BiBi Collisions at 9.2 GeV

I. Maldonado

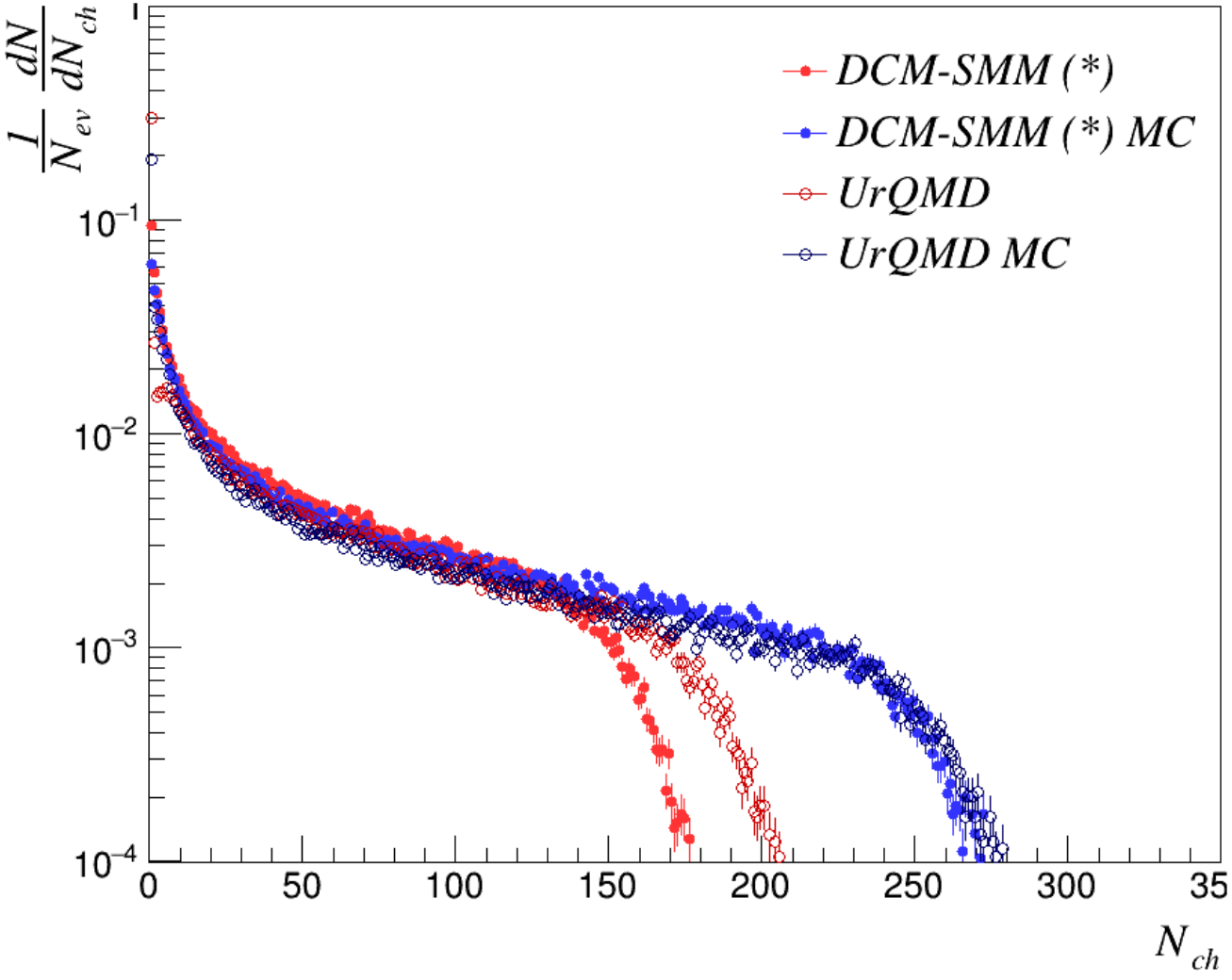
Advances

- MC production
- Multiplicity Results
- Centrality classes
- Summary

MC production

- **Analysis with mpddst.root files**
- **BiBi at 9.2 GeV**
- **Events analyzed ~ 100000 events**
  - **UrQMD:** /eos/nica/mpd/sim/data/exp/dst-BiBi-09.2GeV-mp06-21-500ev/BiBi/09.2GeV-mb/UrQMD/BiBi-09.2GeV-mp06-21-500ev/urqmd-BiBi-09.2GeV-mb-eos0-500-15.reco.root
  - **DCMSMM**: Local Transport and Reconstruction with pz of particles measured at CM system, which corrects shift in rapidity

Multiplicity distribution



- **MC → MCTracks with**
  - p_T>0.15 GeV/c
  - |η|<0.5
  - Primary π^+, π^-, K^+, K^-, p and p^-
- **Reconstructed Tracks**
- p_T > 0.15 GeV/c
- |η| <0.5
- N_{hits} > 16
- DCA < 0.5 cm

Multiplicity distribution

From previous slide:

- **MCTracks distribution is similar for both generators distributions in Blue**
- **MpdGlobalTracks, multiplicity with DCM-SMM is smaller than UrQMD distribution.**

