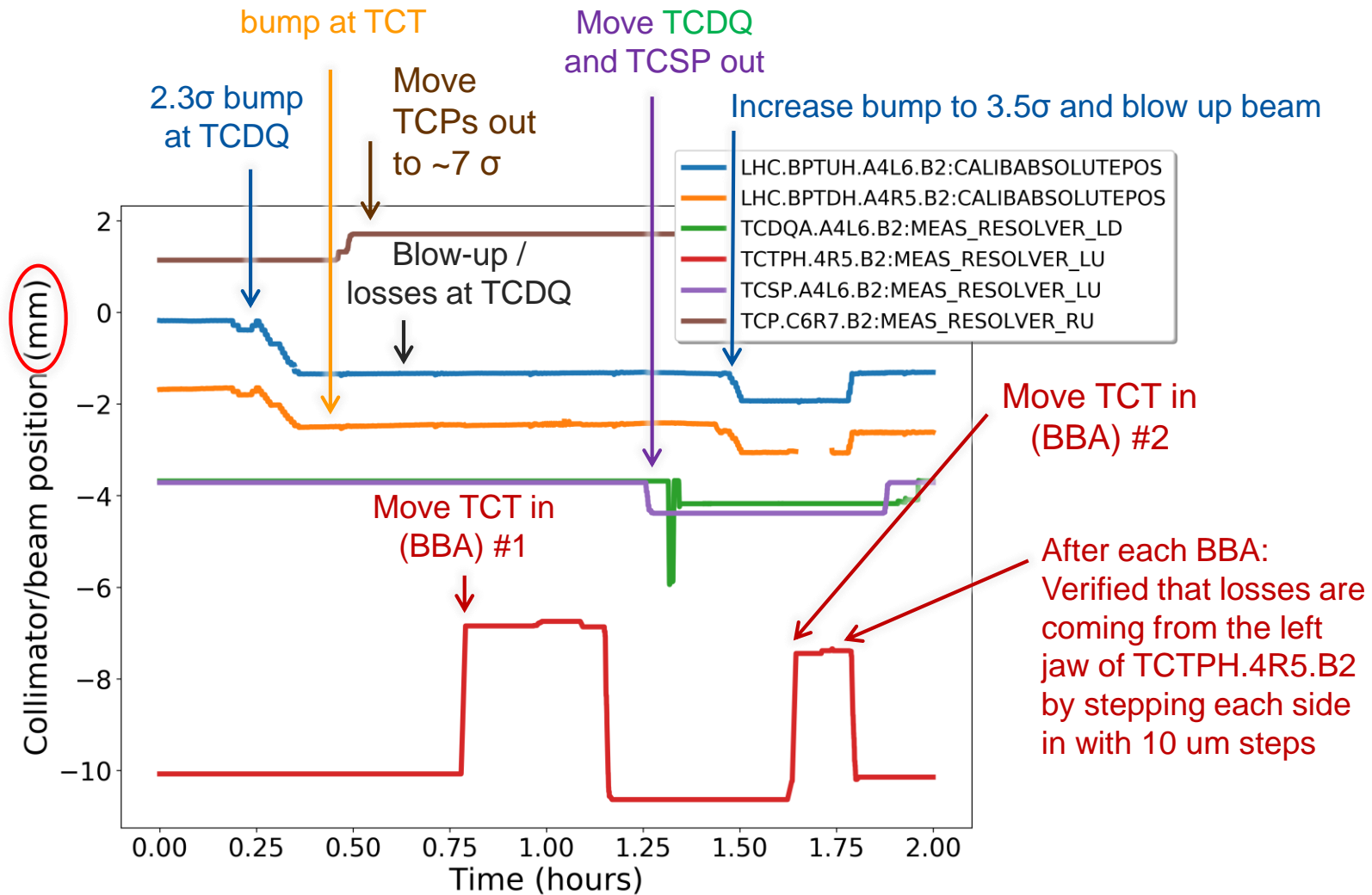
Main MD Parameters

- **3 pilots** ($\sim 1e10$ p+), distributed in buckets 1, 8911, 17851
- Only **Beam 2**
- 6.5 TeV, **collision**, 30 cm, 160 μ rad
- Orbit **bumps of $\sim 2.3\sigma$ and $\sim 3.5\sigma$** from IR6 to IP5

