List of Appendices

Appendix O: ART-2a positive-ion weight vectors for Diamond Bar, Mira Loma, and Riverside ambient during trajectory-matched times September 27-29, 1997: m/z ratio and normalized intensity (vigilance factor = 0.7; 57 clusters)

Appendix P: Color versions of similarity plots presented in the body of the report in grayscale. A red to blue color-coding replaces the white to black grayscale coding. See the body of the report for captions and additional information.

Appendix Q: Temporal plots of clusters #1-20 in Riverside over 40 consecutive days between August 19, 1997 and September 27, 1997 during SCOS97-NARSTO.

Appendix R: List of publications directly supported by this contract.

Appendix A: Possible positive ion m/z assignments for mass spectra.

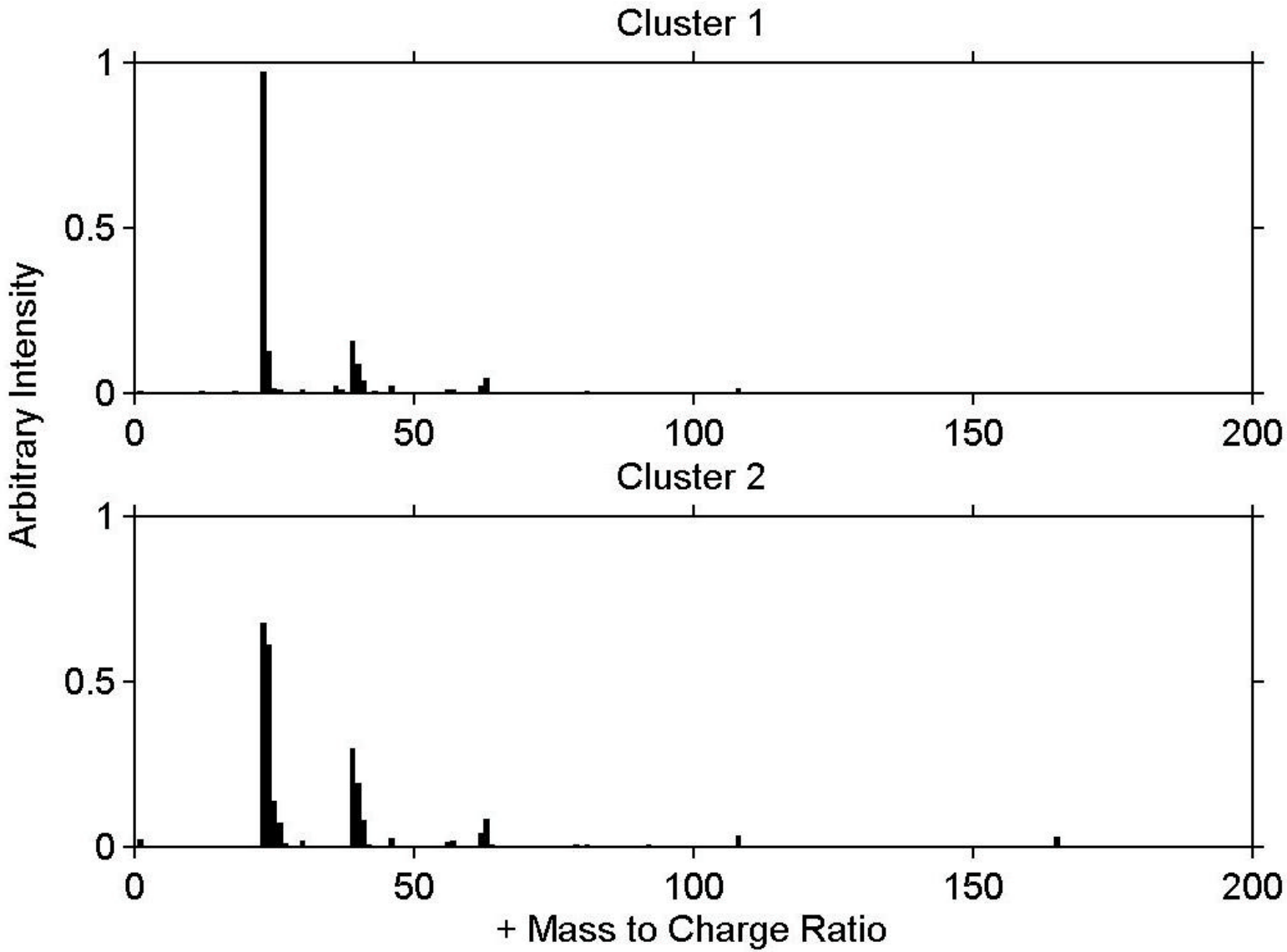
m/z (+)	Species	See also related species at m/z
1	H	
6, 7	Li	
10, 11	B	
12	C	15, also multiples of 12: 24, 36,...
15	CH_3	
17	NH_3	35
18	NH_4	35
19	H_3O	
23	Na	46, 62, 63, 81/83, 108, 165
24	C_2	
24, 25, 26	Mg	64
27	CNH	
27	C_2H_3	
27	Al	43, 70
28	Si	44
29	C_2H_5	
29	CNH_3	
30	NO, N_2O_2	
31	P	
35	NH_4NH_3	
36	C_3	
39	C_3H_3	41, 43
39, 41	K	78, 113/115, 140, 175, 213
40, 41	Ca	44, 56, 75/77, 96, 102
41	C_2NH_3	39, 43
43	CH_3CO	
43	C_2NH_5	
43	AlO	27, 70
46	Na_2, NO_2	
48	C_4	
48 (46-50)	Ti	64, 80
51	V, C_4H_3	67
52, 53	Cr	
54, 56, 57	Fe	
55	C_3NH_5	
55	Mn	
56	CaO	
57	C_3NH_7	
58, 60	Ni	
59	Co	
60	C_5	
62	Na_2O	
63	Na_2OH	
64	TiO	

m/z (+)	Species
63, 65	Cu
64	Mg_2O
64, 66, 68	Zn
67	VO
69	C_4NH_7
70	Al_2O
71	C_4NH_9
72	C_6
73	FeOH
75	As
75/77	CaCl
78	K_2
80	TiO_2
81, 83	Na_2Cl
84	C_7
86, 87, 88	Sr
96	Ca_2O
96	C_8
98 (92-100)	Mo
102	$CaNO_3$
108	Na_2NO_3
108	C_9
113/115	K_2Cl
118 (116-124)	Sn
120	C_{10}
138 (134-138)	Ba
140	K_2NO_3
144	C_{11}
154	BaO
156	C_{12}
165	Na_3SO_4
175	K_2HSO_4
184 (182-186)	W
195 (194-198)	Pt
202 (198-204)	Hg, PAH
206 (205-208)	Pb, PAH
213, 215	K_3SO_4

Appendix B: Possible negative ion m/z assignments for mass spectra.

m/z (-)	Species
1	electrons
12	C
16	O
17	OH
19	F
24	C_2
25	C_2H
26	CN
32	S
35	Cl
36	C_3
37	C_3H/Cl
42	CNO
43	$CNOH/CH_3O$
44	SiO
46	NO_2
48	C_4
59	AlO_2
60	C_5
60	SiO_2
60	CO_3
61	HCO_3
62	NO_3
63	HNO_3
63	PO_2
64	SO_2
64	S_2
72	C_6
76	SiO3
79	PO_3
79, 81	Br
80	SO_3
81	HSO_3
84	C_7
92	SiO_4
95	PO_4
96	C_8
96	SO_4
97	HSO_4
97	$H_2O\ PO_3$
108	C_9
114	NH_4SO_4
120	C_{10}
125	HNO_3NO_3
127	I
132	C_{11}
142	$NH_4(NO_3)_2$
144	C_{12}
147	$Na(NO_3)_2$
156	C_{13}

