

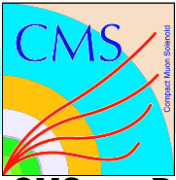


# Latest CSC system performance: spatial resolution & local efficiency with 2017 data

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Stephen Trembath-Reicher (Univ. of Wisconsin Madison)

CSC General Meeting - Dec CMS Week  
December 5, 2017



# CMS Runs p-p collisions 2017F

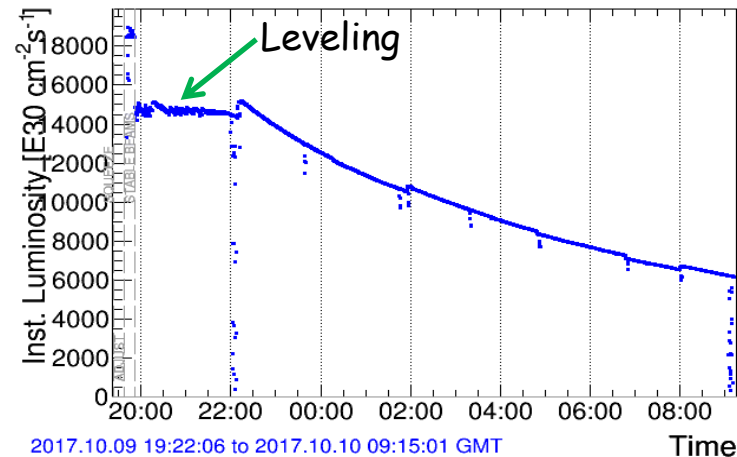


V.Perelygin

## CMS p-p Runs Before MD4 leveling fills Oct – Nov, 2017 (2017F dataset)

1868b $\beta^*=0.3m, <n> = 59, L_{level} \sim 1.5 \times 10^{34} \text{cm}^{-2}\text{sec}^{-1}$				Fill 6358			
<u>Fill 6298</u>	305059	2017.10.14 11:20 - 15:03	158pb-1 976.5mbar	<u>306091</u>	2017.11.02 15:59 - 20:00	205pb-1	967mbar
<u>Fill 6300</u>	305081	2017.10.15 08:45 - 15:58	315pb-1 976.5mbar	<u>306092</u>	2017.11.02 20:03 - 02:23	221pb-1	967mbar
<u>Fill 6303</u>	305112	2017.10.15 22:40 - 08:31	402pb-1 976mbar	<u>Fill 6360</u>	306125 2017.11.03 14:45 - 10:12	567pb-1	963+/-
<u>Fill 6305</u>	305202	2017.10.17 07:49 - 12:30	209pb-1 973.5mbar			0.5mbar	
<u>Fill 6306</u>	305207	2017.10.17 23:13 - 06:12	318pb-1 968mbar	<u>Fill 6362</u>			
<u>Fill 6307</u>	305237	2017.10.18 11:41 - 19:14	338pb-1 964mbar	306135	2017.11.04 17:50 - 01:24	345pb-1	960mbar
<u>Fill 6308</u>	305247	2017.10.18 23:35 - 02:24	123pb-1 964mbar	306138	2017.11.05 01:31 - 09:56	213pb-1	958.5+/-
<u>Fill 6311</u>	305310	2017.10.19 20:04 - 23:00	130pb-1 963mbar			1mbar	
<u>Fill 6312</u>	305336	2017.10.20 11:56 - 13:30	66pb-1 967mbar	306139	2017.11.05 10:17 - 17:32	103pb-1	962.5mbar
<u>Fill 6314</u>	305365	2017.10.21 06:20 - 11:44	250pb-1 968mbar	<u>Fill 6364</u>			
<u>Fill 6315</u>	305377	2017.10.22 01:06 - 11:04	400pb-1 970.5mbar	306154	2017.11.06 03:09 - 11:08	339pb-1	964mbar
<u>Fill 6317</u>	305406	2017.10.22 21:44 - 07:21	321pb-1 972mbar	306155	2017.11.06 11:11 - 20:31	220pb-1	964.5mbar
<u>Fill 6318</u>	305440	2017.10.23 10:42 - 12:33	83pb-1 973.5mbar	<u>Fill 6371</u>			
<u>Fill 6323</u>	305516	2017.10.23 23:24 - 03:32	180pb-1 974.5mbar	306456	2017.11.09 14:57 - 20:02	237pb-1	971.5mbar
<u>Fill 6324</u>	305586	2017.10.24 17:25 - 21:33	187pb-1 974mbar	306459	2017.11.09 21:59 - 12:43	309pb-1	972.5mbar
<u>Fill 6325</u>	305636	2017.10.25 13:03 - 04:37	528pb-1 974.5+/-1mbar				
<u>Fill 6337</u>	305766	2017.10.27 04:15 - 10:11	265pb-1 973.5mbar				
<u>Fill 6343</u>	305814	2017.10.28 05:43 - 18:12	449pb-1 975+/-2mbar				
<u>Fill 6344</u>	305821	2017.10.28 20:06 - 01:37	241pb-1 972.5mbar				
<u>Fill 6346</u>	305832	2017.10.29 10:48 - 13:03	58pb-1 969mbar				
<u>Fill 6347</u>	305862	2017.10.30 10:56 - 15:35	202pb-1 969.5mbar				
<u>Fill 6348</u>	305898	2017.10.30 19:54 - 01:00	230pb-1 973mbar				
<u>Fill 6349</u>	305902	2017.10.31 04:06 - 07:33	155pb-1 973.5mbar				

