



CSC spatial resolution with GIF++ testbeam data (update)

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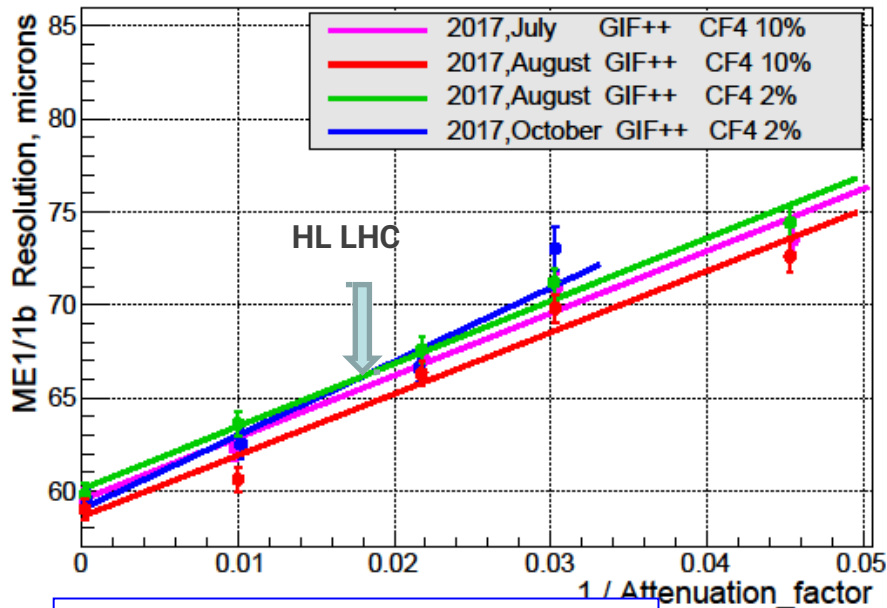
Victor Perelygin (Dubna-JINR)

GIF++ CSC working meeting

June 12, 2018

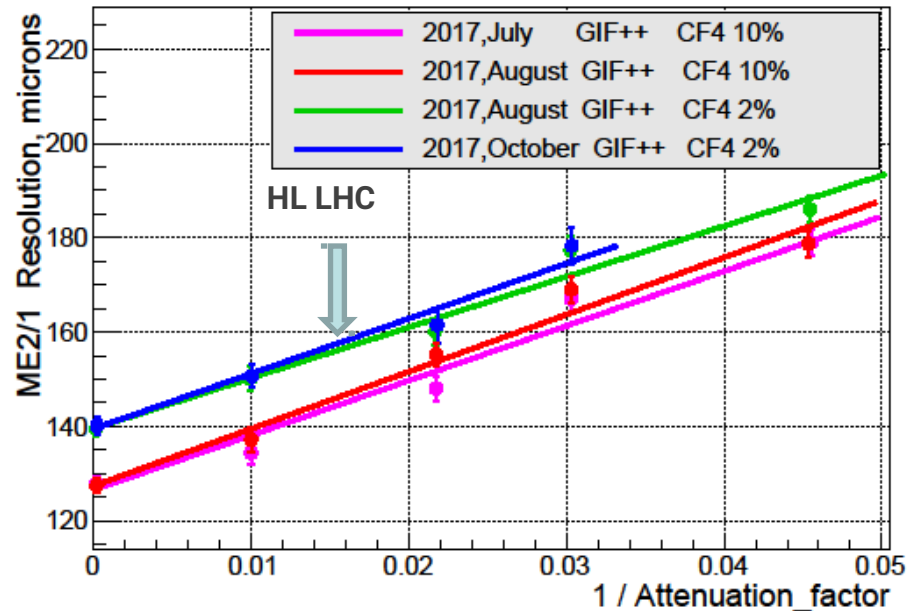
Resolution vs inversed Attenuation factor