Appendix C: ART-2a positive-ion weight vectors for Riverside ambient August 21-23, 1997: m/z ratio and normalized intensity (vigilance factor = 0.5; top 20 of 57 clusters)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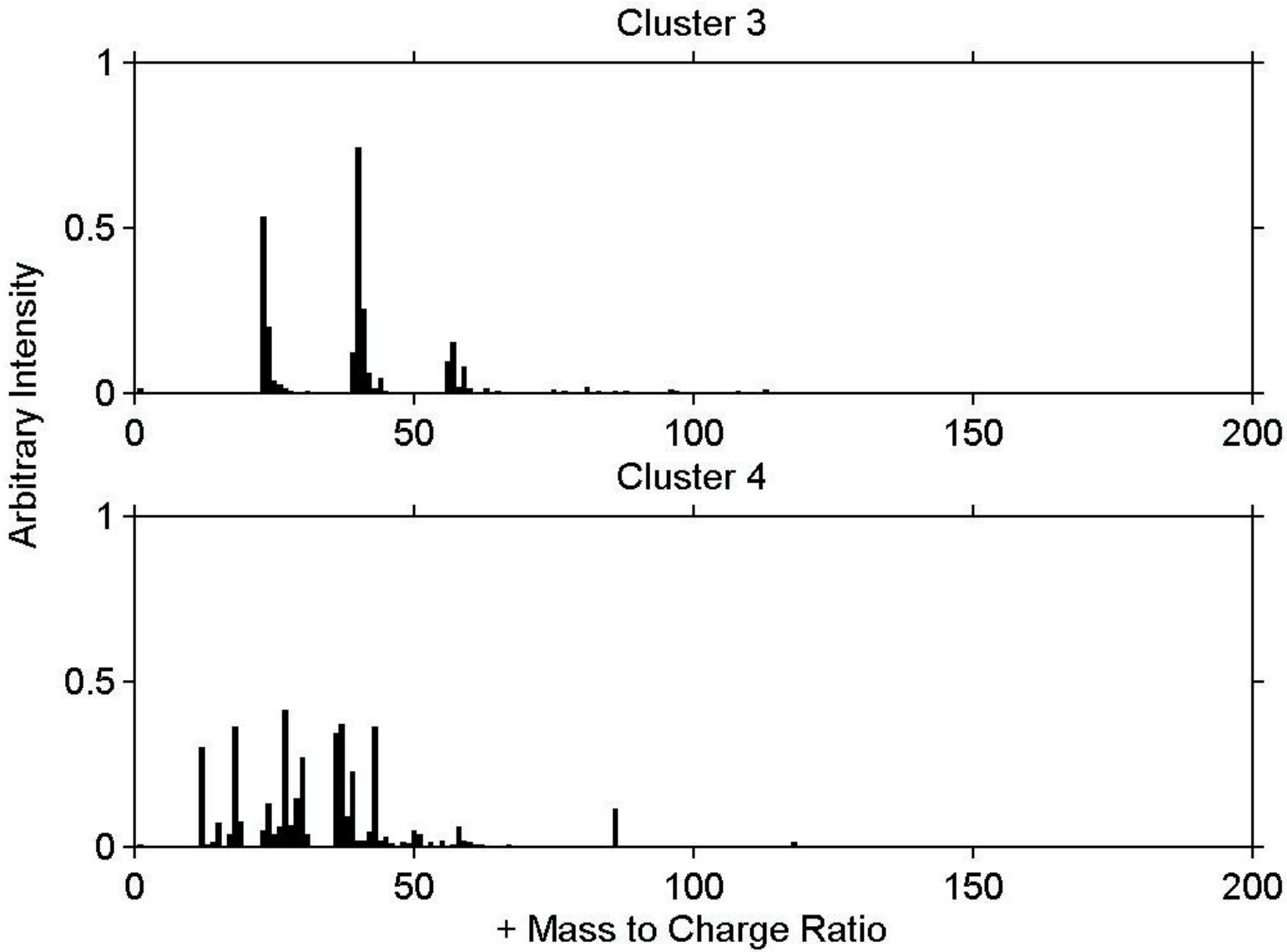
+ Mass to Charge Ratio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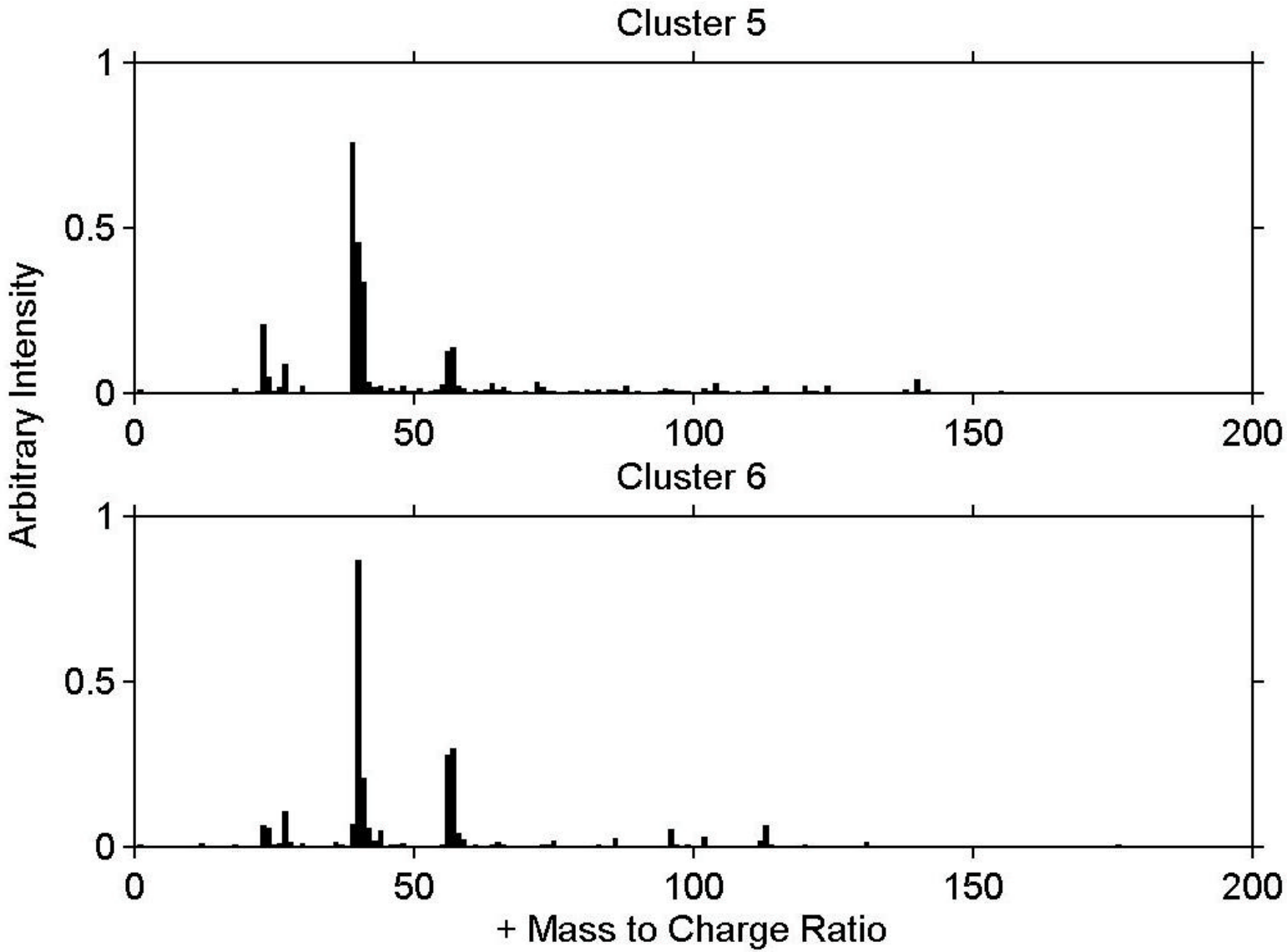
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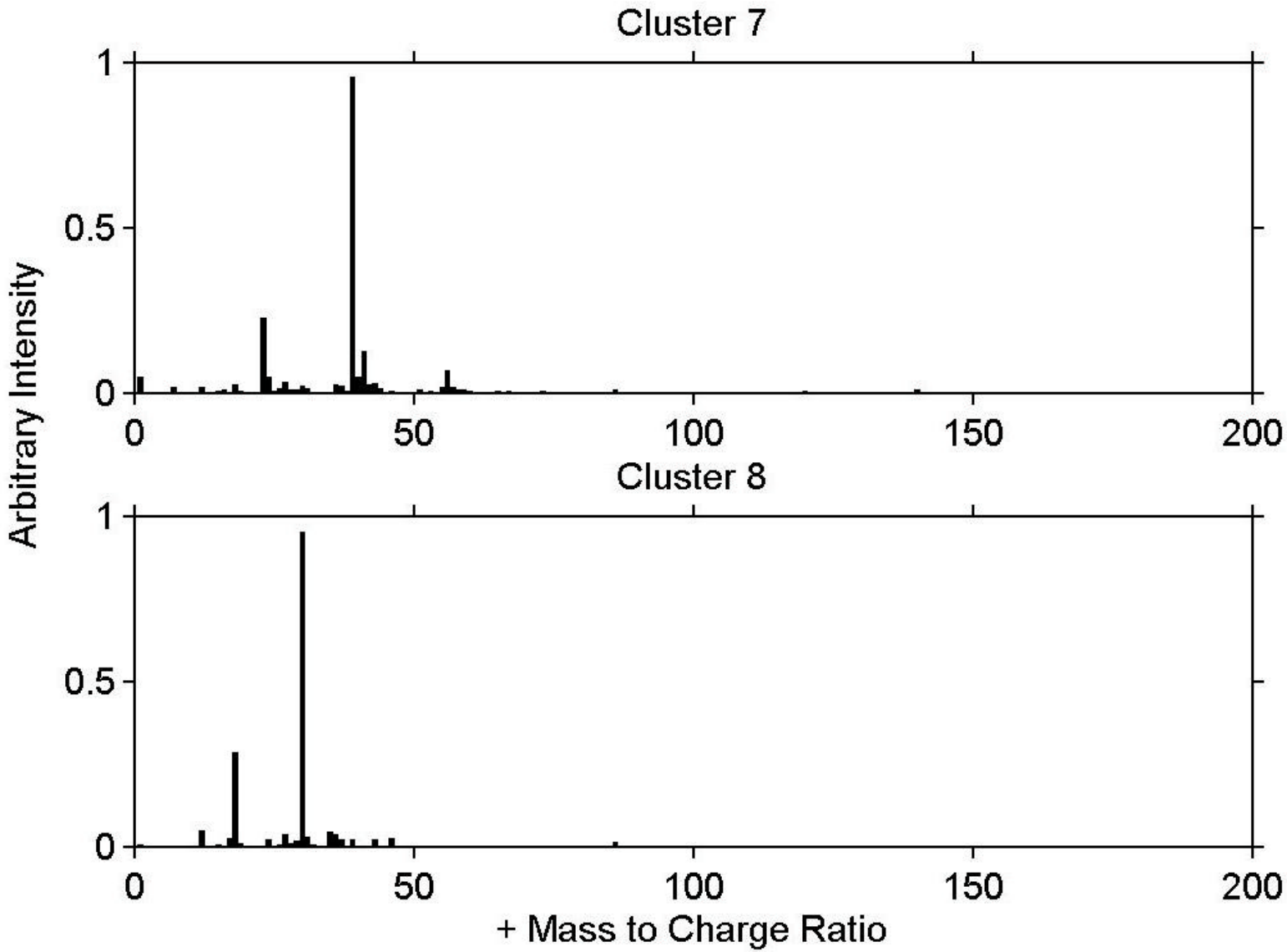
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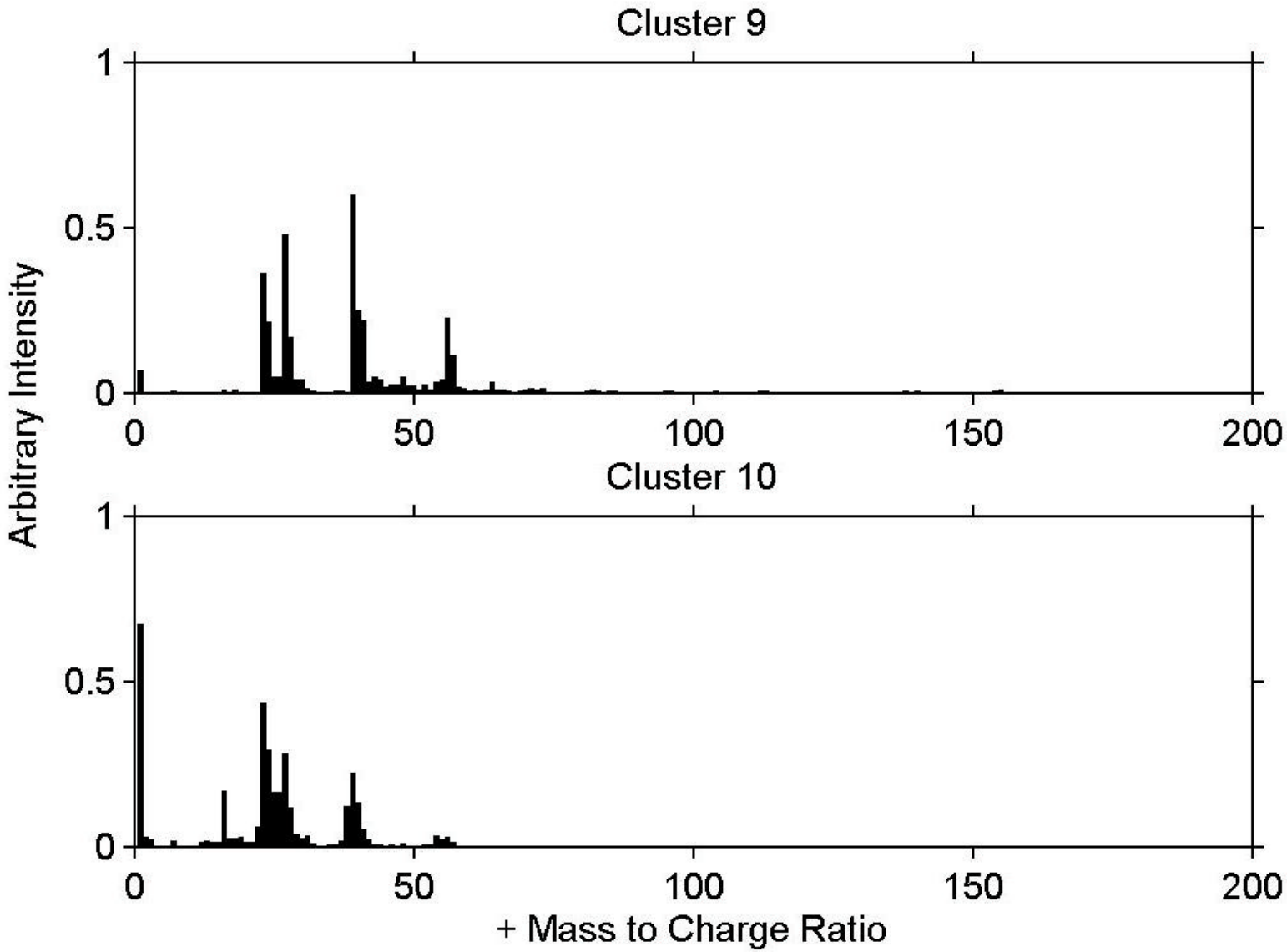
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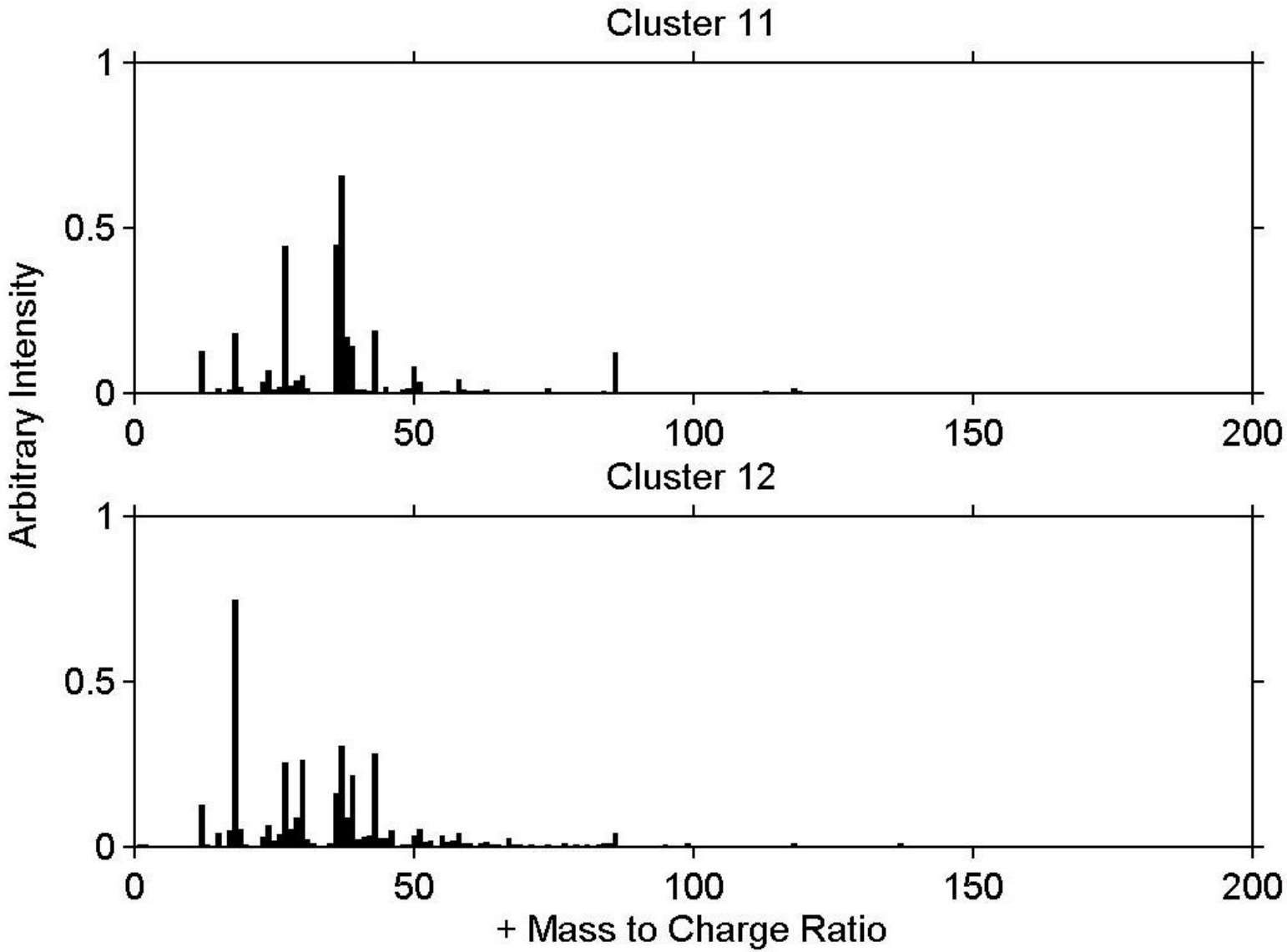