CMS: Fill 6287 Instantaneous Luminosity ■ CMS Online Lumi





# CSC Spatial Resolution: selection



**Select good quality segment/muon track for spatial resolution measurement:**

- segments matched to global muons with  $P > 10$  GeV
- 6 hits on a track segment
- Track-segment  $\chi^2$  (2D) criteria
- Cut on large angles  $dx/dz$  (local coordinates):
  - $| dx/dz | < 0.25$  for ME11
  - $| dx/dz | < 0.2$  for all other stations
- Track-segment  $\chi^2$  (strips) criteria
- Sum of charges for 3 strips and 3 time slices:
  - $150 < Q_{3 \times 3} < 4000$  ADCs for ME1/1 station
  - $150 < Q_{3 \times 3} < 2000$  ADCs for all other stations

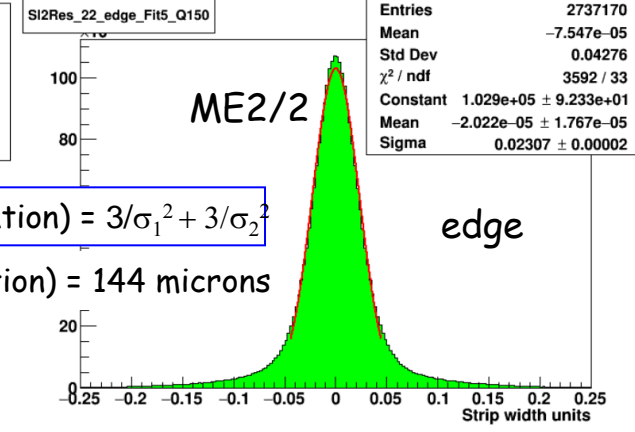
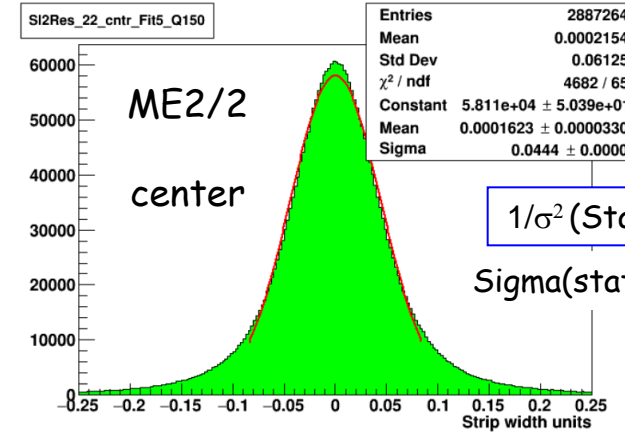
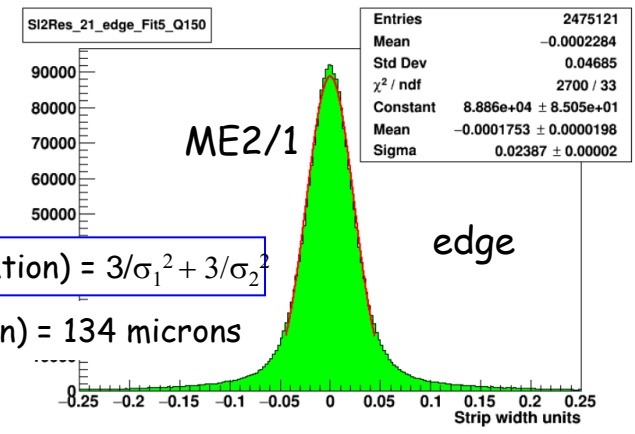
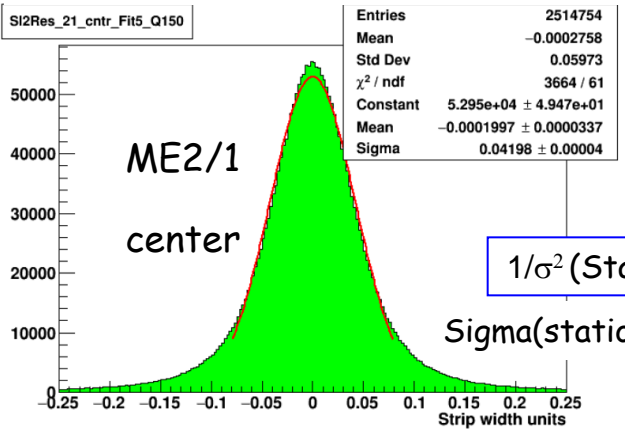
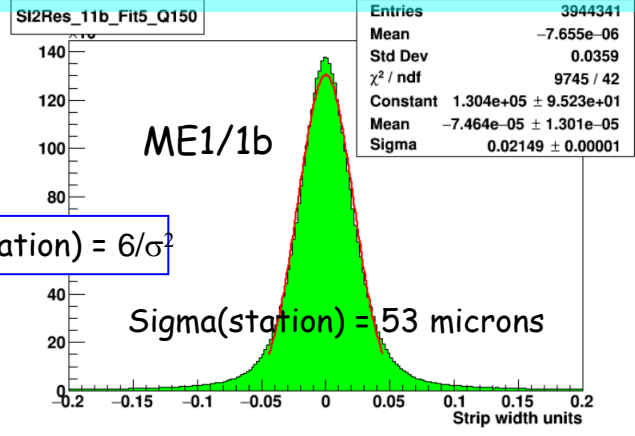
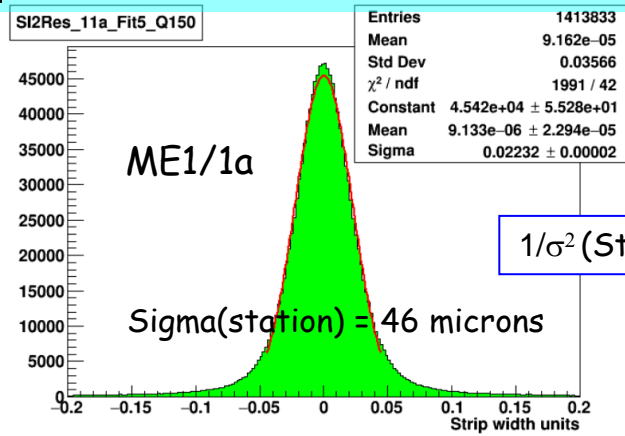
**Resolution is normalized to atm. pressure 965 mbar**

