

Erratum: Searches for long-lived charged particles in pp collisions at $\sqrt{s} = 7$ and 8 TeV



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CMS has uncovered an issue with the muon trigger simulation that impacts particles with $|Q| = e/3$. Consequently, we retract the cross section and mass limits, and related analysis details for $|Q| = e/3$ particles set in [JHEP 07 \(2013\) 122](#). The $|Q| = 2e/3$ results are not affected within the uncertainties. We are supplying in attachment revised plots for figure 10 and figure 11 plus a revised table 8 that have the $|Q| = e/3$ results removed.

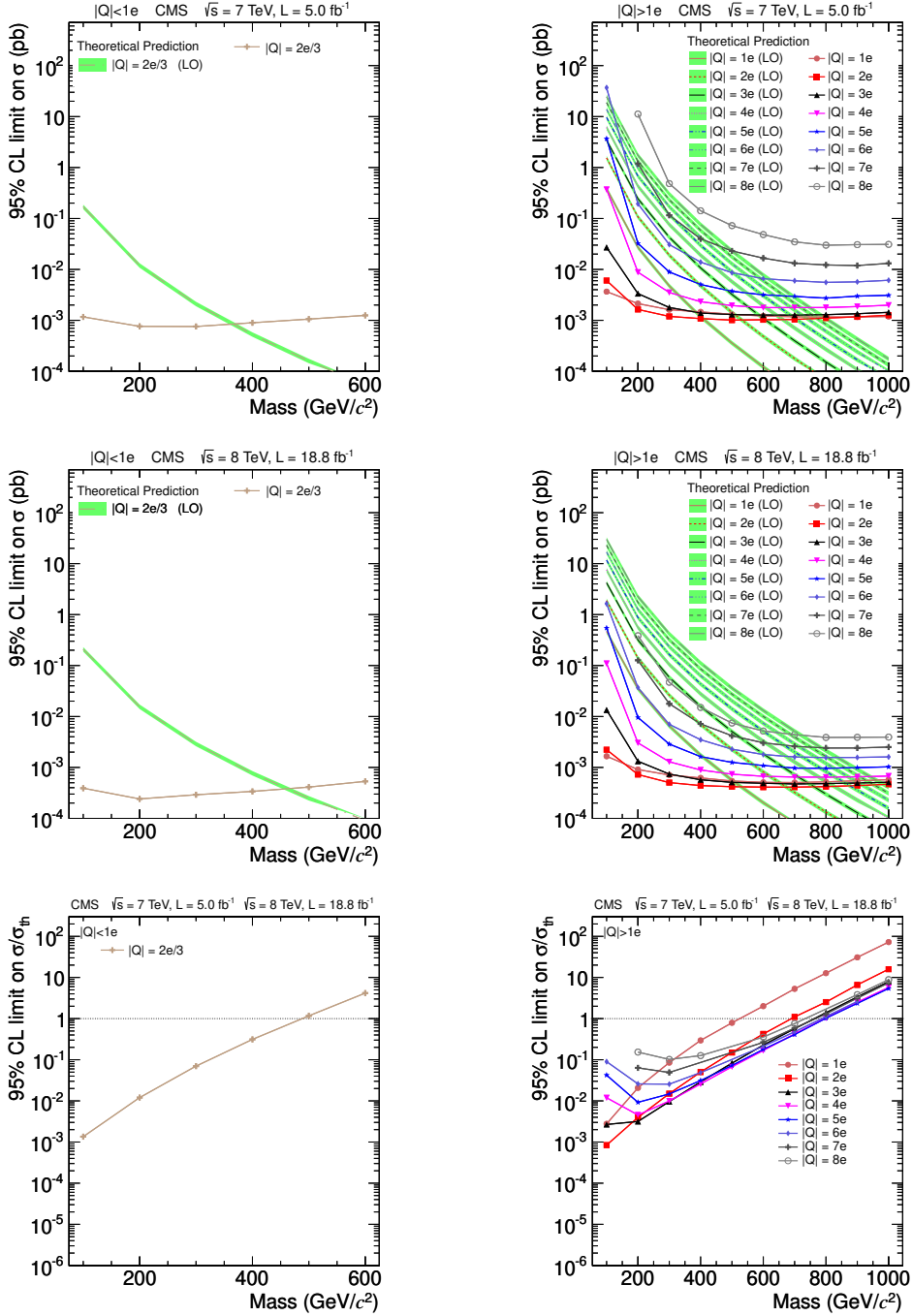


Figure 10. Upper cross section limits at 95% C.L. on various signal models for the fractionally charged analysis (left column) and multiply charged analysis (right column). The top row is for the data at $\sqrt{s} = 7$ TeV, the middle row is for the data at $\sqrt{s} = 8$ TeV, the bottom row shows the ratio of the limit to the theoretical value for the combined dataset.