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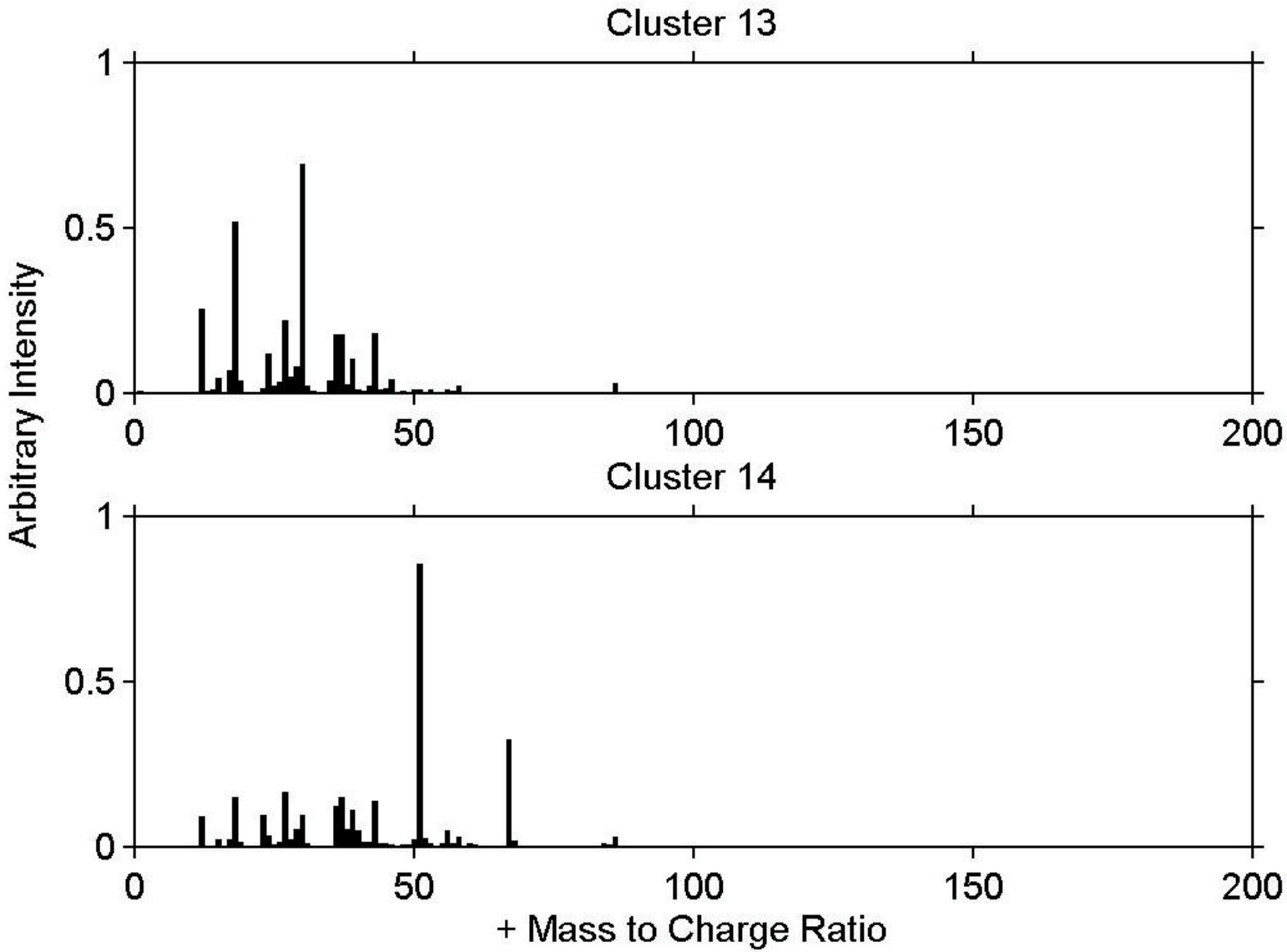
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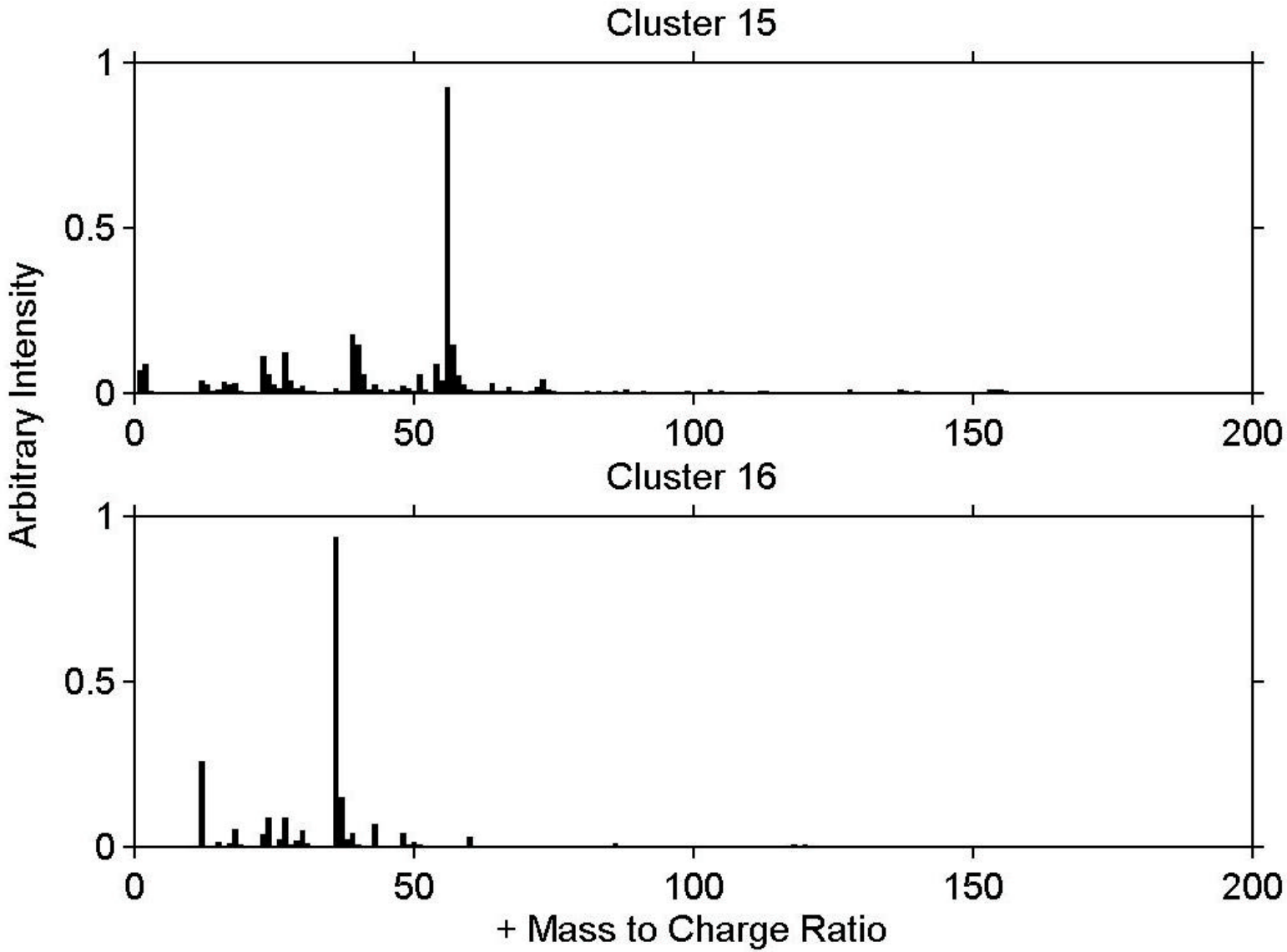
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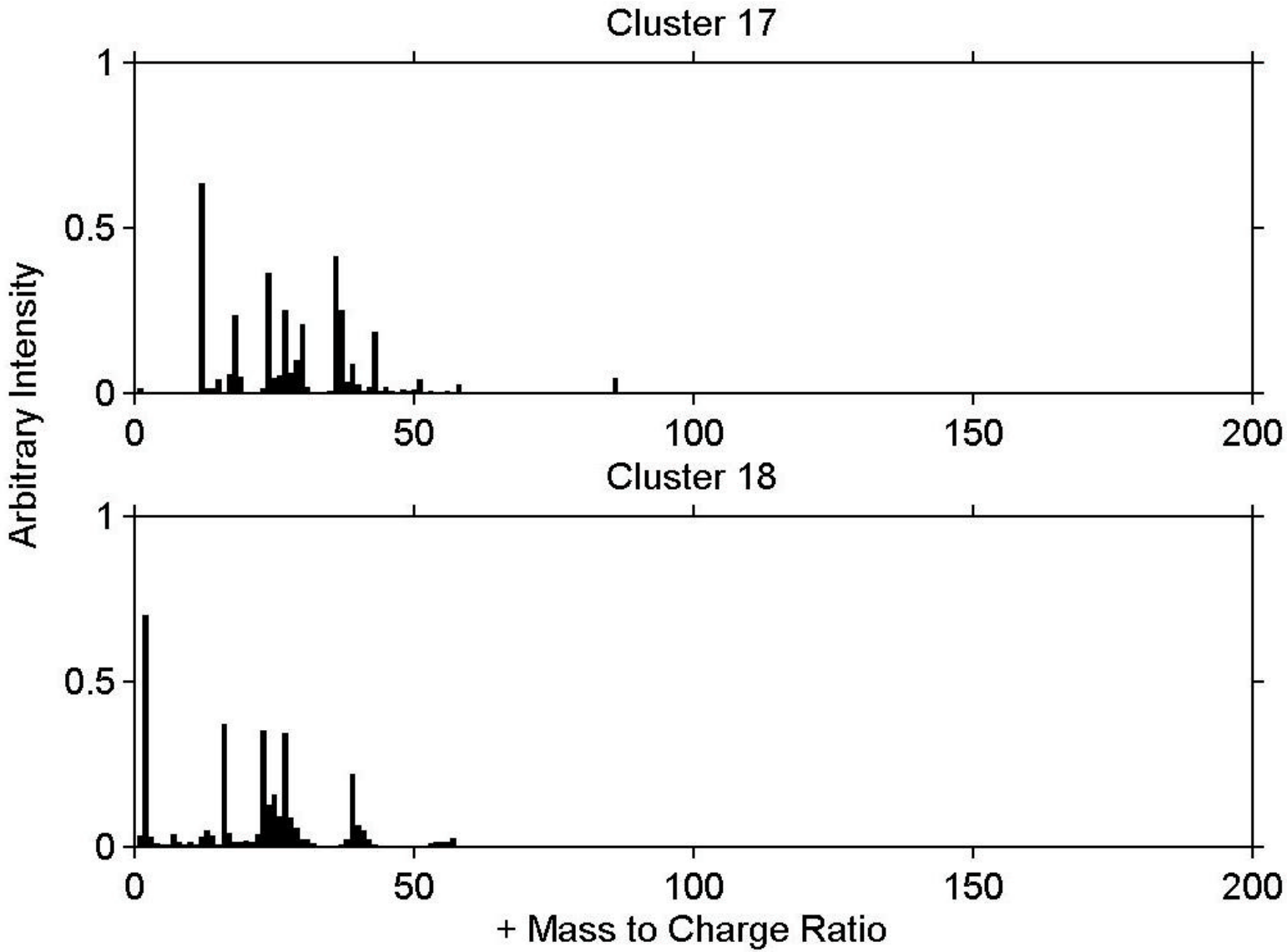
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Cluster 18
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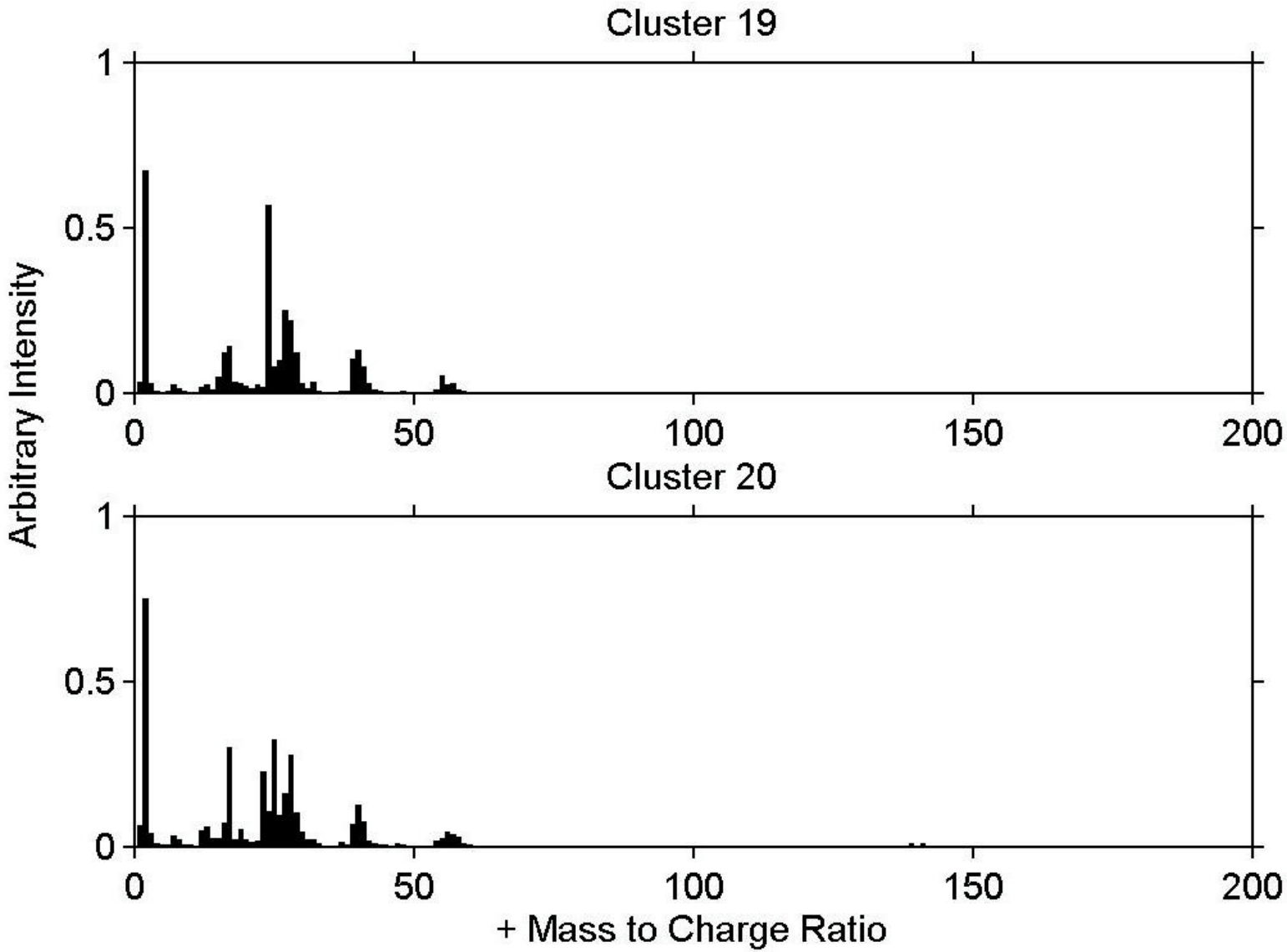
200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Cluster 20
Arbitrary Intensity
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50
100
150
200