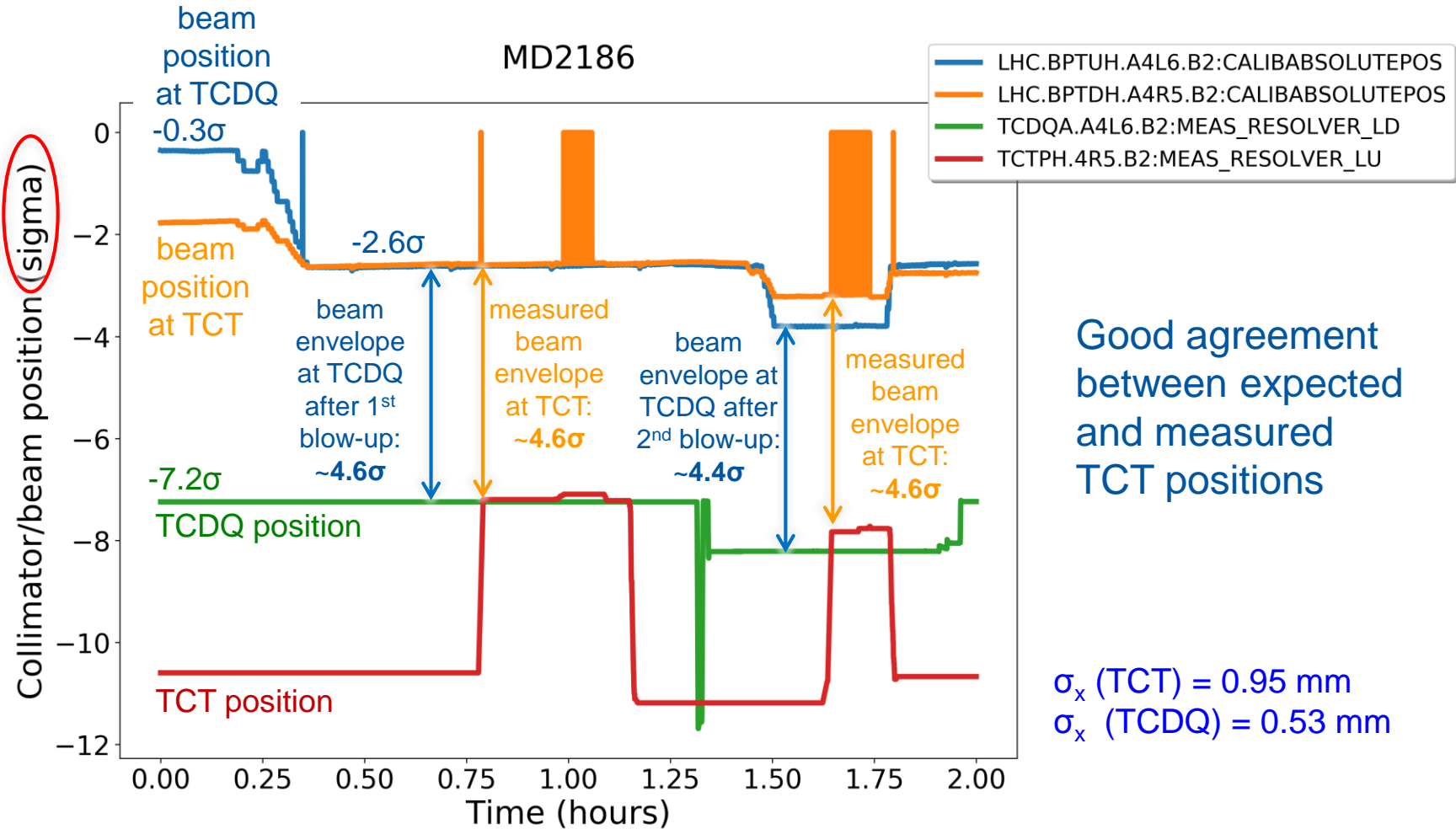


Measured bump of 2.3 sigma from IR6 to IP5

MD Overview



MD Results



MD Results

Bump	Nominal	2.3 sigma	3.5 sigma
Measured position TCTPH.4R5* (mm)	10.05 mm	6.84 mm	7.45 mm
Measured position TCTPH.4R5* (σ)	10.57 σ	7.19 σ	7.83 σ
Expected position where left jaw of TCTPH.4R5 should hit the beam**	–	7.20 σ	7.63 σ
Difference measured – expected position (σ)		-0.01 σ	+0.20 σ

*TCTPH.4R5.B2:MEAS_RESOLVER_LU

Detailed study, including estimation of errors/uncertainties, ongoing.