ME1/1



$$1/\sigma^2 (\text{Station}) = 6/\sigma^2(\text{layer})$$

ME2/1



$$1/\sigma^2 (\text{Station}) = 3/\sigma_1^2 + 3/\sigma_2^2$$

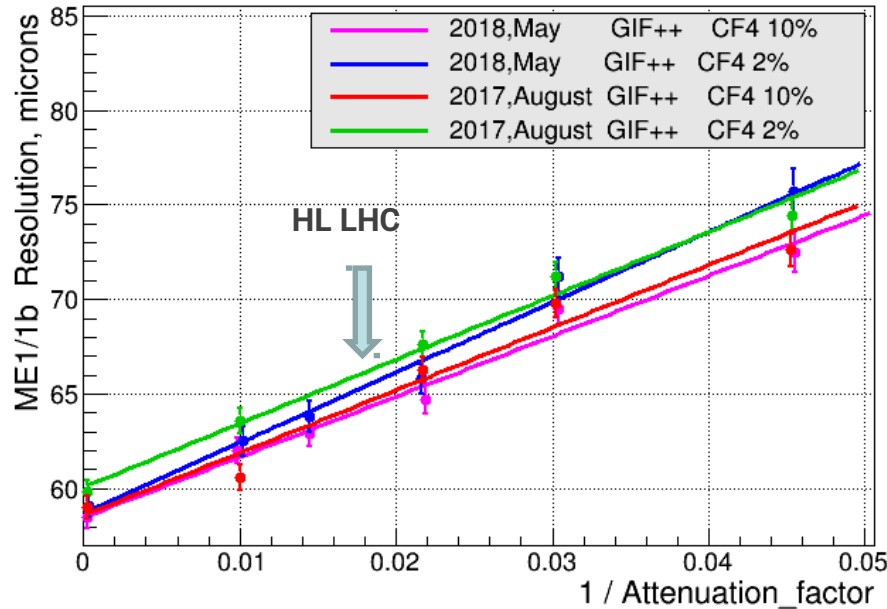
Small difference more visible for the ME2/1 case:

The analysis is updated with 2018 data and better selection for ME2/1 (to different occupy distributions for different testbeams)

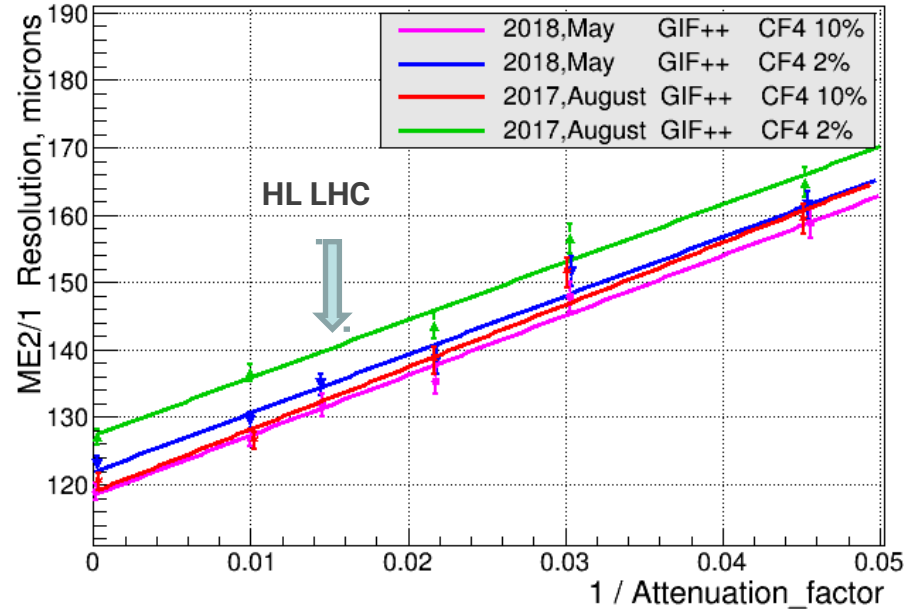
Updated comparison 2% vs 10% CF4

Resolution vs inversed Attenuation factor

ME1/1



ME2/1



$$1/\sigma^2 (\text{Station}) = 6/\sigma^2(\text{layer})$$

$$1/\sigma^2 (\text{Station}) = 3/\sigma_1^2 + 3/\sigma_2^2$$

ME2/1: the discrepancy is smaller for 2018 data, some small deviations comparable with errors are still there for both chambers