Results of Centrality with Centrality Framework

- **DCM SMM**

Centrality, %	N_{ch}^{min}	N_{ch}^{max}	$\langle b \rangle$, fm	RMS	b_{min}, fm	b_{max}, fm	$\langle N_{part} \rangle$	RMS	N_{part}^{min}	N_{part}^{max}	$\langle N_{coll} \rangle$	RMS	N_{coll}^{min}	N_{coll}^{max}
0 - 10	111	195	2.94	1.13	1.44	4.16	341.19	34.90	298.46	389.82	776.91	103.39	652.86	923.71
10 - 20	80	111	5.16	0.80	4.16	6.00	260.98	32.53	227.21	298.46	547.98	85.30	457.87	652.86
20 - 30	57	80	6.72	0.69	6.00	7.38	197.29	27.63	171.22	227.21	381.33	67.39	316.50	457.87
30 - 40	40	57	7.97	0.64	7.38	8.53	147.64	23.48	126.73	171.22	260.50	53.17	213.17	316.50
40 - 50	27	40	9.05	0.63	8.53	9.56	108.17	20.19	91.02	126.73	172.79	41.87	137.53	213.17
50 - 60	17	27	10.06	0.64	9.56	10.53	75.77	17.03	62.23	91.02	107.84	31.80	83.06	137.53
60 - 70	10	17	11.00	0.67	10.53	11.47	50.03	14.08	39.35	62.23	62.36	23.09	45.59	83.06
70 - 80	5	10	11.95	0.75	11.47	12.43	30.02	11.33	22.02	39.35	32.26	15.78	21.94	45.59
80 - 90	2	5	12.95	0.91	12.43	13.54	15.51	8.28	10.53	22.02	14.20	9.52	8.43	21.94

Results of Centrality with Centrality Framework

- **UrQMD**

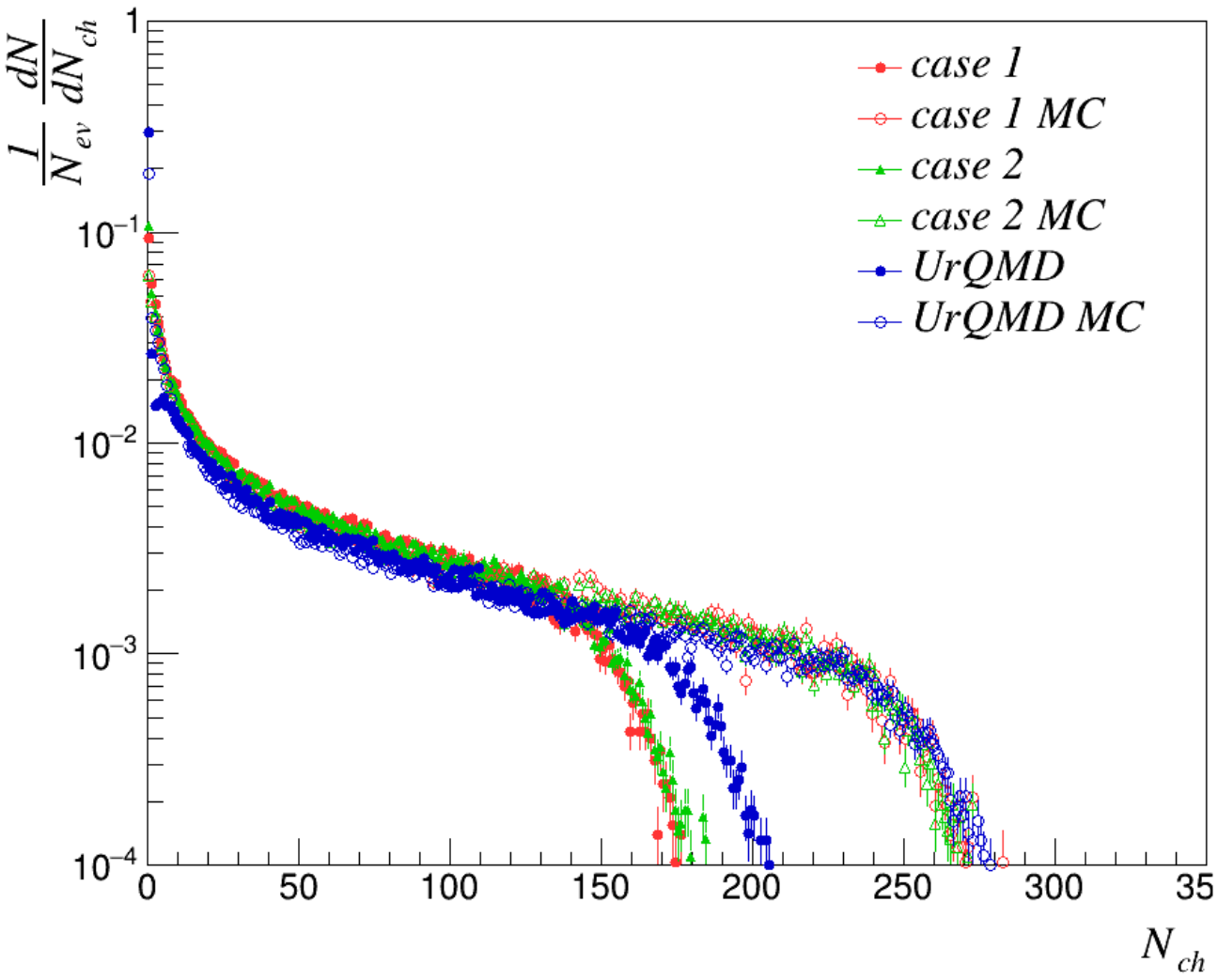
Centrality, %	N_{ch}^{min}	N_{ch}^{max}	$\langle b \rangle$, fm	RMS	b_{min}, fm	b_{max}, fm	$\langle N_{part} \rangle$	RMS	N_{part}^{min}	N_{part}^{max}	$\langle N_{coll} \rangle$	RMS	N_{coll}^{min}	N_{coll}^{max}
0 - 10	129	225	2.95	1.12	1.32	4.22	340.63	34.85	296.29	393.45	776.02	102.31	648.39	929.43
10 - 20	92	129	5.22	0.77	4.22	6.06	258.66	31.52	224.87	296.29	541.52	80.19	452.15	648.39
20 - 30	65	92	6.76	0.66	6.06	7.41	195.69	26.62	169.91	224.87	377.14	62.91	312.42	452.15
30 - 40	45	65	8.01	0.61	7.41	8.55	146.37	22.57	125.95	169.91	257.49	49.35	210.77	312.42
40 - 50	30	45	9.09	0.60	8.55	9.59	107.02	19.24	90.27	125.95	170.10	38.56	136.18	210.77
50 - 60	19	30	10.06	0.61	9.59	10.55	75.58	16.21	61.86	90.27	107.26	29.36	82.62	136.18
60 - 70	11	19	10.98	0.65	10.55	11.41	50.45	13.48	40.31	61.86	62.82	21.70	46.59	82.62
70 - 80	6	11	11.86	0.70	11.41	12.24	31.47	10.67	24.72	40.31	33.98	14.70	24.76	46.59
80 - 90	3	6	12.67	0.81	12.24	13.28	18.66	8.34	12.66	24.72	17.60	9.84	11.45	24.76
90 - 100	1	2	14.03	1.04	13.28	15.01	6.50	4.69	-0.91	12.66	5.00	4.46	-3.72	11.45