Software: CMSSW\_9\_2\_X

Datasets: /SingleMuon/Run2017\*-ZMu-PromptReco-v\*/RAW-RECO



# Spatial Resolution: results with 2017F collision data

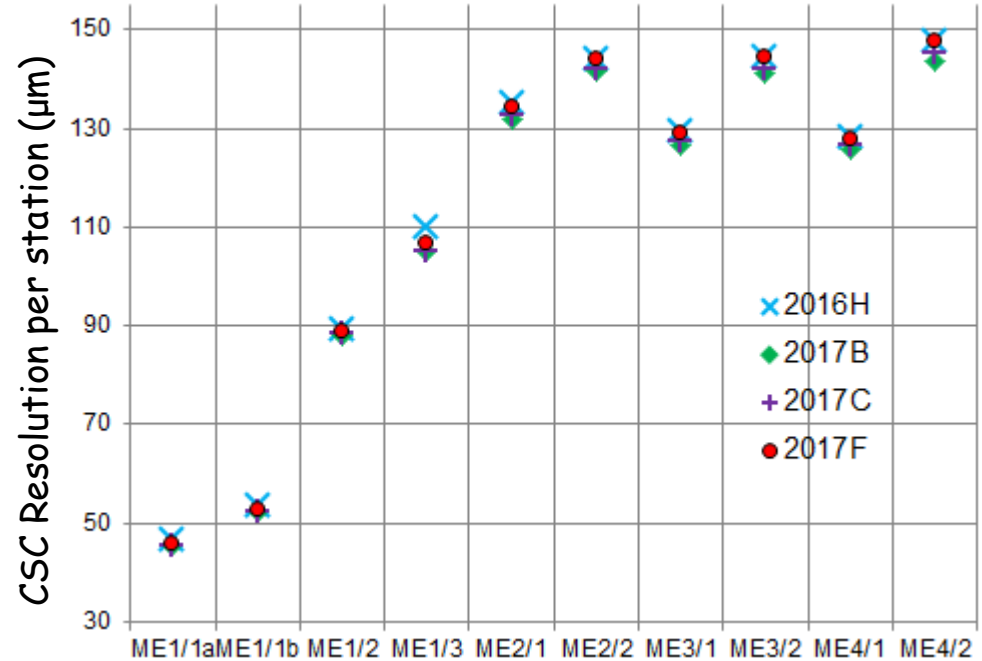


## Spatial resolution per station ( $\mu\text{m}$ ):

Station	Collision ZMu datasets			
	Run2			
	2016H Sep-Oct'16	2017B June'17	2017C Aug'17	2017F Oct-Nov'17
PeakLumi (e34Hz/cm2)	1.3 - 1.5	1.2 - 1.4	1.5 - 1.7	1.5
Statistics (1/fb)	4	2	2	2
<b>ME1/1a</b>	47	45	46	46
<b>ME1/1b</b>	53	52	52	53
<b>ME1/2</b>	89	88	88	89
<b>ME1/3</b>	110	105	105	107
<b>ME2/1</b>	135	132	133	134
<b>ME2/2</b>	144	141	142	144
<b>ME3/1</b>	129	126	127	129
<b>ME3/2</b>	144	141	142	144
<b>ME4/1</b>	128	126	126	128
<b>ME4/2</b>	148	144	145	148



SegRU re-reco 2016 data



Values are normalized to atm.pressure 965 mbar

Results 2016/2017 are in good agreement



# Spatial Resolution Conclusion



- 2017 resolution results are stable for different data taking periods and are in good agreement with the previous year.

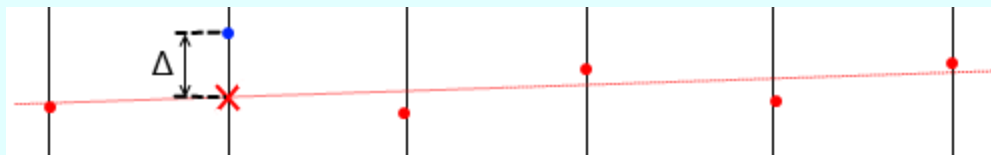


## Backup Slides



## Spatial resolution calculation:

- Only 6 -point segments are considered;
- For each layer with hit a straight line fit is applied excluding the current layer and the residual ( $\Delta$ ) between the measured strip coordinate and the predicted track coordinate from fit is used for resolution calculation.



- - hit used for fit
- - hit excluded from fit
- - predicted track coordinate