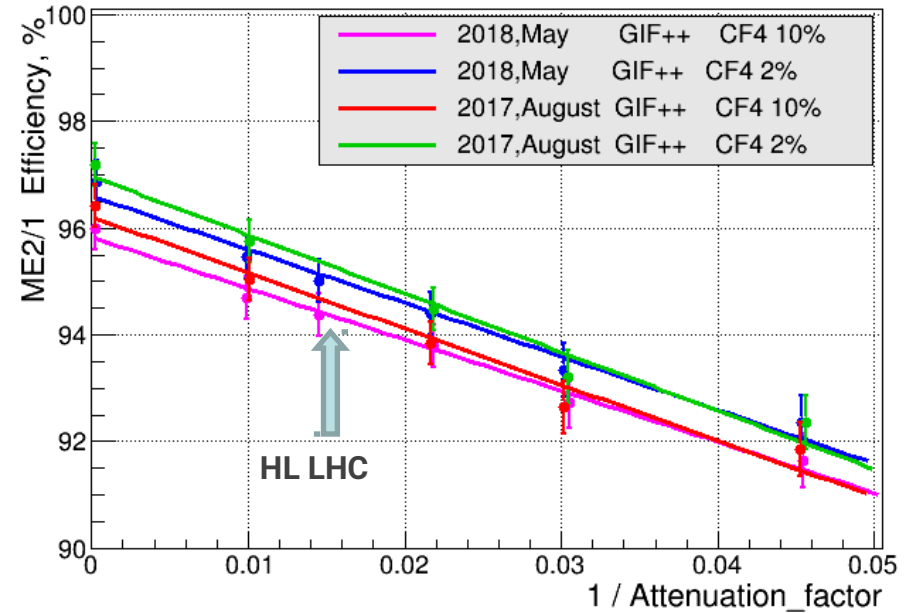
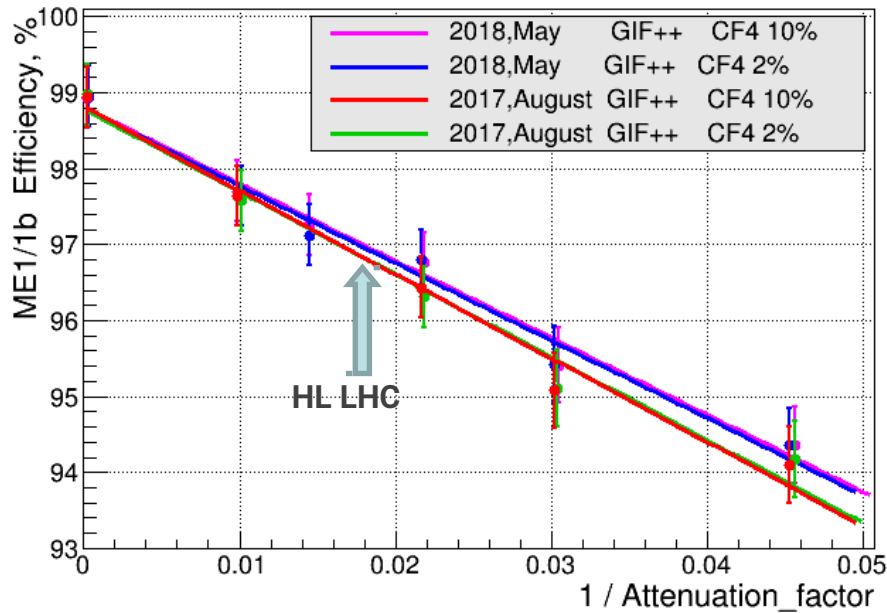
Updated comparison 2% vs 10% CF4