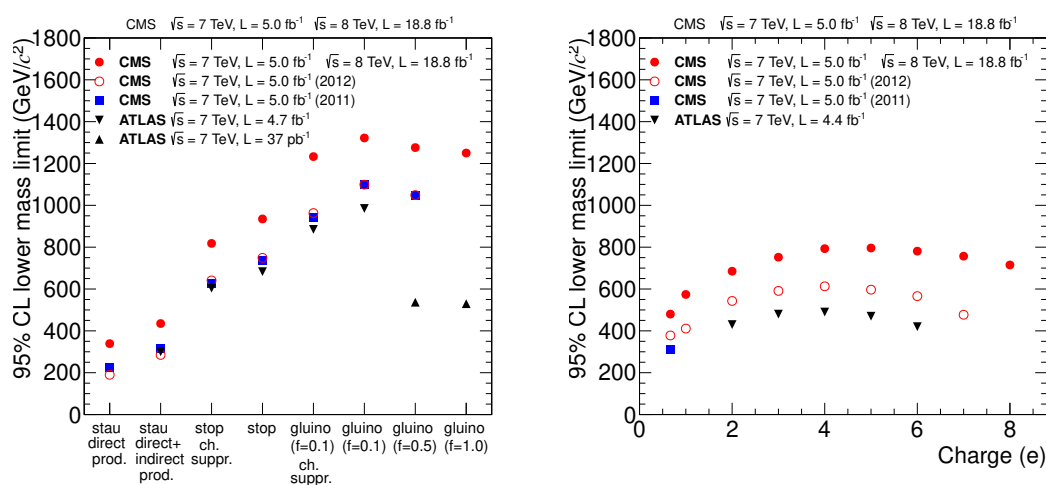


Figure 11. Lower mass limits at 95% C.L. for various models compared with previously published results [19–26]. The model type is given on the x-axis (left). Mass limits are shown for Drell-Yan like production of fractionally, singly, and multiply charged particles (right). These particles were assumed to be neutral under $SU(3)_C$ and $SU(2)_L$.

Mass (GeV/ c^2)	M req. (GeV/ c^2)	σ (pb) ($\sqrt{s} = 7$ TeV)			σ (pb) ($\sqrt{s} = 8$ TeV)			$\sigma/\sigma_{\text{th}}$ (7+8 TeV)	
		Exp.	Obs.	Acc.	Exp.	Obs.	Acc.	Exp.	Obs.
Drell-Yan like production $ Q = 2e/3$ — $ Q < 1e$ analysis									
100	—	0.0011	0.0012	0.53	0.00042	0.00039	0.45	0.0015	0.0013
200	—	0.00071	0.00076	0.81	0.00027	0.00024	0.68	0.014	0.012
400	—	0.00083	0.00090	0.68	0.00033	0.00034	0.56	0.35	0.31
Drell-Yan like production $ Q = 1e$ — tracker+TOF analysis									
200	>120	0.0015	0.0036	0.41	0.00077	0.0013	0.36	0.019	0.040
500	>340	0.00098	0.0010	0.60	0.00028	0.00029	0.56	0.41	0.44
800	>530	0.0010	0.0010	0.58	0.00030	0.00031	0.52	7.5	8.1
Drell-Yan like production $ Q = 2e$ — $ Q > 1e$ analysis									
200	—	0.0016	0.0016	0.36	0.00050	0.00073	0.33	0.0028	0.0040
500	—	0.00098	0.0010	0.59	0.00029	0.00042	0.56	0.11	0.15
800	—	0.0011	0.0011	0.55	0.00029	0.00042	0.56	1.9	2.5
Drell-Yan like production $ Q = 3e$ — $ Q > 1e$ analysis									
200	—	0.0031	0.0034	0.18	0.00090	0.0013	0.18	0.0023	0.0032
500	—	0.0012	0.0013	0.47	0.00035	0.00051	0.46	0.059	0.083
800	—	0.0012	0.0013	0.47	0.00033	0.00048	0.49	0.99	1.4
Drell-Yan like production $ Q = 4e$ — $ Q > 1e$ analysis									
200	—	0.0082	0.0088	0.069	0.0021	0.0030	0.078	0.0031	0.0045
500	—	0.0018	0.0020	0.31	0.00051	0.00074	0.32	0.048	0.068
800	—	0.0017	0.0018	0.34	0.00045	0.00064	0.37	0.75	1.0
Drell-Yan like production $ Q = 5e$ — $ Q > 1e$ analysis									
200	—	0.030	0.032	0.019	0.0066	0.0096	0.025	0.0064	0.0092
500	—	0.0035	0.0037	0.16	0.00086	0.0013	0.19	0.052	0.073
800	—	0.0026	0.0027	0.22	0.00066	0.00096	0.24	0.71	1.0
Drell-Yan like production $ Q = 6e$ — $ Q > 1e$ analysis									
200	—	0.17	0.19	0.0032	0.026	0.037	0.0064	0.018	0.026
500	—	0.0079	0.0086	0.072	0.0016	0.0023	0.10	0.055	0.077
800	—	0.0054	0.0056	0.11	0.0011	0.0016	0.15	0.81	1.1
Drell-Yan like production $ Q = 7e$ — $ Q > 1e$ analysis									
200	—	1.1	1.2	0.00053	0.086	0.13	0.0019	0.047	0.063
500	—	0.022	0.023	0.026	0.0028	0.0042	0.057	0.079	0.11
800	—	0.012	0.012	0.049	0.0017	0.0024	0.099	0.96	1.3
Drell-Yan like production $ Q = 8e$ — $ Q > 1e$ analysis									
200	—	9.8	11	7.1×10^{-5}	0.26	0.38	0.00064	0.11	0.15
500	—	0.068	0.072	0.0084	0.0051	0.0074	0.032	0.11	0.16
800	—	0.028	0.030	0.020	0.0027	0.0039	0.062	1.0	1.4