**Values used for calculation:

- TCTPH.4R5: $\beta_x = 1791$ m
- TCTPH.4R5: $\sigma_x = 0.95$ mm
- TCSP.A4L6 : $\beta_x = 546$ m
- TCSP.A4L6 : $\sigma_x = 0.53$ mm

Conclusions and Remarks

- New method to measure margins between IR6 absorbers and TCTs in IP5 tested and successfully validated
- Good agreement between expected and measured values observed
- Extend method to B1?
- Bonus: Beam dumped by blow-up in nominal collimator settings → Secondary losses in IP5, which can be further analyzed.

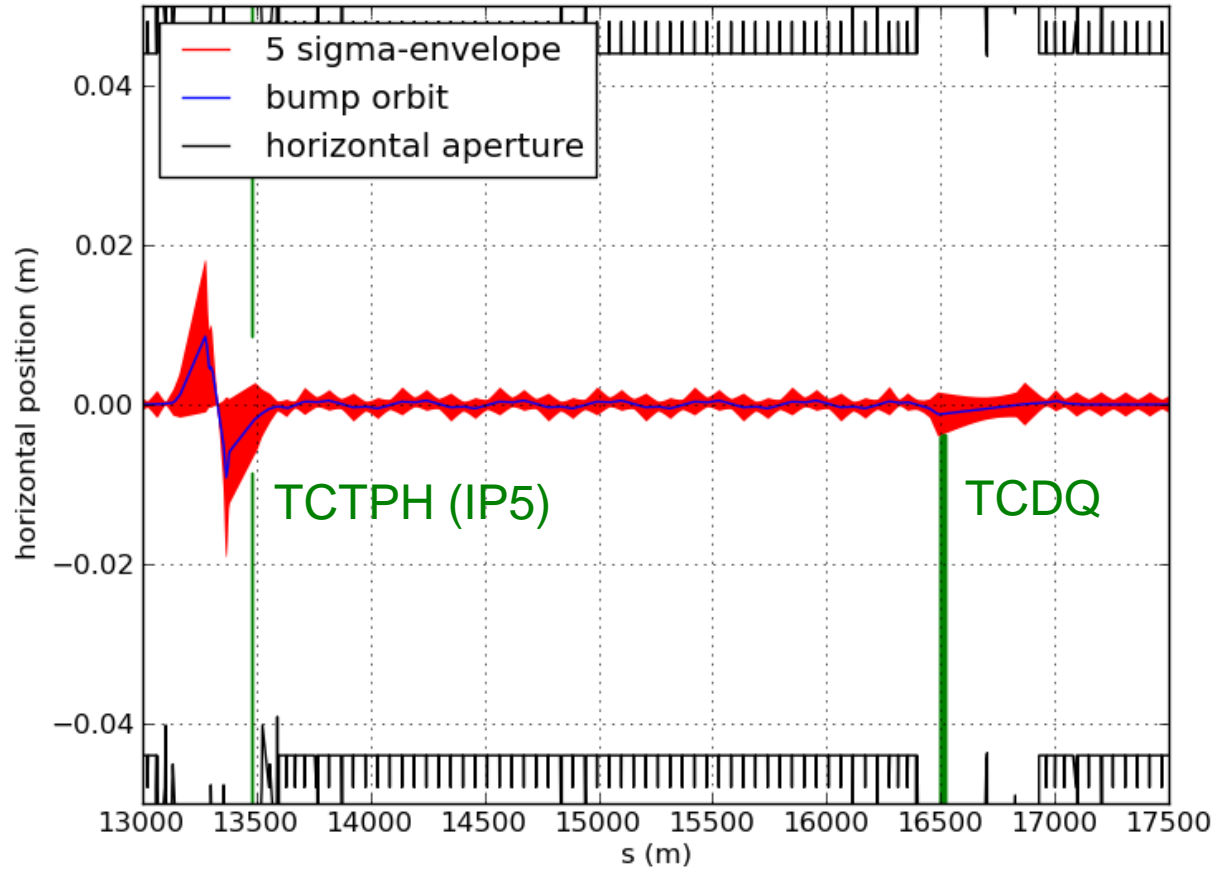
Thanks a lot to OP and COLL for the support!



Thank you for your attention!

Orbit bump

Calculated 2σ bump (Beam 2)



M. Valette