RecHit Efficiency vs inversed Attenuation

ME1/1

factor

ME2/1

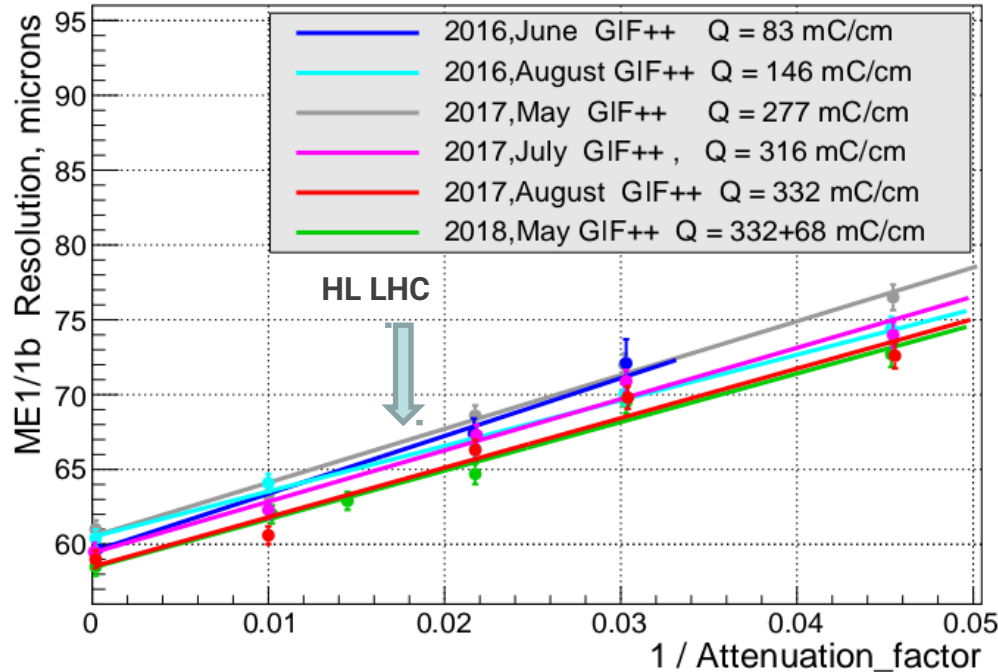


Slight systematical difference for ME2/1, within errors

ME1/1 vs accumulated charge with 10% CF4



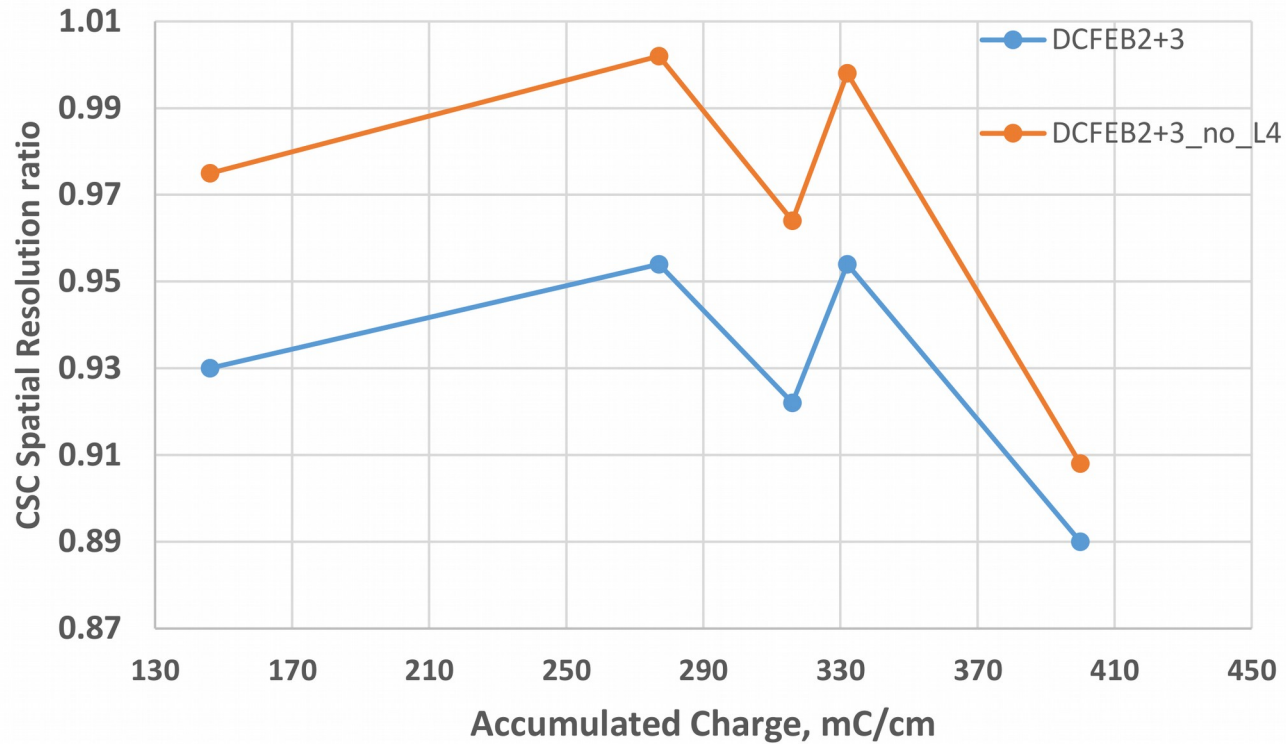
Resolution vs inversed Attenuation factor