The <b> is a little bit higher than in DCM SMM case, expected by the difference in multiplicity

With and without smearing DCM-SMM

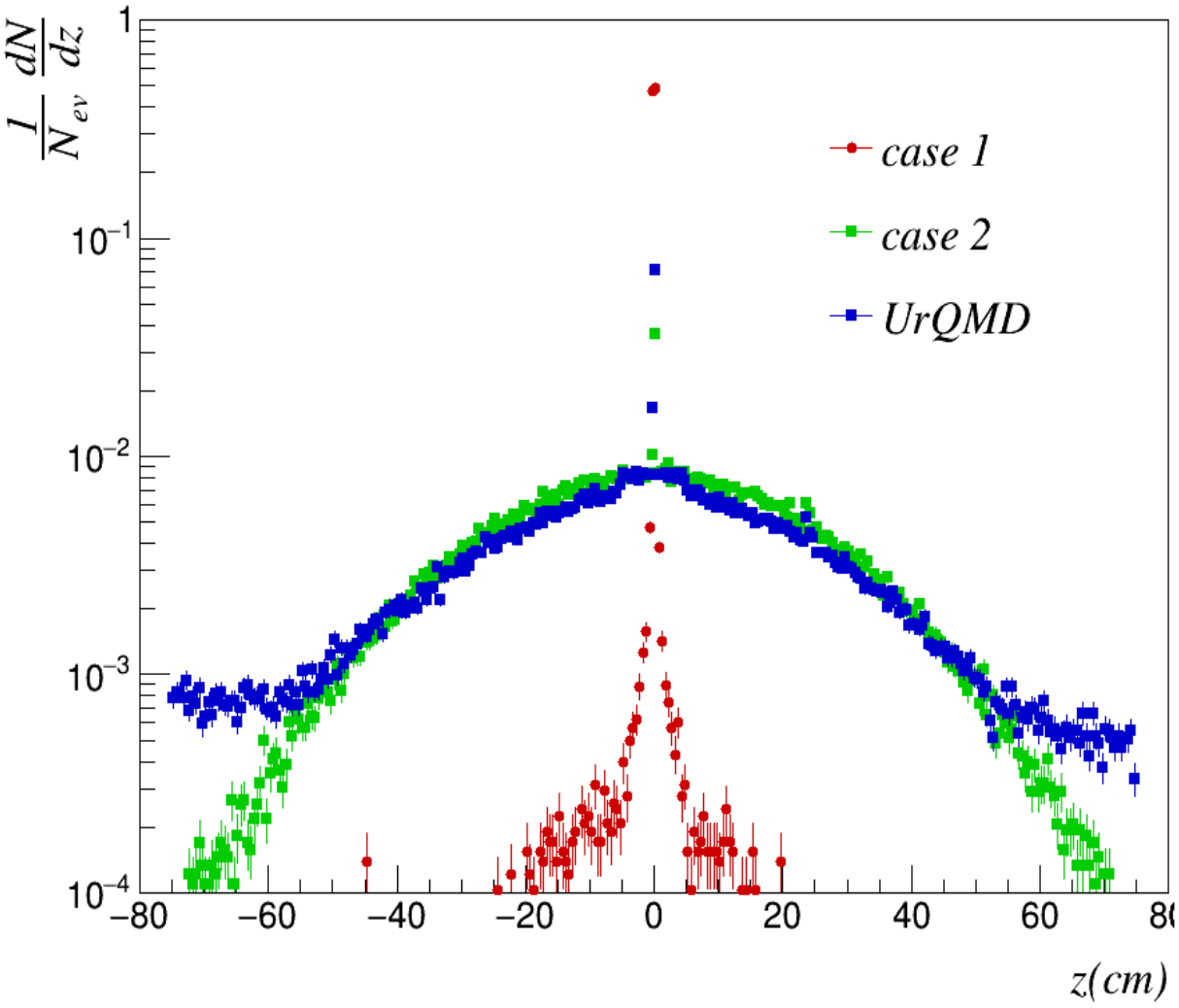
- **Case 1: NO smearing selection**
- **Case 2: Smearing Selection**
  - primGen->SetBeam(0.0,0.0,0.1,0.1);
  - primGen->SetTarget(0.0,24.0);
  - primGen->SmearGausVertexZ(kTRUE);
  - primGen->SmearVertexXY(kTRUE);
- **UrQMD for comparison**