Appendix D: Matching results for particles in Los Angeles, Azusa, and Mira Loma matched to top 20 Riverside clusters (shown in Appendix C). Note matching procedure only uses positive ion spectra since lab-based instrument could only detect one ion polarity at a time. Matching is for total particles sampled.

Class #	Number of particles in the class Riverside	Number of particles matched to the class Los Angeles	Number of particles matched to the class Azusa	Number of particles matched to the class Mira Loma
1	24,234	223	402	6691
2	15,488	108	221	572
3	5,061	18	54	227
4	3,034	252	283	741
5	2,997	23	35	867
6	2,891	13	41	514
7	2,861	29	42	2802
8	2,509	0	0	5
9	2,338	31	49	266
10	1,783	2	5	1
11	1,718	106	150	427
12	1,701	26	19	208
13	1,654	0	0	17
14	1,623	23	61	97
15	1,561	22	22	435
16	1,493	151	88	4894
17	1493	33	22	140
18	1424	0	18	13
19	1264	0	9	23
20	1229	0	3	14

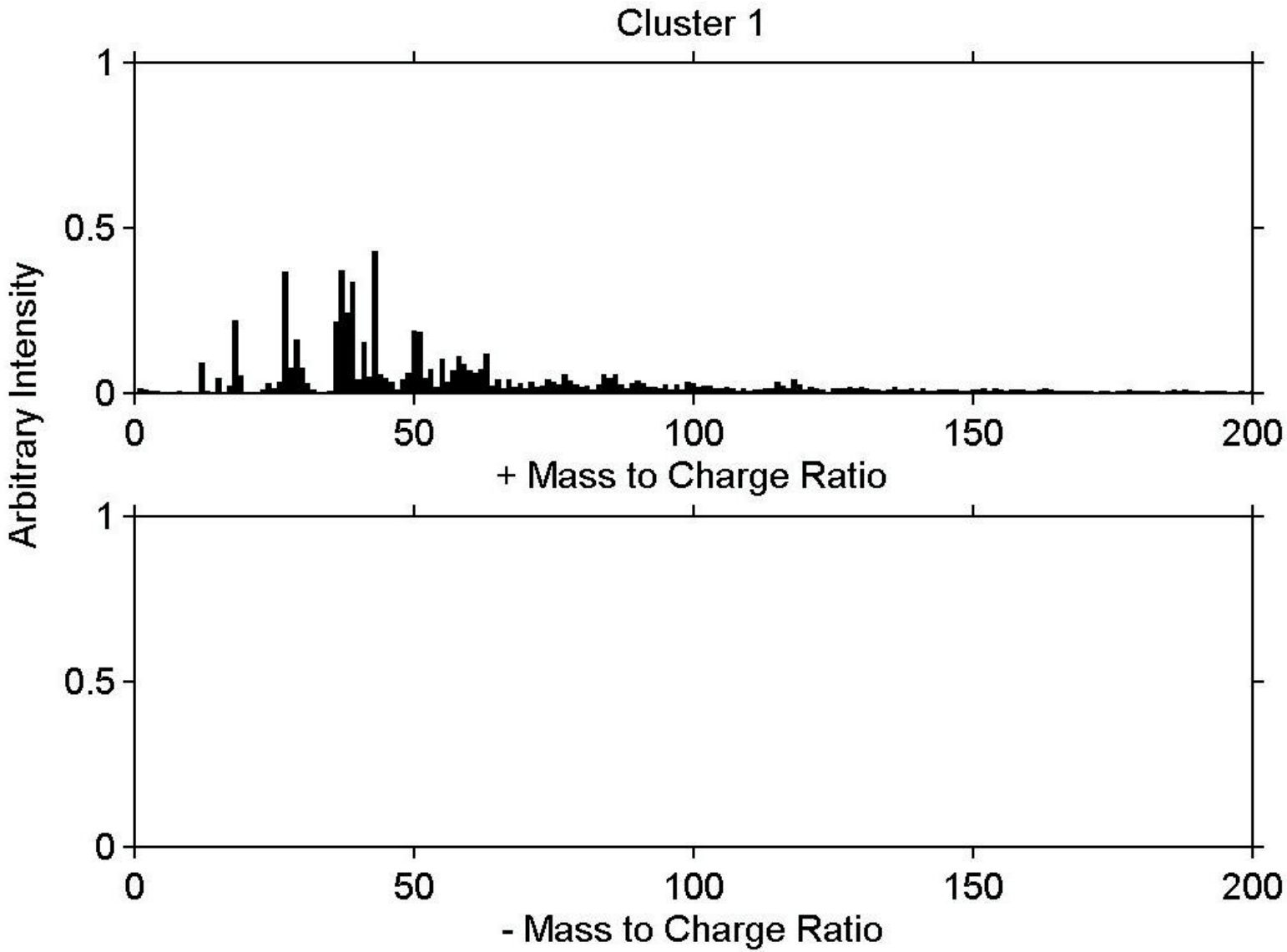
Appendix E: Matching results for particles in Los Angeles and Azusa matched to top 20 Riverside clusters (shown in Appendix C). Note matching procedure only uses positive ion spectra since lab-based instrument could only run with one ion polarity. Matching is sub-divided into sub- and super-µm particles.

Class #	Number of particles matched to the class Los Angeles sub-micrometer sized particles	Number of particles matched to the class Los Angeles super-micrometer sized particles	Number of particles matched to the class Azusa sub-micrometer sized particles	Number of particles matched to the class Azusa super-micrometer sized particles
1	11	212	25	366
2	3	105	9	208
3	2	16	2	52
4	155	97	225	57
5	11	12	12	23
6	1	12	10	31
7	16	13	7	34
8	0	0	0	0
9	8	23	12	37
10	1	1	0	5
11	79	25	125	23
12	12	14	7	12
13	0	0	0	0
14	16	7	56	4
15	7	15	8	13
16	111	39	63	23
17	24	8	18	3
18	0	0	3	15
19	0	0	0	9
20	0	0	0	3

Appendix F: ART-2a dual-ion weight vectors for Los Angeles ambient August 21, 1997 12:40-15:40: m/z ratio and normalized intensity (vigilance factor = 0.7; 20 clusters)

Class #	Number of particles in the class Los Angeles	Number of particles matched to the class Azusa
1	165	264
2	124	44
3	120	319
4	94	62
5	88	151
6	72	26
7	49	35
8	41	0
9	30	14
10	29	16
11	18	41
12	18	20
13	17	5
14	16	12
15	16	45
16	14	18
17	11	28
18	11	15
19	11	11
20	10	29