Victor's guess: the total resolution is a composition of LL1,6 and LL2-5. The idea is to look at the ratio of the corresponding averaged layer resolutions.

- Influence of the replacement of DCFEB#2 before the May18 TB was studied – no systematic difference wrt permanent DCFEB#3
- Larger resolution for L4 was observed – to be studied (possibly a geometry effect)
- The ratio $\langle \sigma_{1,6} \rangle / \langle \sigma_{2-5} \rangle$ was checked
- The error on the ratio was estimated as 2.2% from $\text{error}(\text{station_resolution}) \sim 0.5 \text{ um}$

10%CF4 $\langle\sigma\rangle(L1,6)/\langle\sigma(L_irrad)$ vs Charge



The tendency to be confirmed with August-18 data

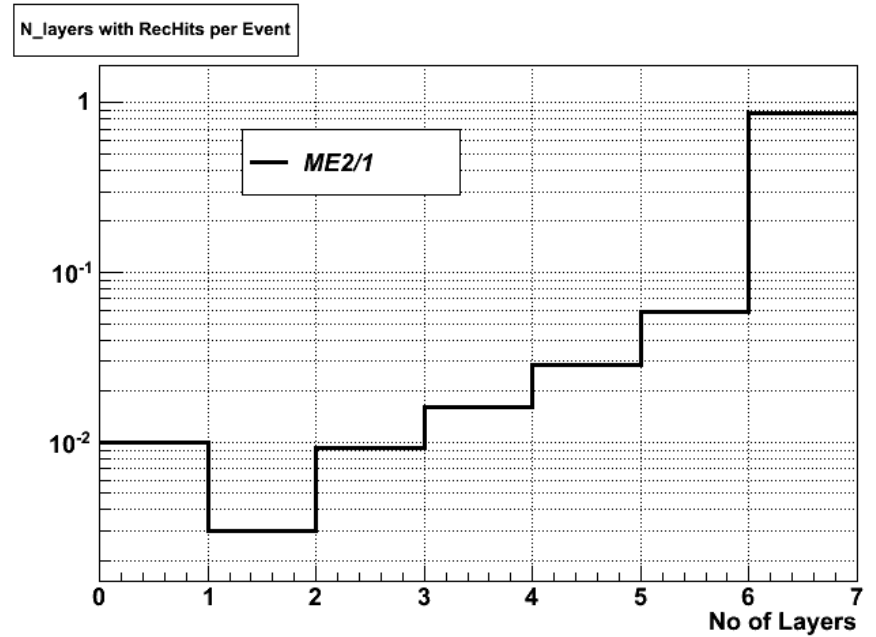
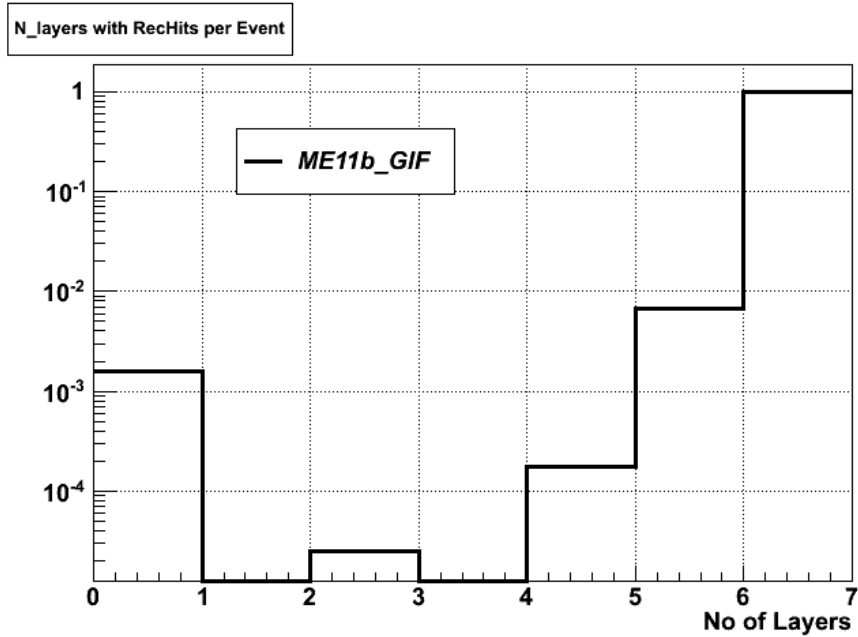
- The difference in resolution and RecHit efficiency for 2% and 10% CF₄ is still there, but at the level comparable to errors.
- ME1/1 station resolution does not change with the accumulated charge.
- More detailed studies of averaged layer resolution for LL1,6 and LL2-5 show a tendency to resolution degradation for LL2-5, which should be confirmed with Aug18 data.