Multiplicity



- **It looks there isn't difference between consider or not smearing for DCM-SMM**

Primary Vertex

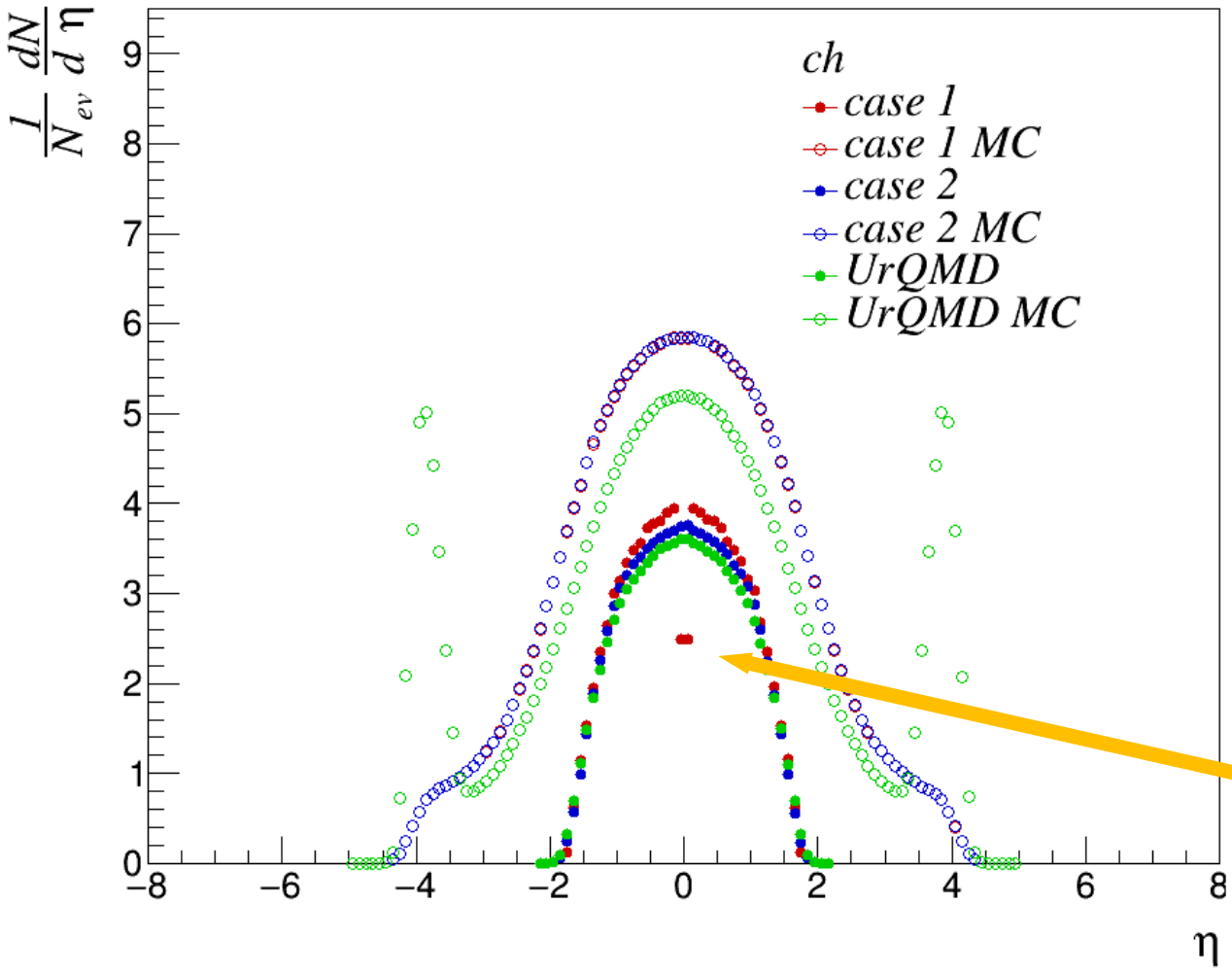


- **However vertex distribution affects the η distribution**

For the following plots

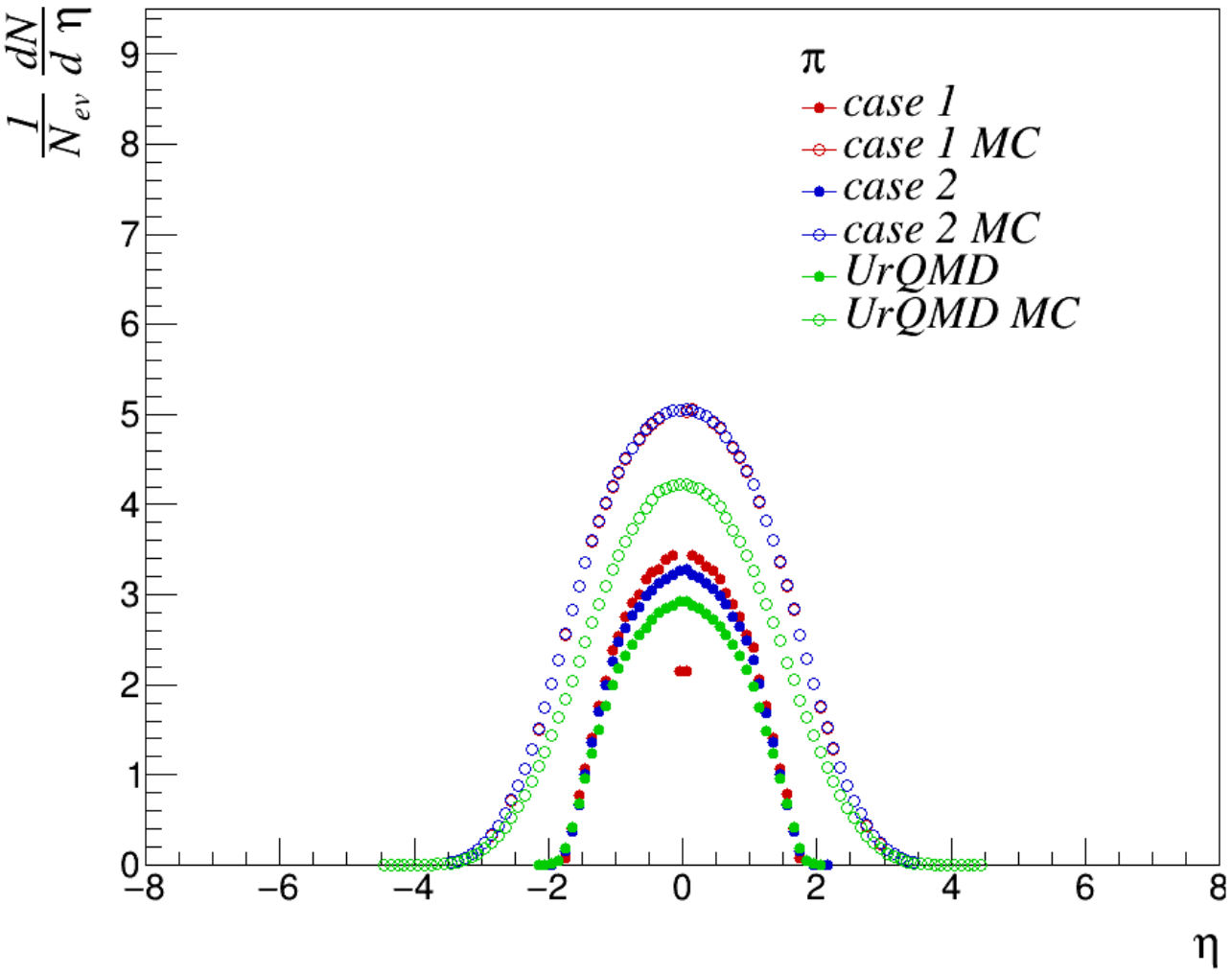