For this dual-ion data set the positive-ion spectrum for each weight vector is provided first, followed by the negative-ion spectrum.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+ Mass to Charge Ratio
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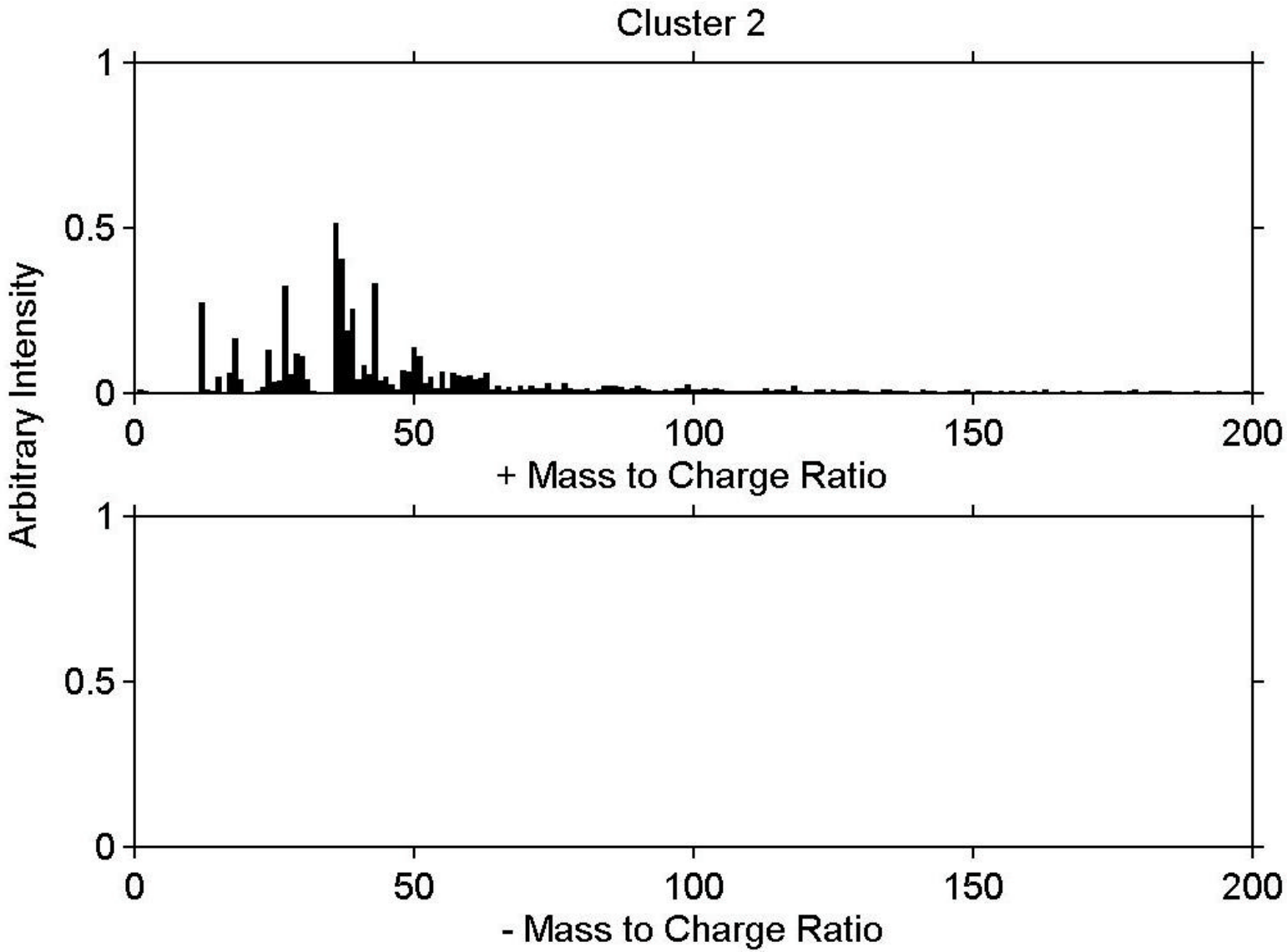
100
150
200
- Mass to Charge Ratio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Arbitrary Intensity
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100
150
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+ Mass to Charge Ratio
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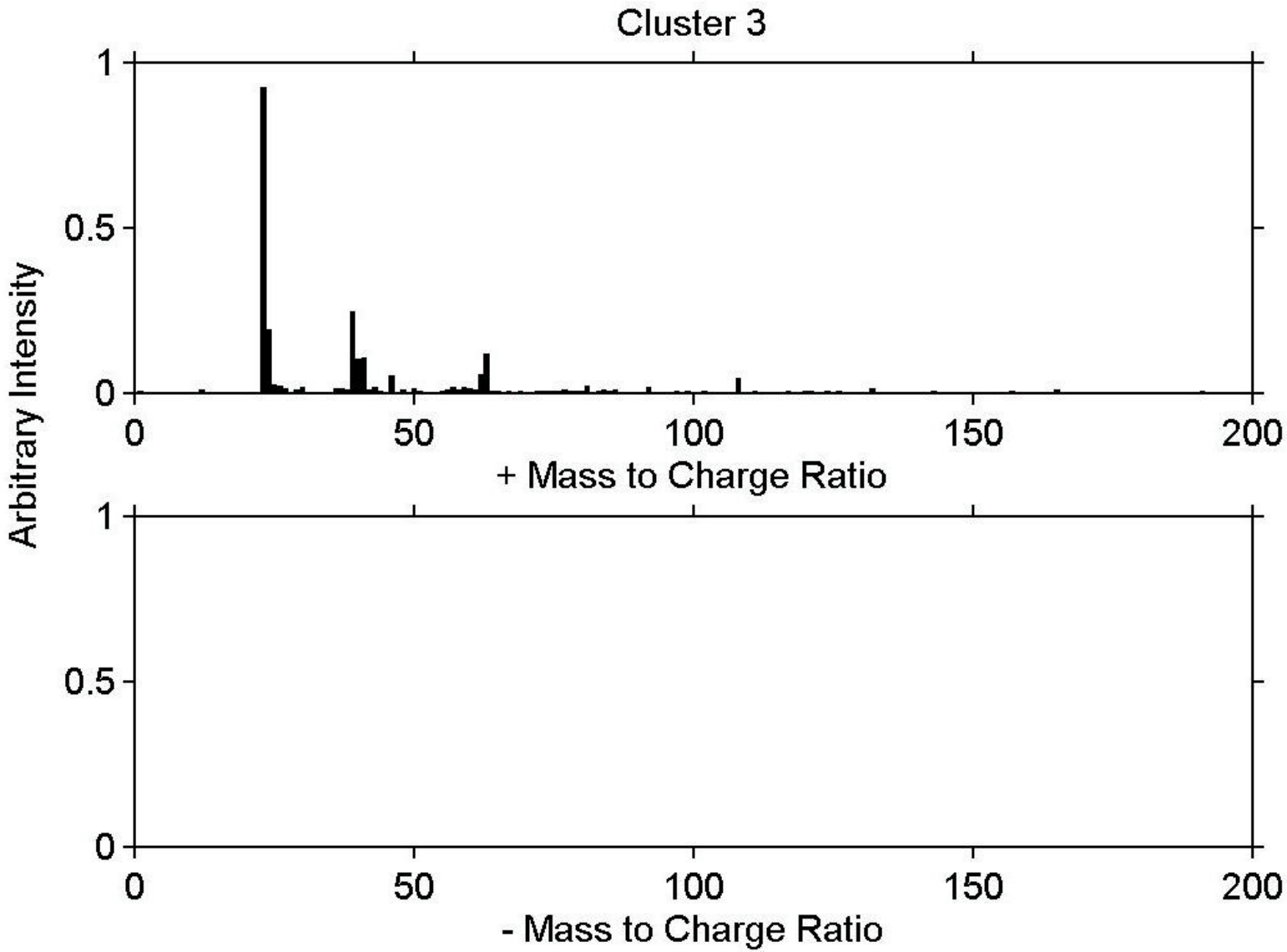
0
50
100
150
200
- Mass to Charge Ratio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Arbitrary Intensity