Table 8. Expected and observed cross section limits and the signal acceptance for the Drell-Yan like production of fractionally, singly, and multiply charged particles at $\sqrt{s} = 7$ and 8 TeV, as well as the ratio of the cross section limit to the theoretical value for the combined dataset. The minimum reconstructed mass required (M req.) for each sample in the tracker+TOF analysis is also given.

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- 33: Also at Facoltà Ingegneria, Università di Roma, Roma, Italy
- 34: Also at Scuola Normale e Sezione dell'INFN, Pisa, Italy
- 35: Also at INFN Sezione di Roma, Roma, Italy
- 36: Also at University of Athens, Athens, Greece
- 37: Also at Rutherford Appleton Laboratory, Didcot, United Kingdom
- 38: Also at Paul Scherrer Institut, Villigen, Switzerland
- 39: Also at Institute for Theoretical and Experimental Physics, Moscow, Russia
- 40: Also at Albert Einstein Center for Fundamental Physics, Bern, Switzerland
- 41: Also at Gaziosmanpasa University, Tokat, Turkey
- 42: Also at Adiyaman University, Adiyaman, Turkey
- 43: Also at Cag University, Mersin, Turkey
- 44: Also at Mersin University, Mersin, Turkey
- 45: Also at Izmir Institute of Technology, Izmir, Turkey
- 46: Also at Ozyegin University, Istanbul, Turkey
- 47: Also at Kafkas University, Kars, Turkey
- 48: Also at Suleyman Demirel University, Isparta, Turkey
- 49: Also at Ege University, Izmir, Turkey
- 50: Also at Mimar Sinan University, Istanbul, Istanbul, Turkey
- 51: Also at Kahramanmaras Sütcü Imam University, Kahramanmaras, Turkey
- 52: Also at School of Physics and Astronomy, University of Southampton, Southampton, United Kingdom
- 53: Also at INFN Sezione di Perugia; Università di Perugia, Perugia, Italy
- 54: Also at Utah Valley University, Orem, U.S.A.
- 55: Now at University of Edinburgh, Scotland, Edinburgh, United Kingdom
- 56: Also at Institute for Nuclear Research, Moscow, Russia
- 57: Also at University of Belgrade, Faculty of Physics and Vinca Institute of Nuclear Sciences, Belgrade, Serbia

- 58: Also at Argonne National Laboratory, Argonne, U.S.A.
- 59: Also at Erzincan University, Erzincan, Turkey
- 60: Also at Yildiz Technical University, Istanbul, Turkey
- 61: Also at Kyungpook National University, Daegu, Korea