- **For reconstructed tracks, we consider additionally MC association for charged particles and π, K and p**

η Distribution for charged particles



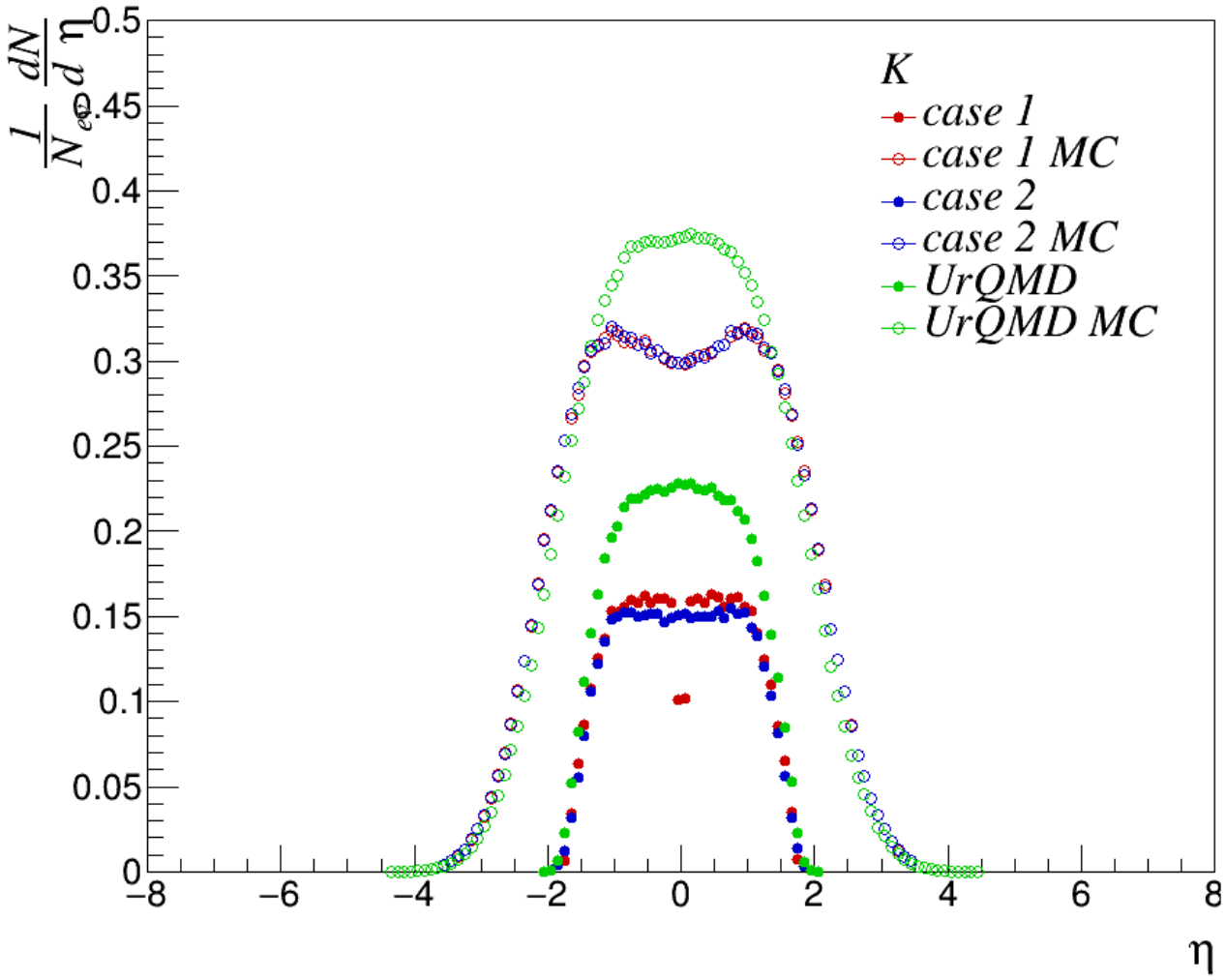
- MC distribution for case 1 and case 2 is the same
- Reconstructed tracks there is high difference for η=0