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100
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200
+ Mass to Charge Ratio
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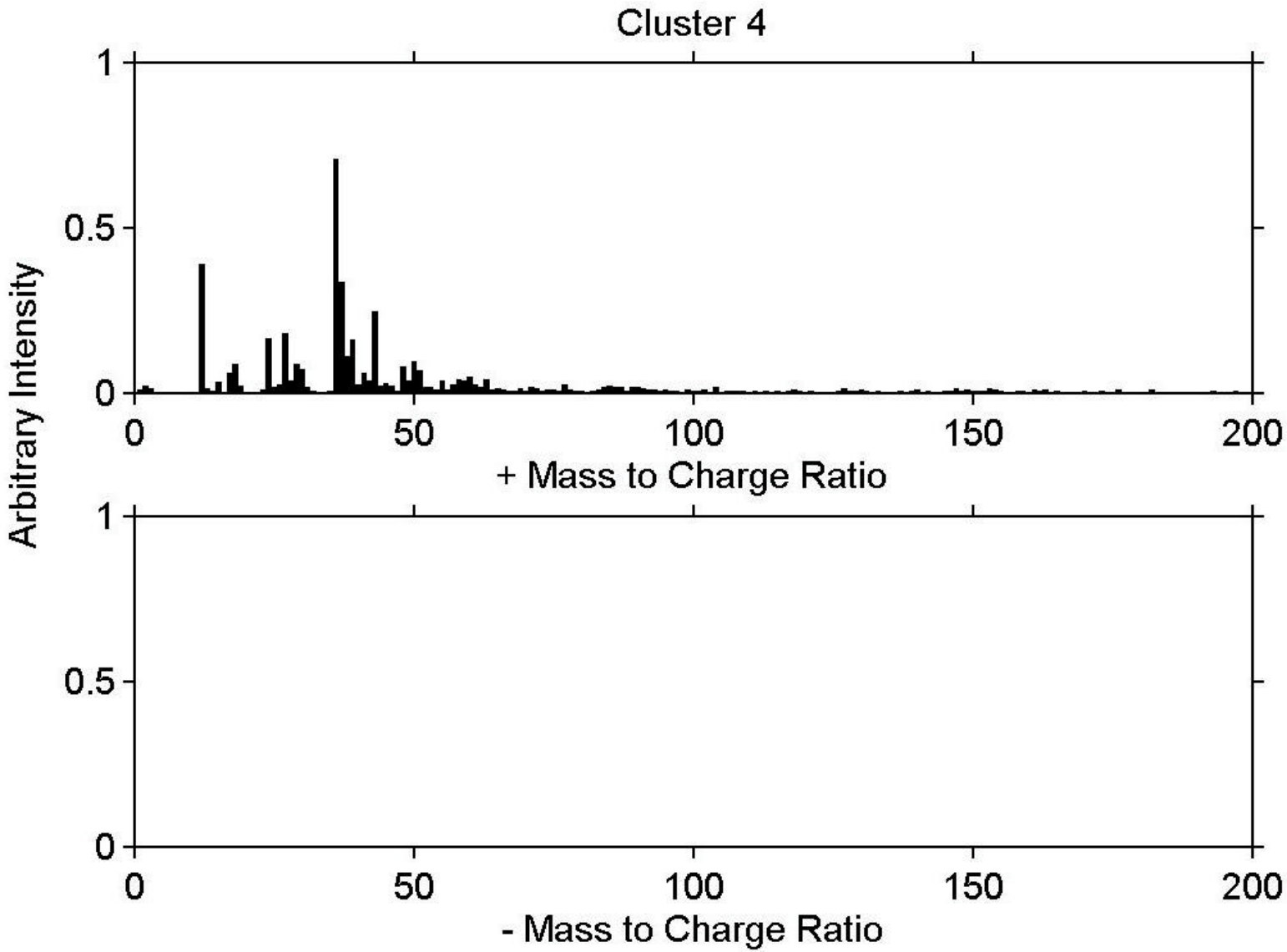
0
50
100
150
200
- Mass to Charge Ratio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Arbitrary Intensity
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+ Mass to Charge Ratio
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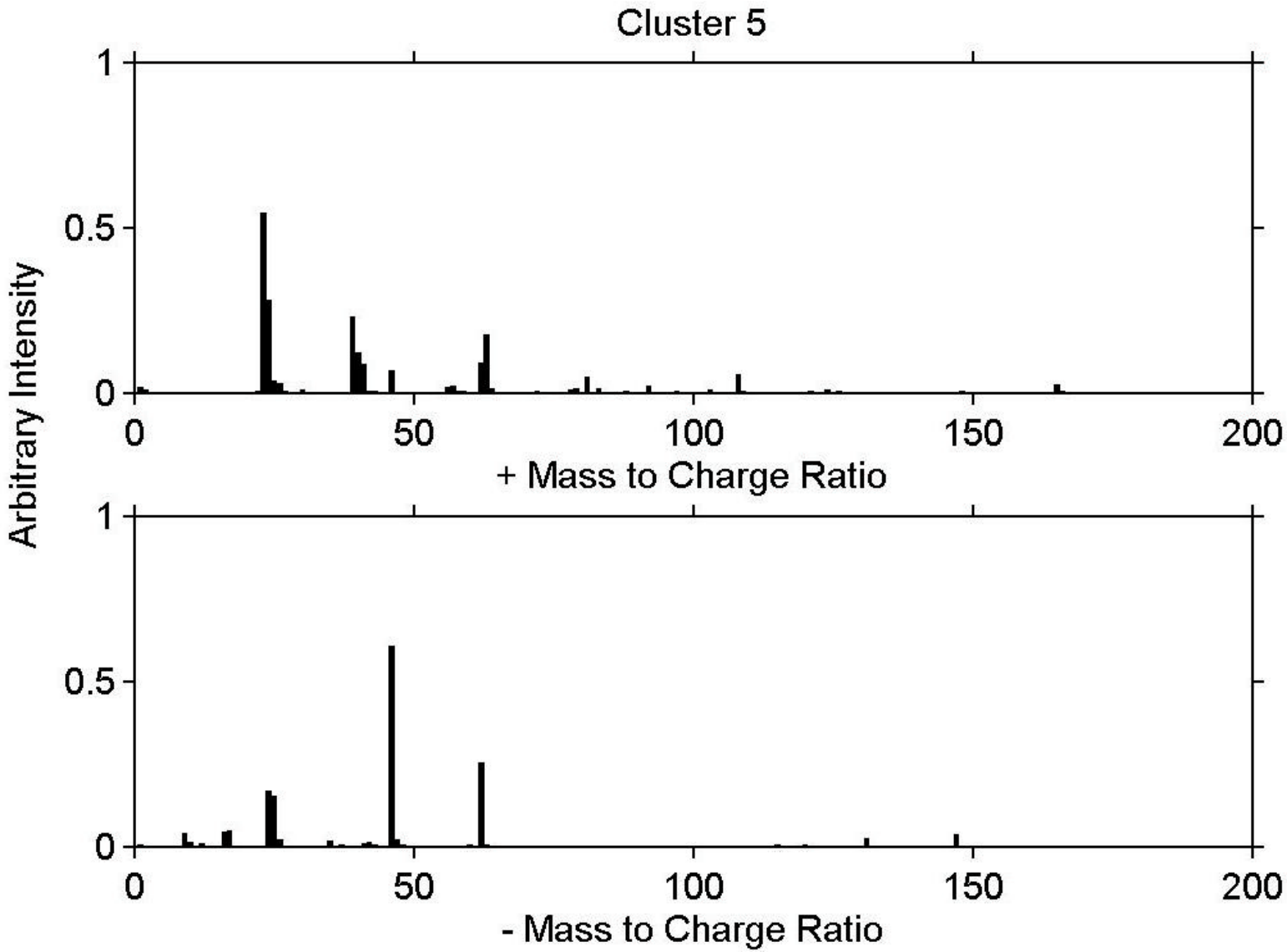
100
150
200
- Mass to Charge Ratio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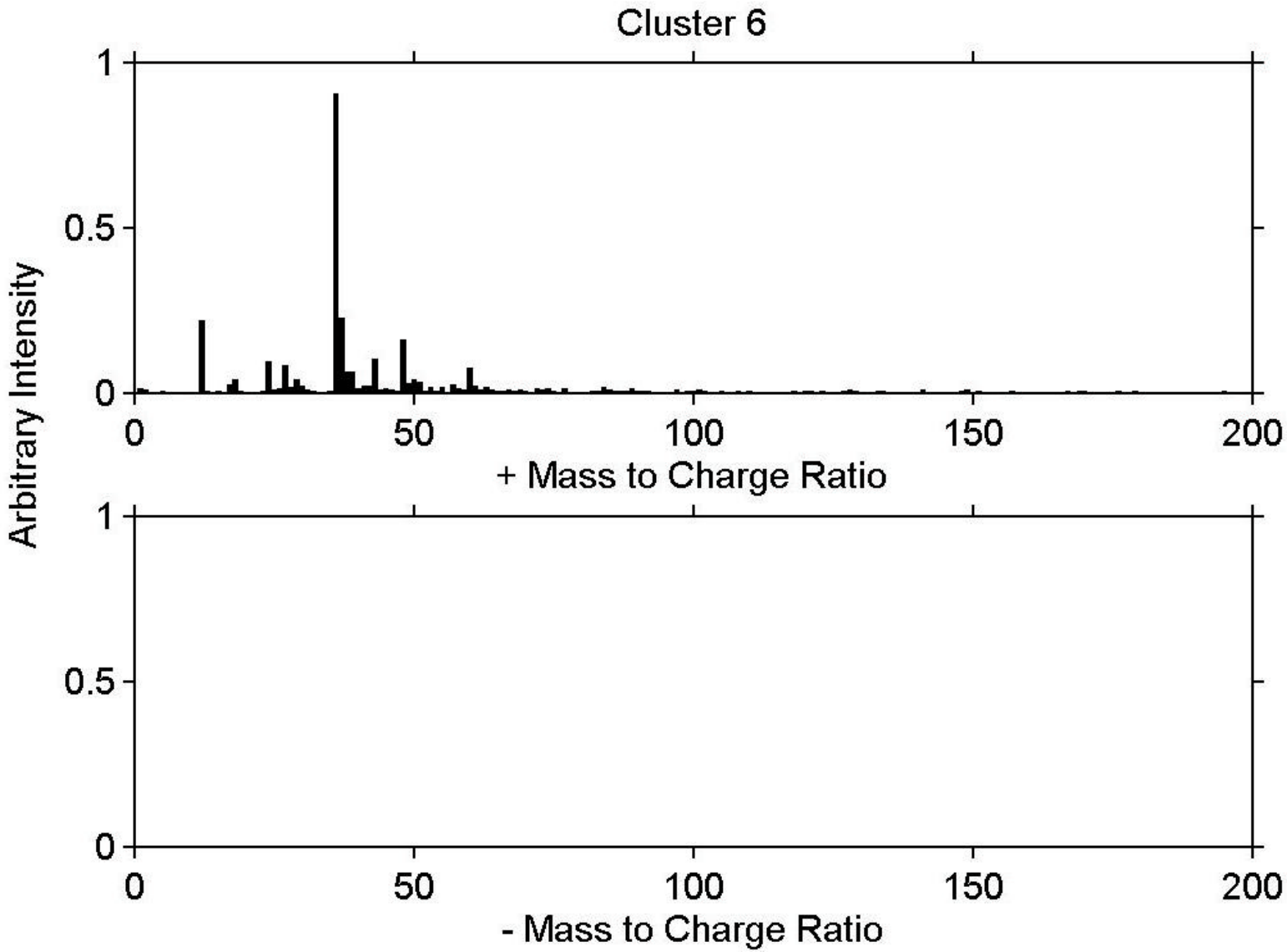
100
150
200
- Mass to Charge Ratio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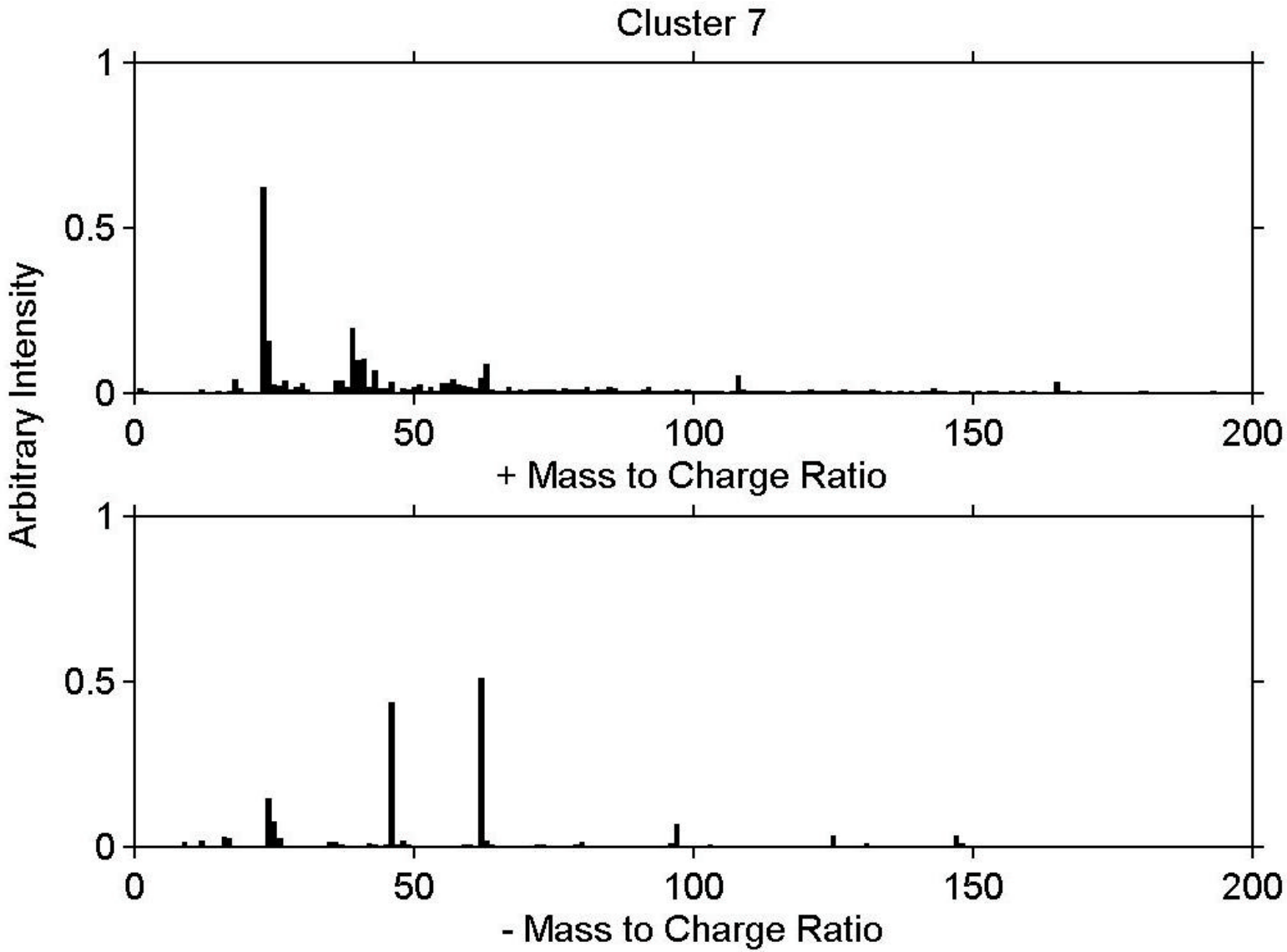