Back up

Number of layers with RecHit per event



Aug17, 10%CF4, Source OFF



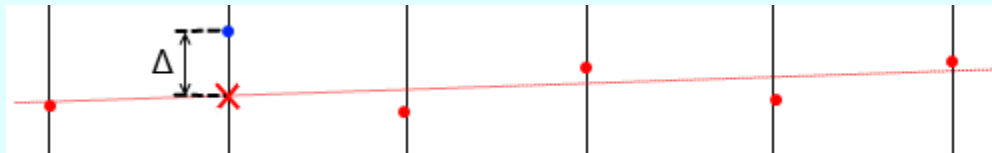
GIF++ Test Beams 1,3 and 4. Filter scans: Pressure and Current in CSCs

Att. Factor	TB-1 May-2017			TB-3 August-2017			TB-4 October-2017		
	Pmbar	$\langle I_{ME1/1} \rangle \mu\text{A}$	$\langle I_{ME2/1} \rangle \mu\text{A}$	Pmbar	$\langle I_{ME1/1} \rangle \mu\text{A}$	$\langle I_{ME2/1} \rangle \mu\text{A}$	Pmbar	$\langle I_{ME1/1} \rangle \mu\text{A}$	$\langle I_{ME2/1} \rangle \mu\text{A}$
460*							968	1.5	0.85
220*							968	2.9	1.6
100*	951	6.5	4.1	962	5.6	3.1	966	5.6	3.1
69*	950	9.2	5.6	962	8.7	5.2			
46*	949	11.6	7.0	962	11.0	6.5	968	11.0	6.3
33*	950	18.0	10.8	962	17.1	9.5	968	16.9	9.6
22*	951	23.3	14.1	962	21.6	12.4			
15*	951		21.8						

Spatial Resolution & Efficiency

Spatial resolution calculation:

- Only 6 & 5-point segments are considered;
- For each layer with hit a straight line fit is applied excluding the current layer and the residual (Δ) 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