Pseudorapidity π



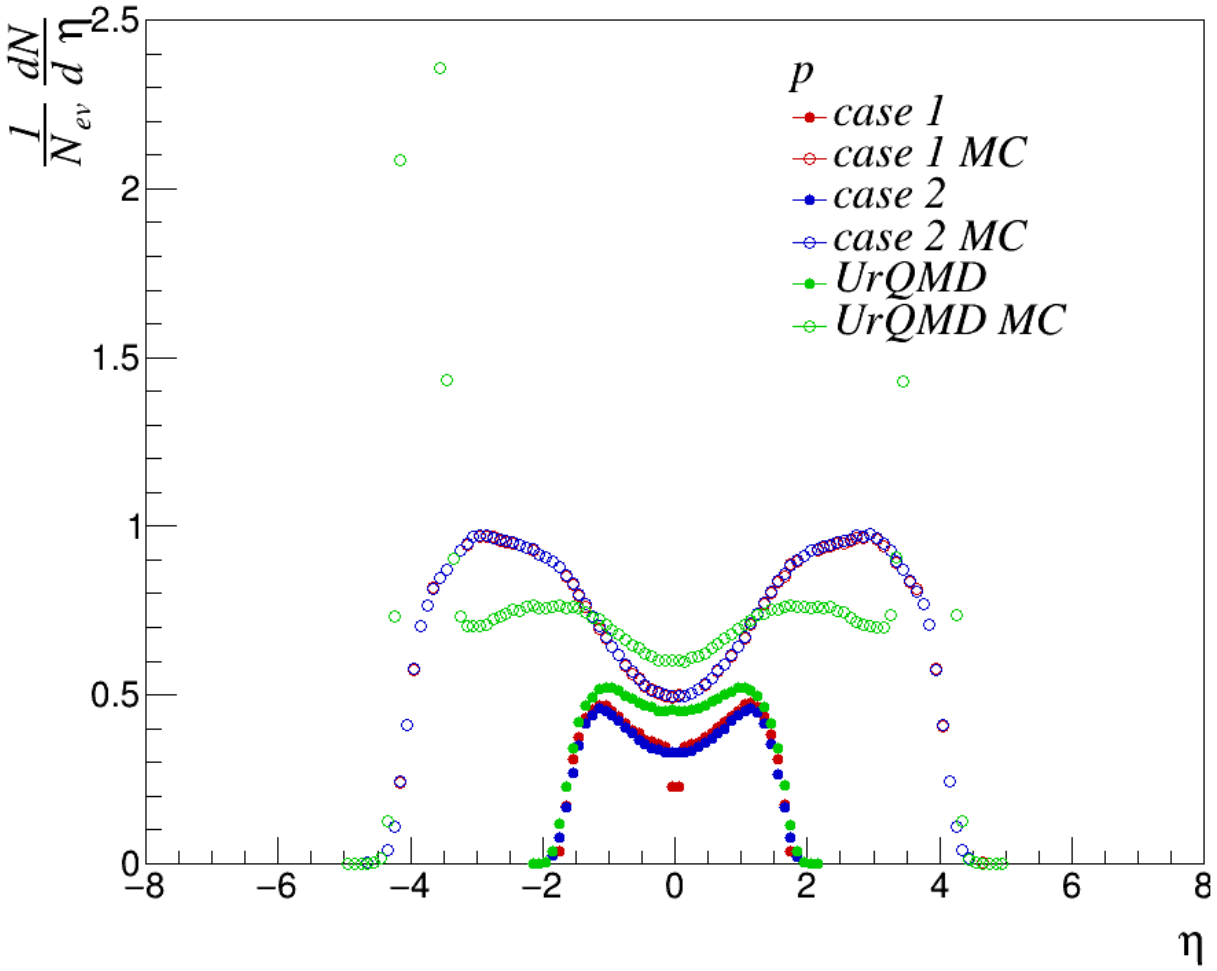
- **Similar effect for η=0**
- **Smaller value with smearing**