150
200
- Mass to Charge Ratio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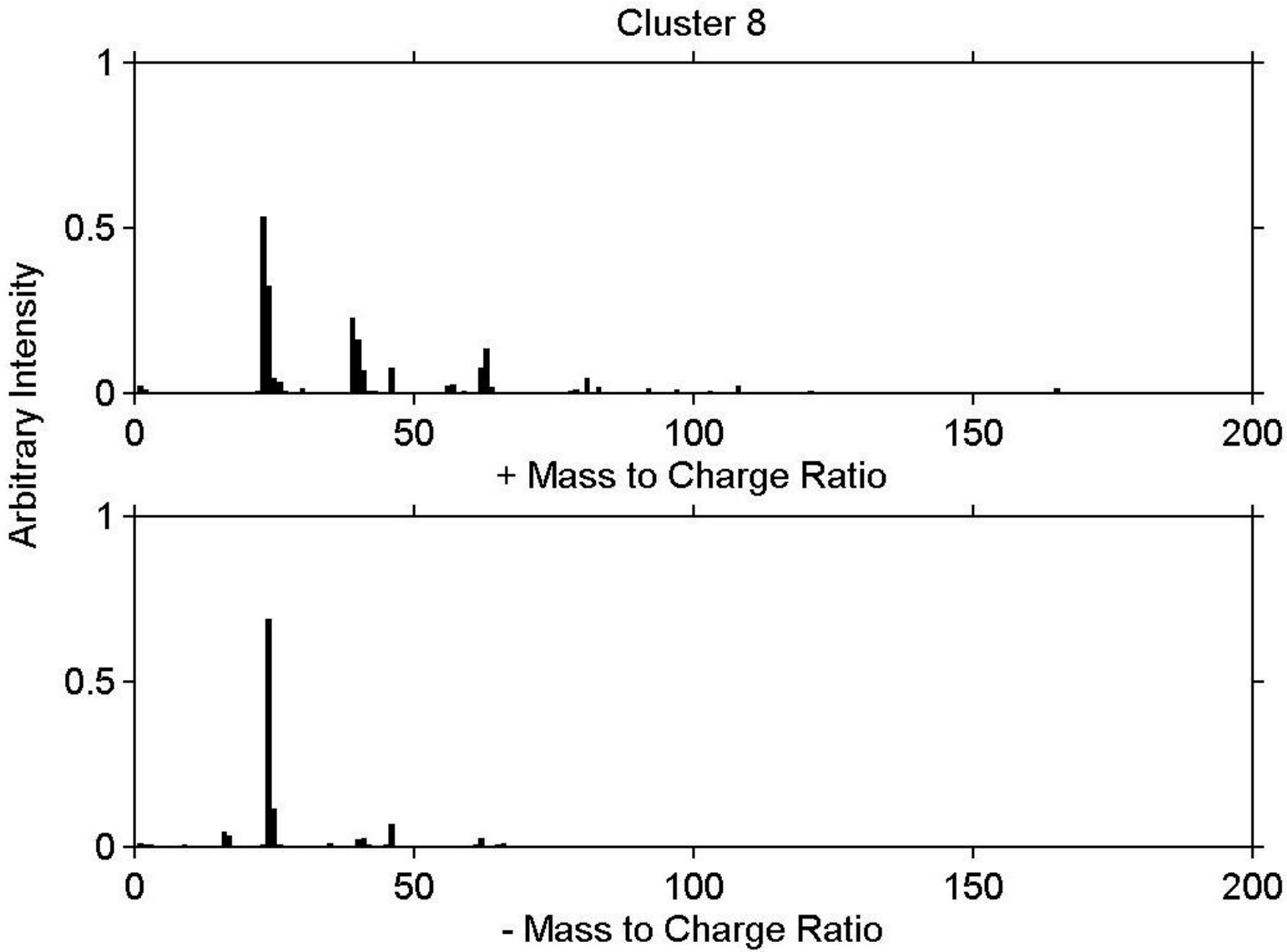
- Mass to Charge Ratio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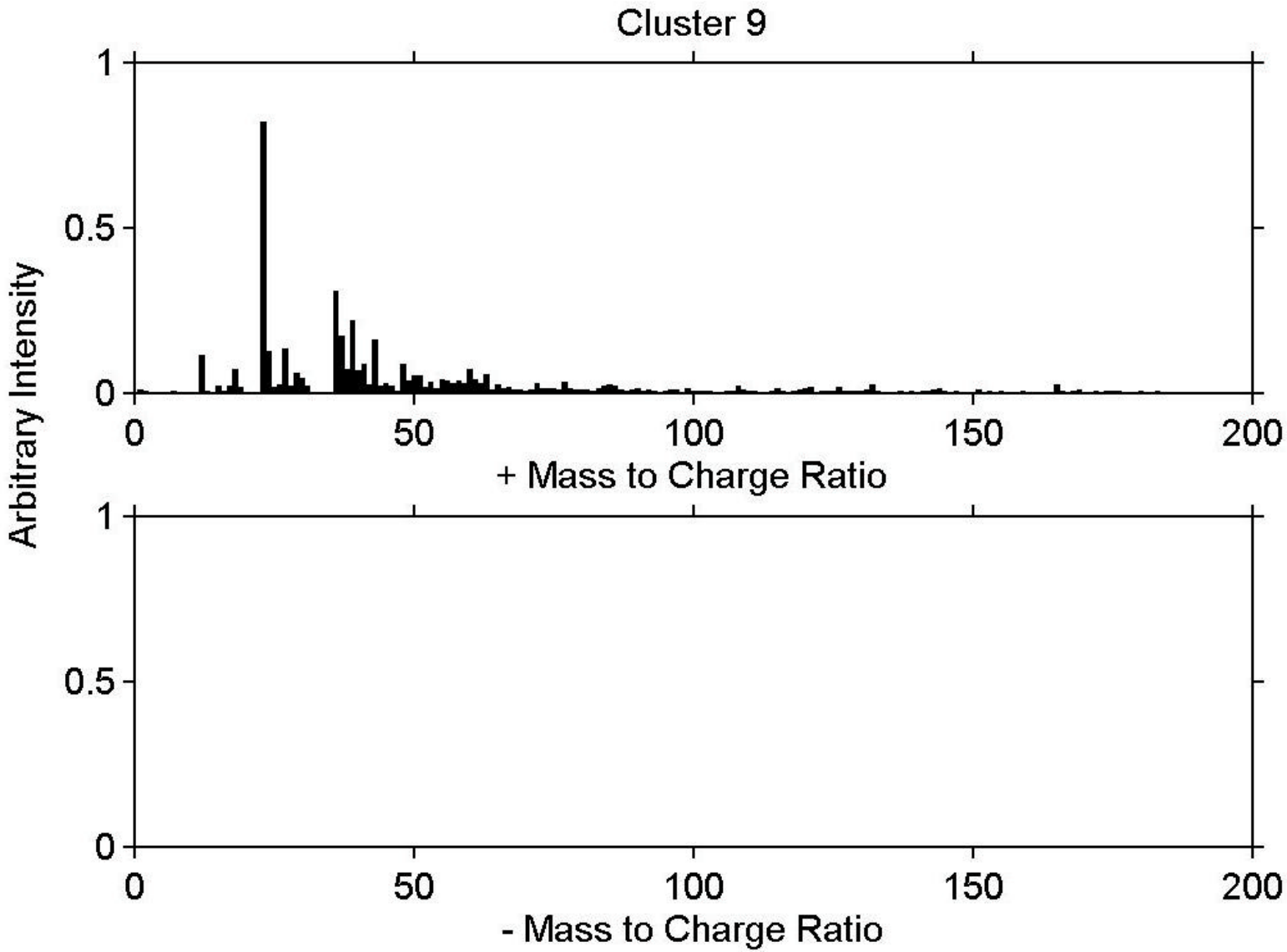
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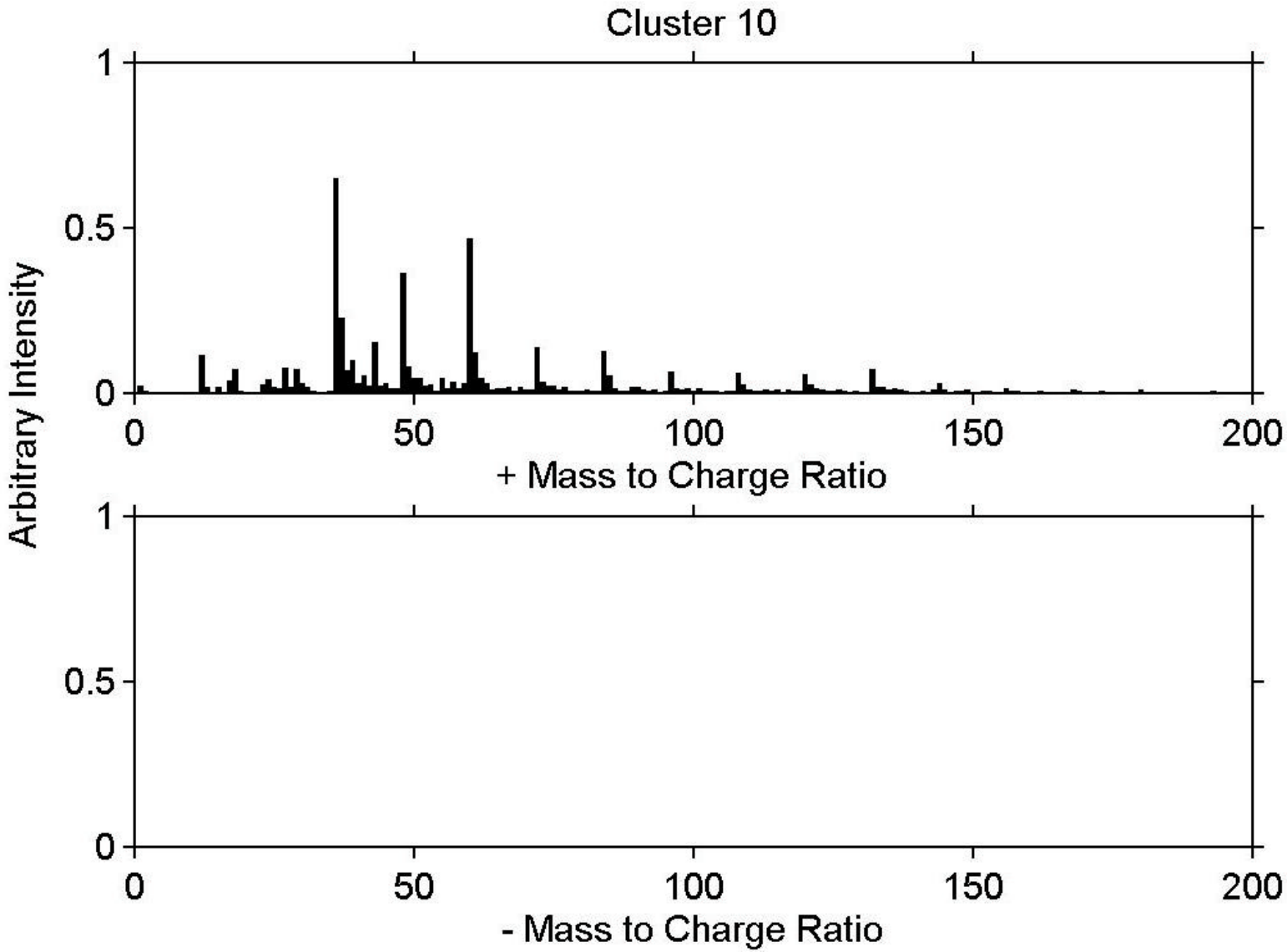
- Mass to Charge Ratio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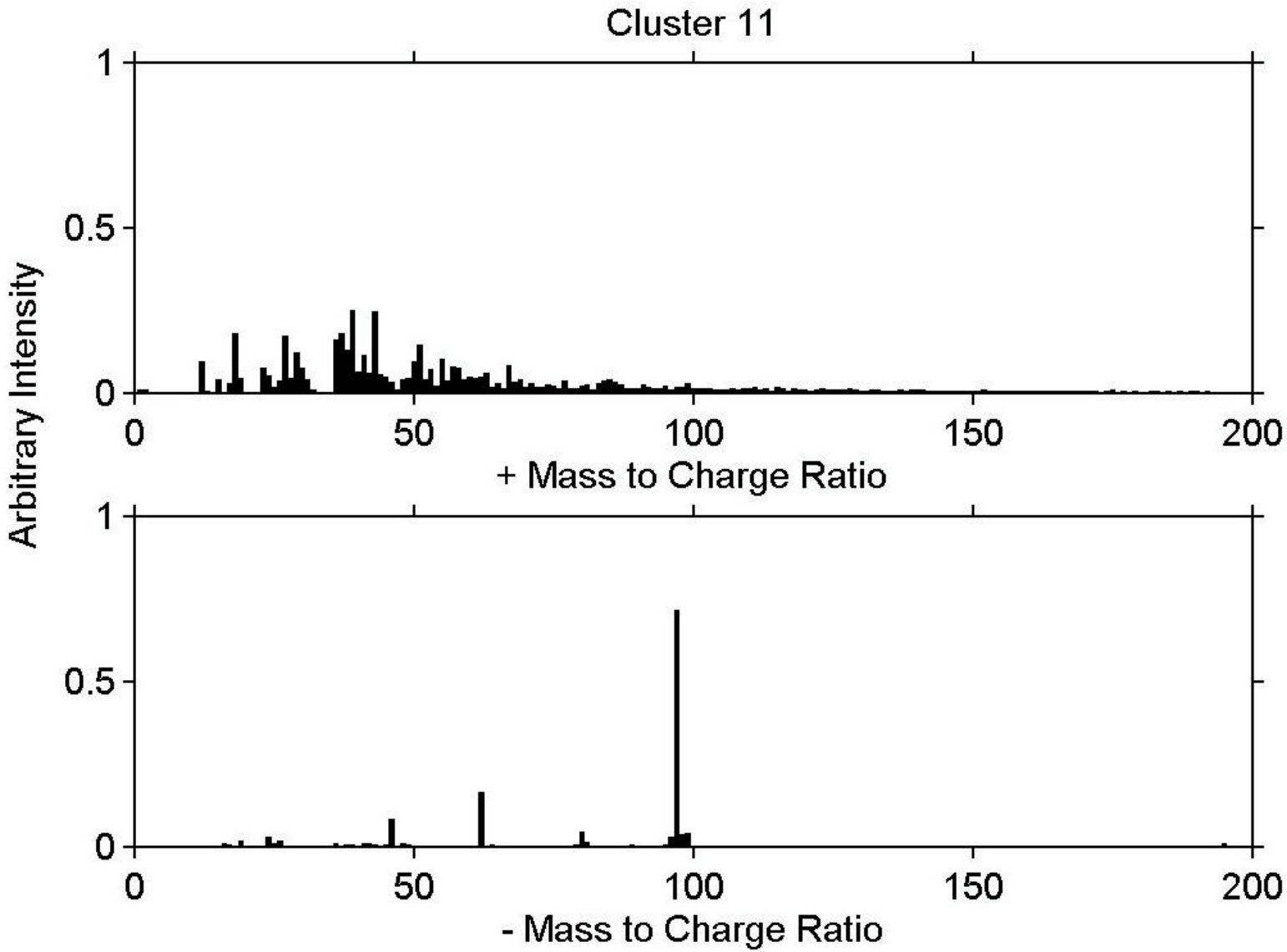
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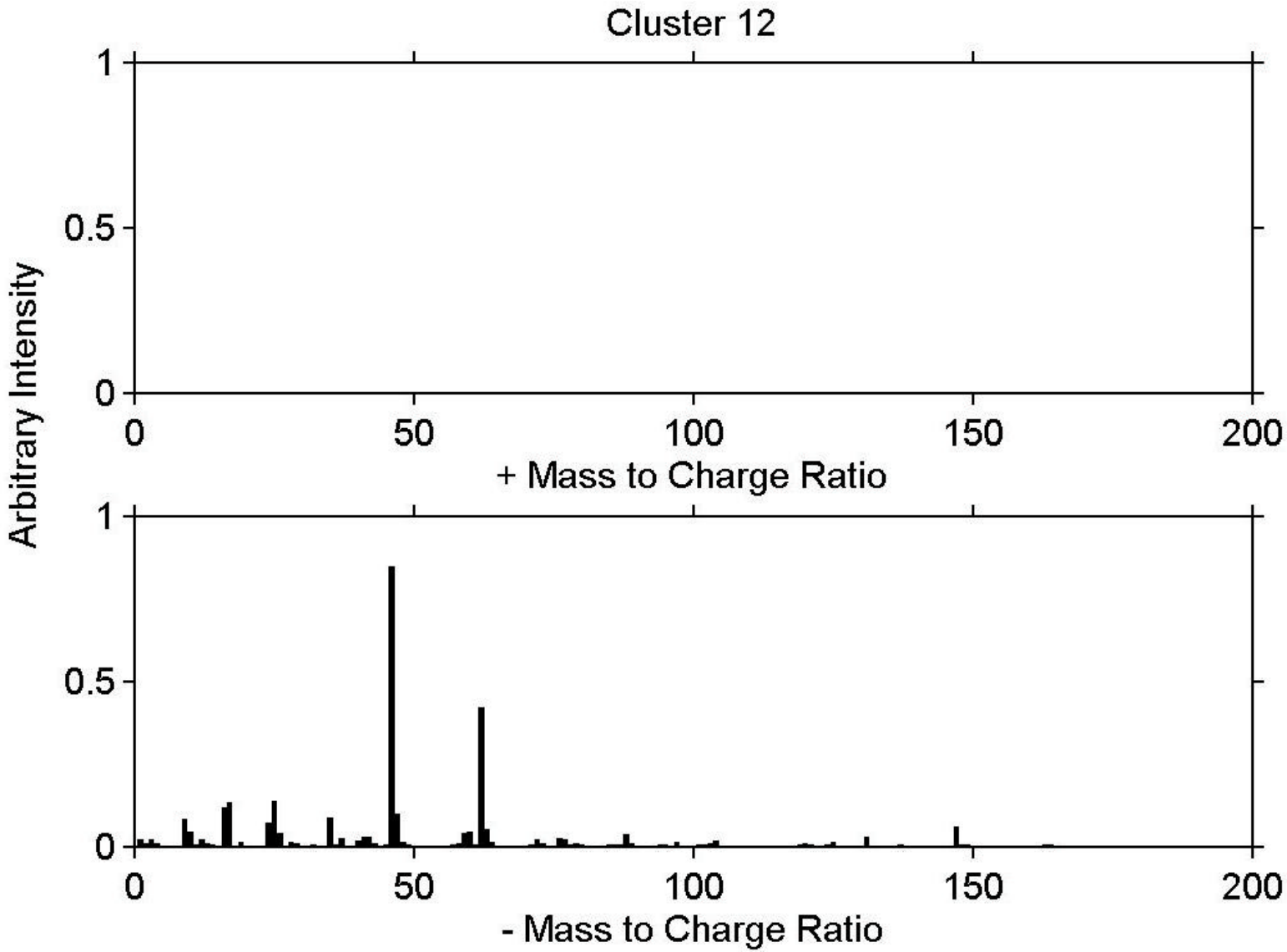
- Mass to Charge Ratio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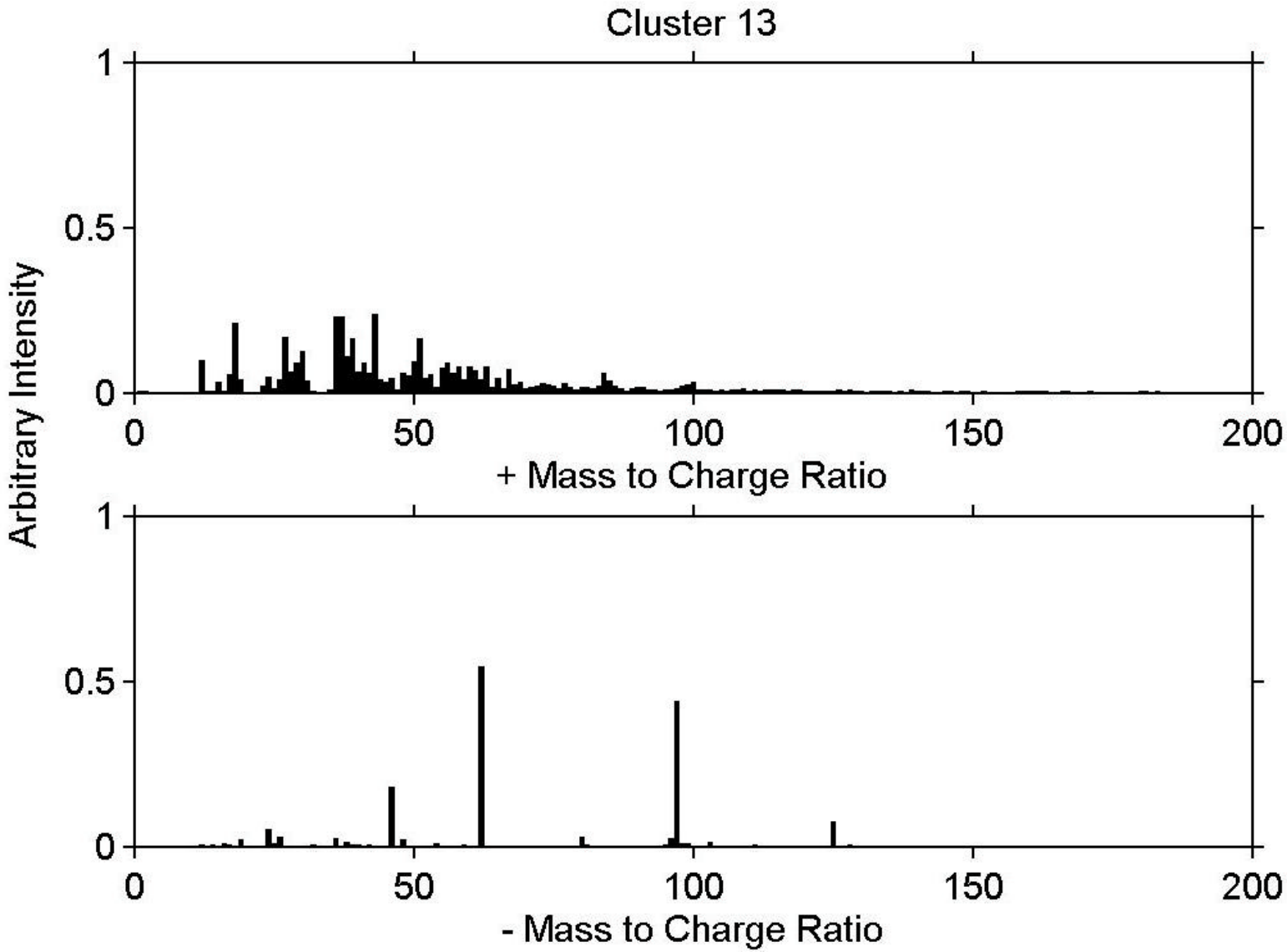
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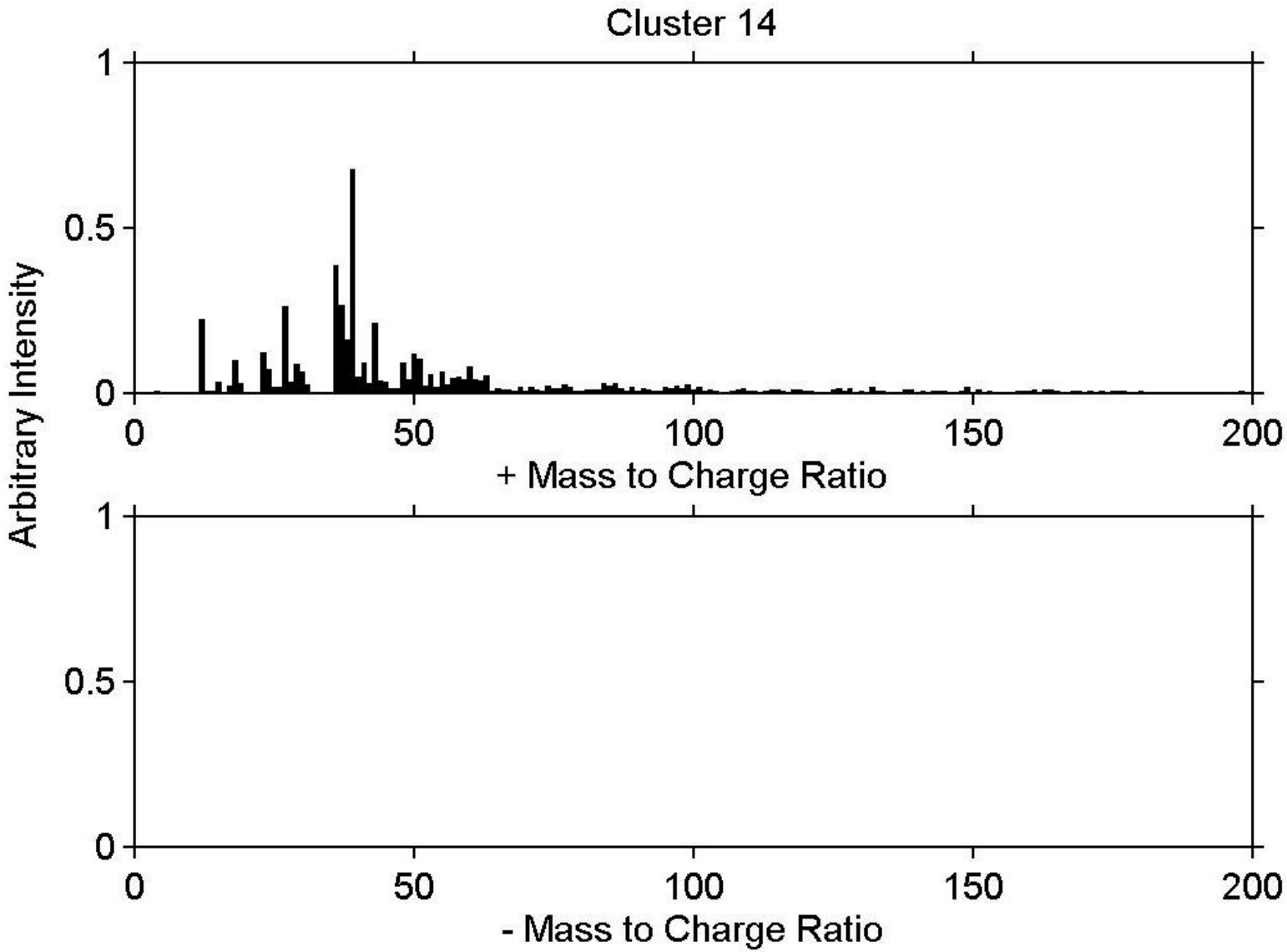