Pseudorapidity K



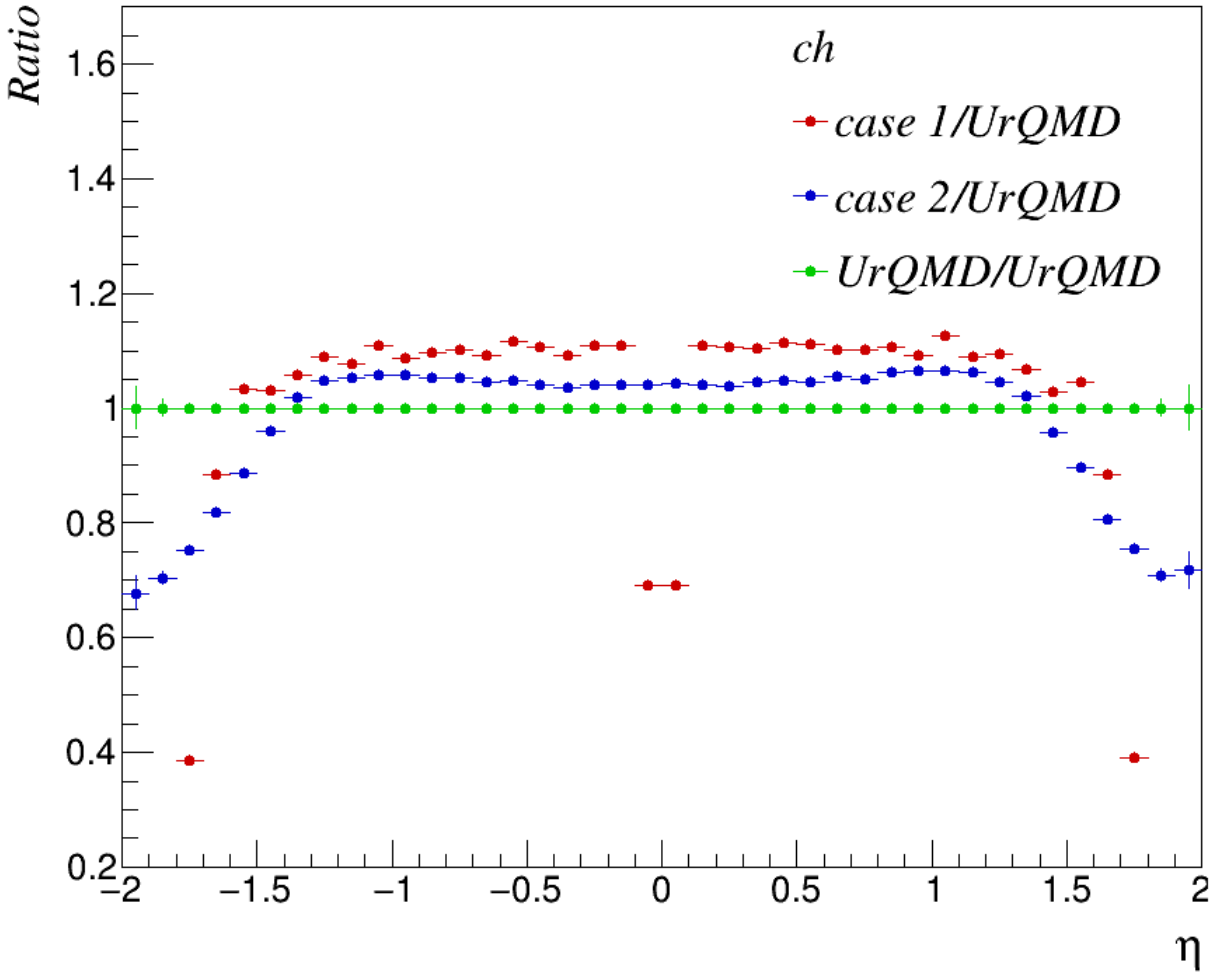
- **Similar effect for η=0**

Pseudorapidity p



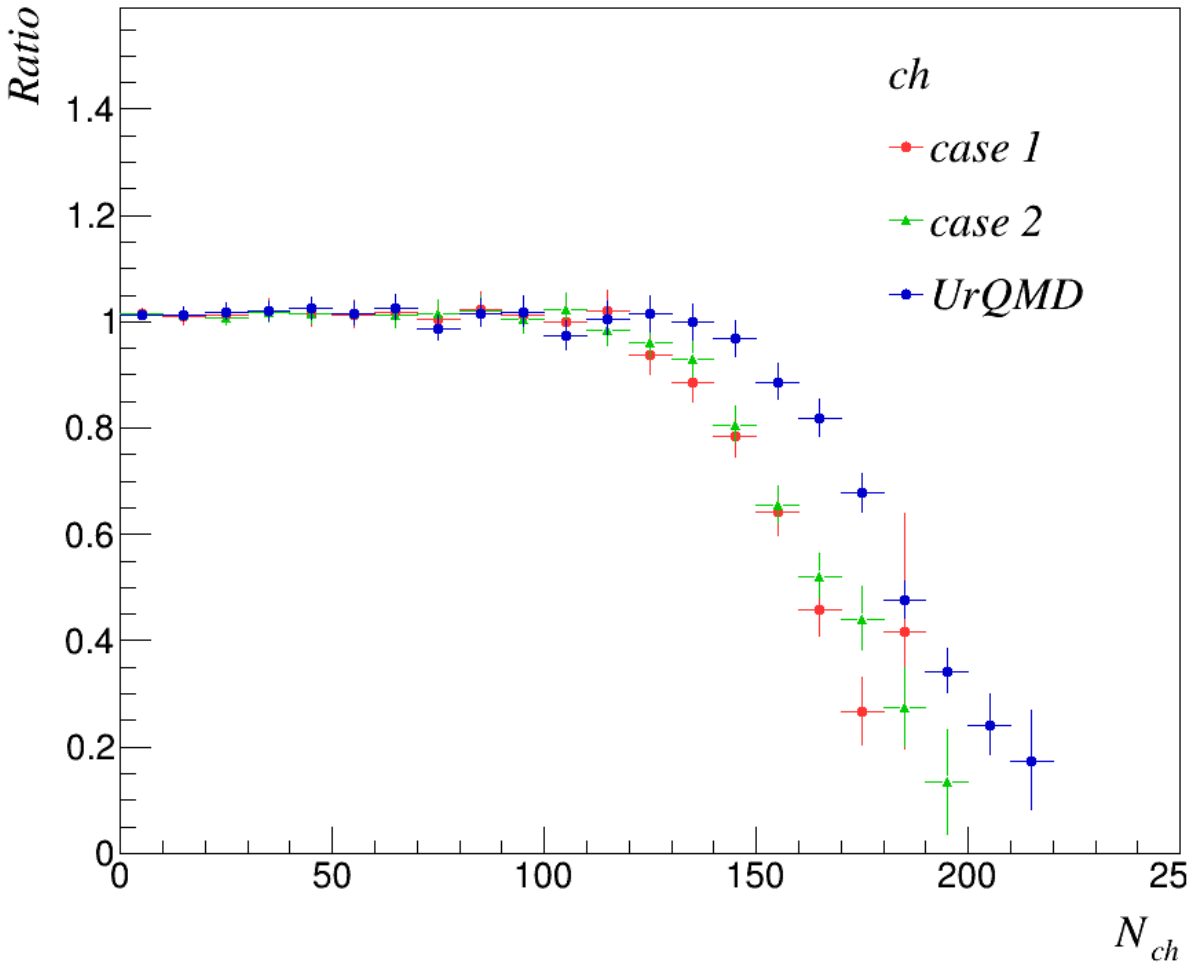
- **Similar effect for η=0**

Ratio for Pseudorapidity ch w.r.t UrQMD



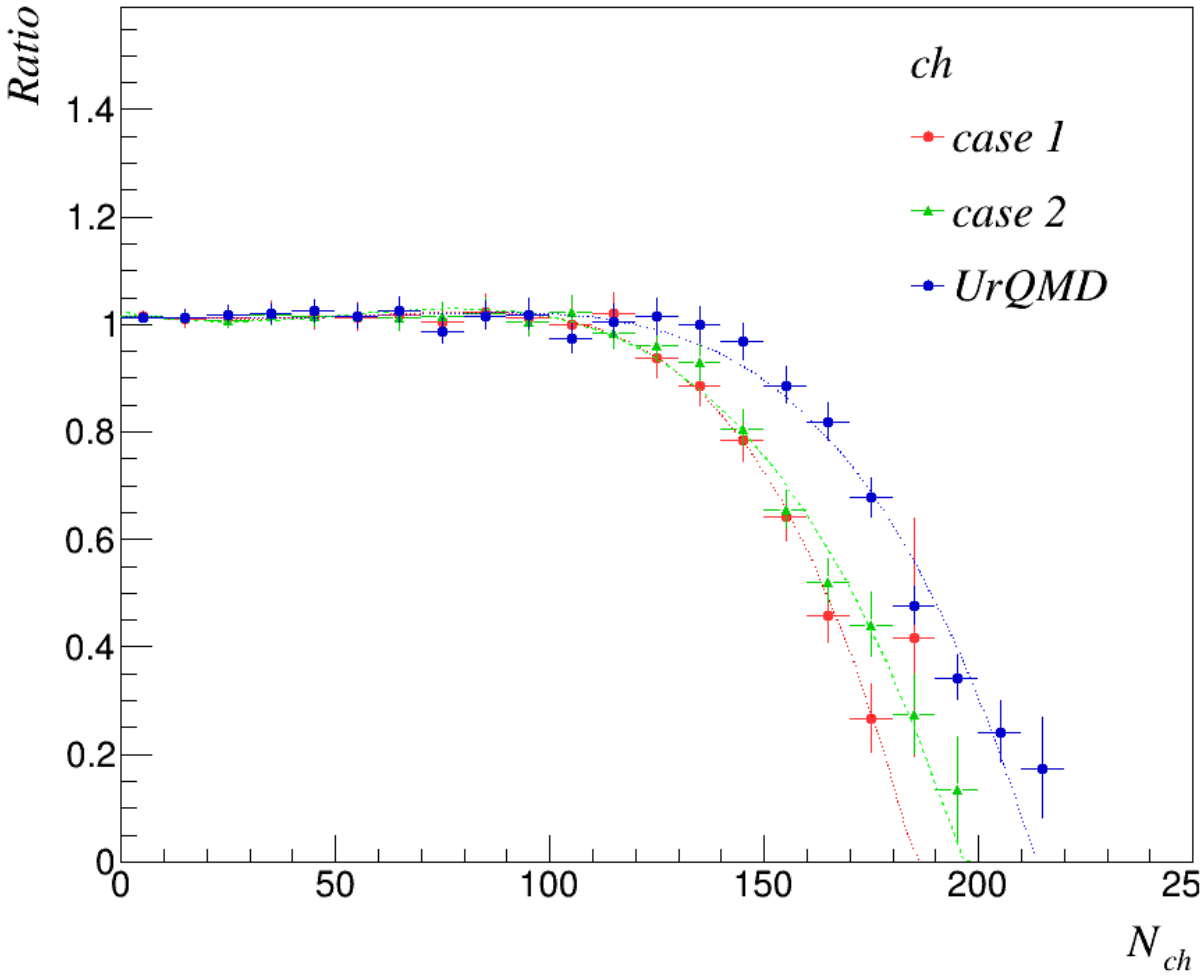
- **The smearing changes the value of pseudorapidity**

Ratio of Multiplicity with/without MC association



- **The multiplicity is increased as an effect of the smearing of primary vertex.**

Ratio of Multiplicity with/without MC association



- **The multiplicity is increased as an effect of the smearing of primary vertex.**

Summary

- **From comparison between DCM-SMM with and without smearing we should expect smaller multiplicity, for primary particles, the effect is small, but increases if we consider MC association.**
- **The smearing produces that some secondary particles be considered like primaries.**
- **This difference could explain the higher value of multiplicity in UrQMD sample, because the spread of primary vertex is higher.**