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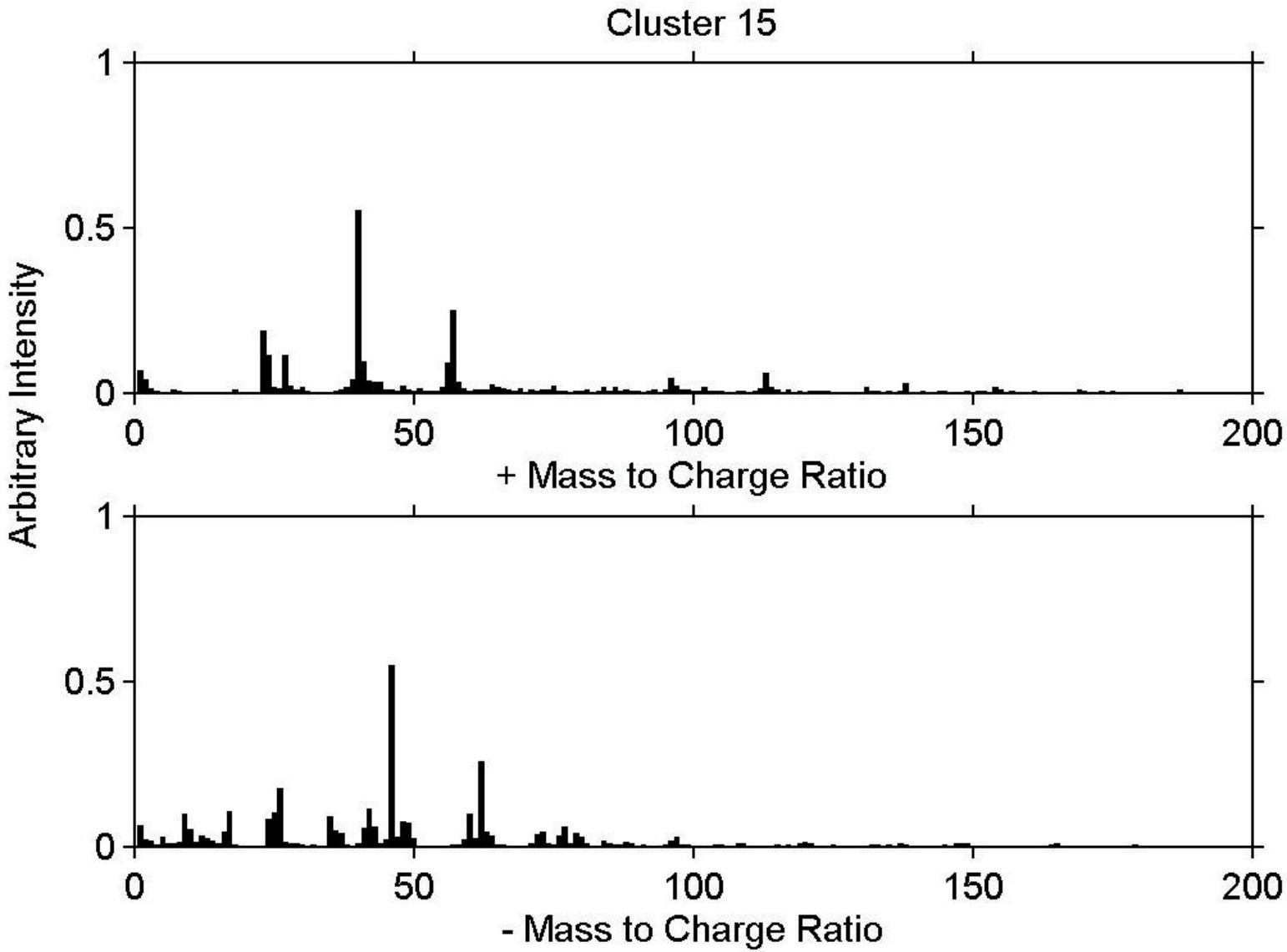
- Mass to Charge Ratio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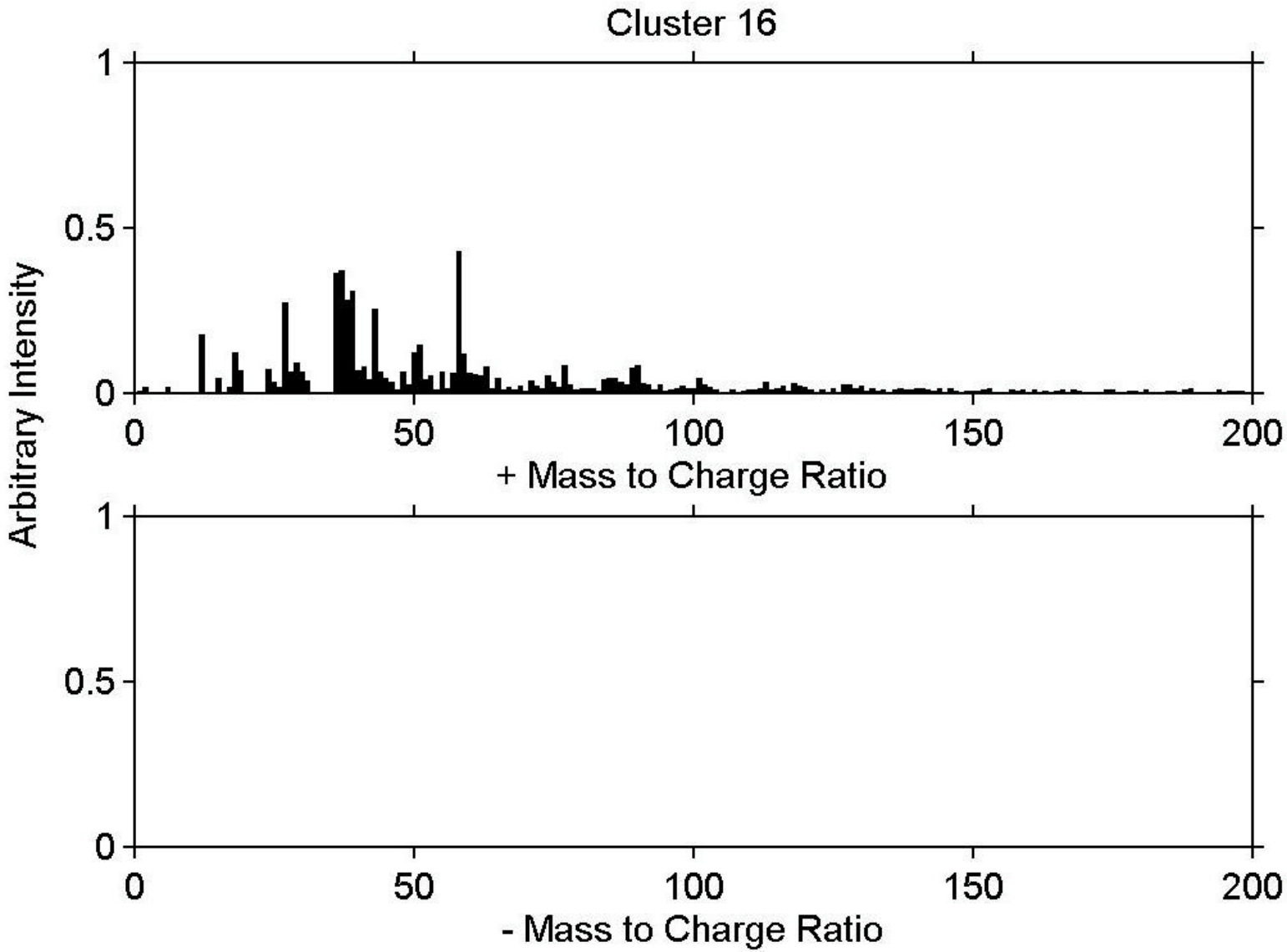
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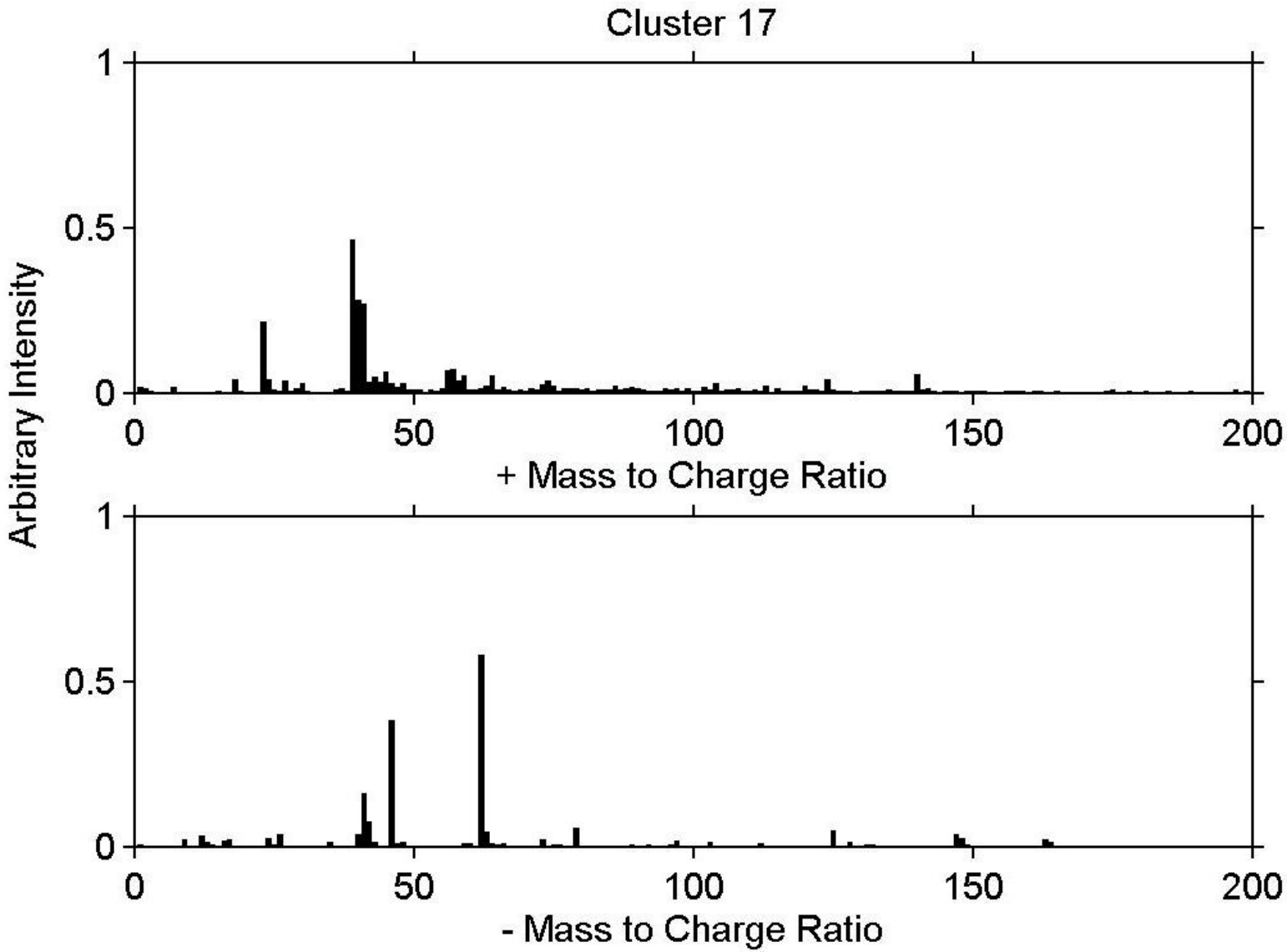
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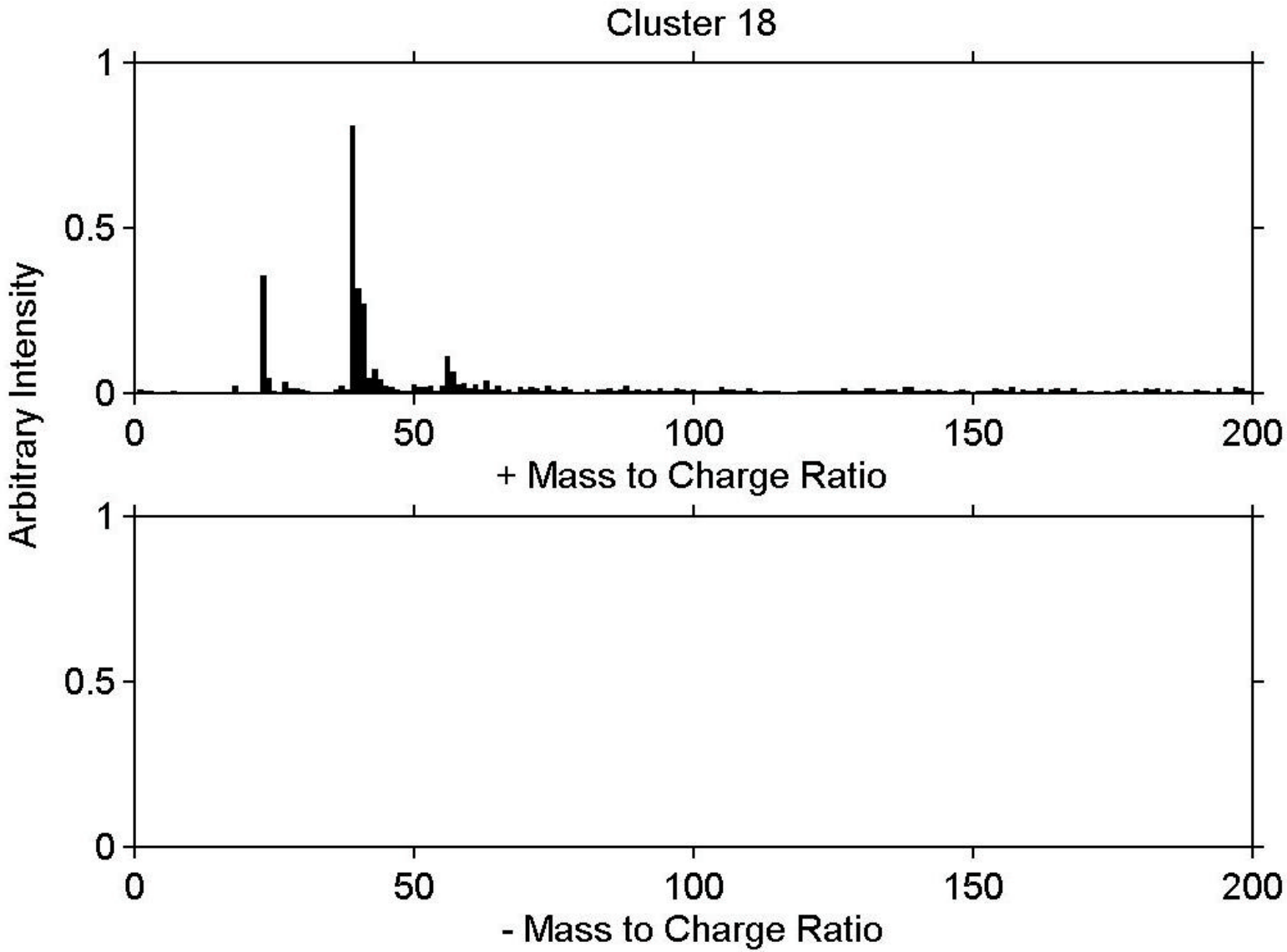
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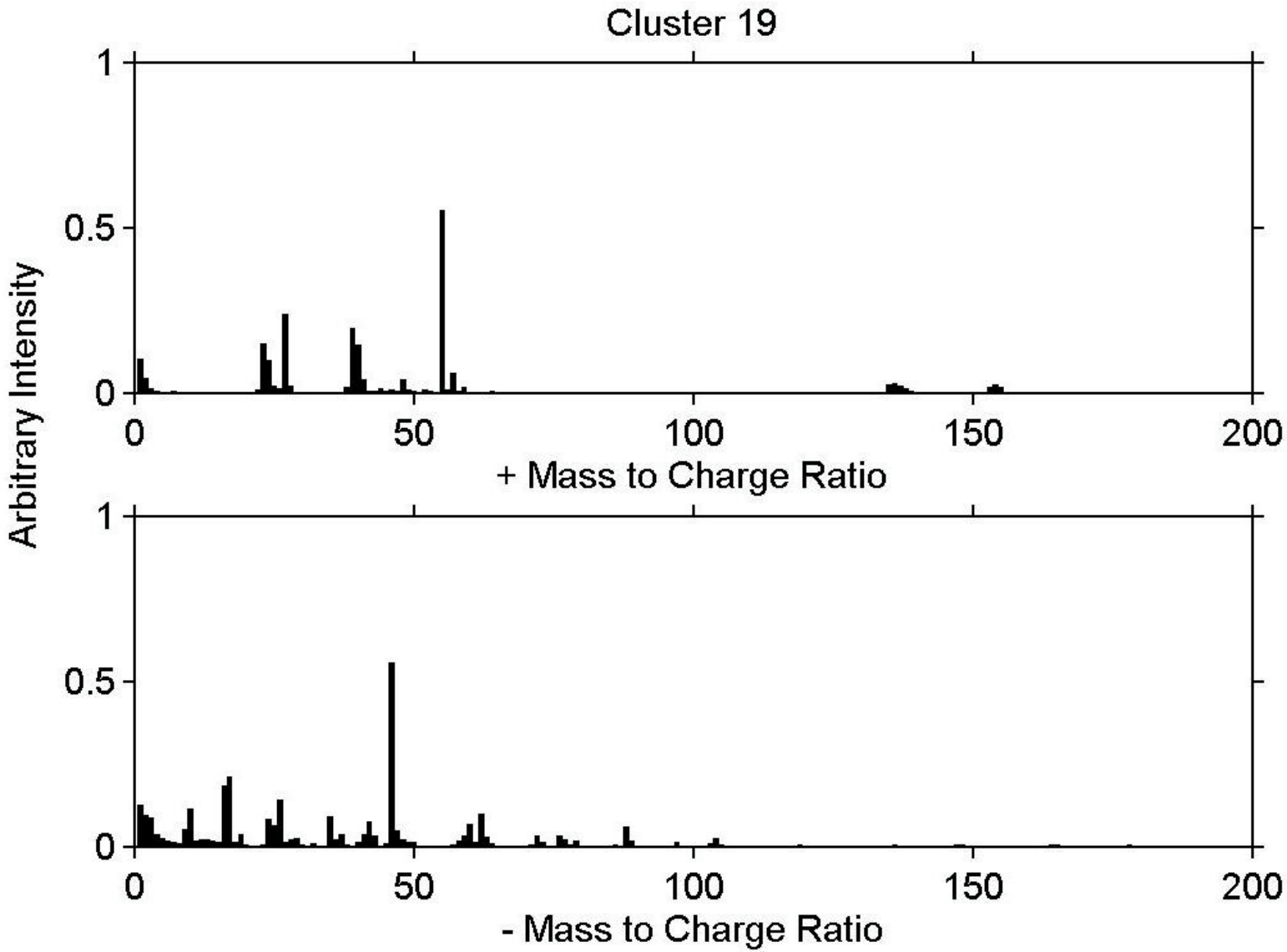
- Mass to Charge Ratio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Arbitrary Intensity
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+ Mass to Charge Ratio
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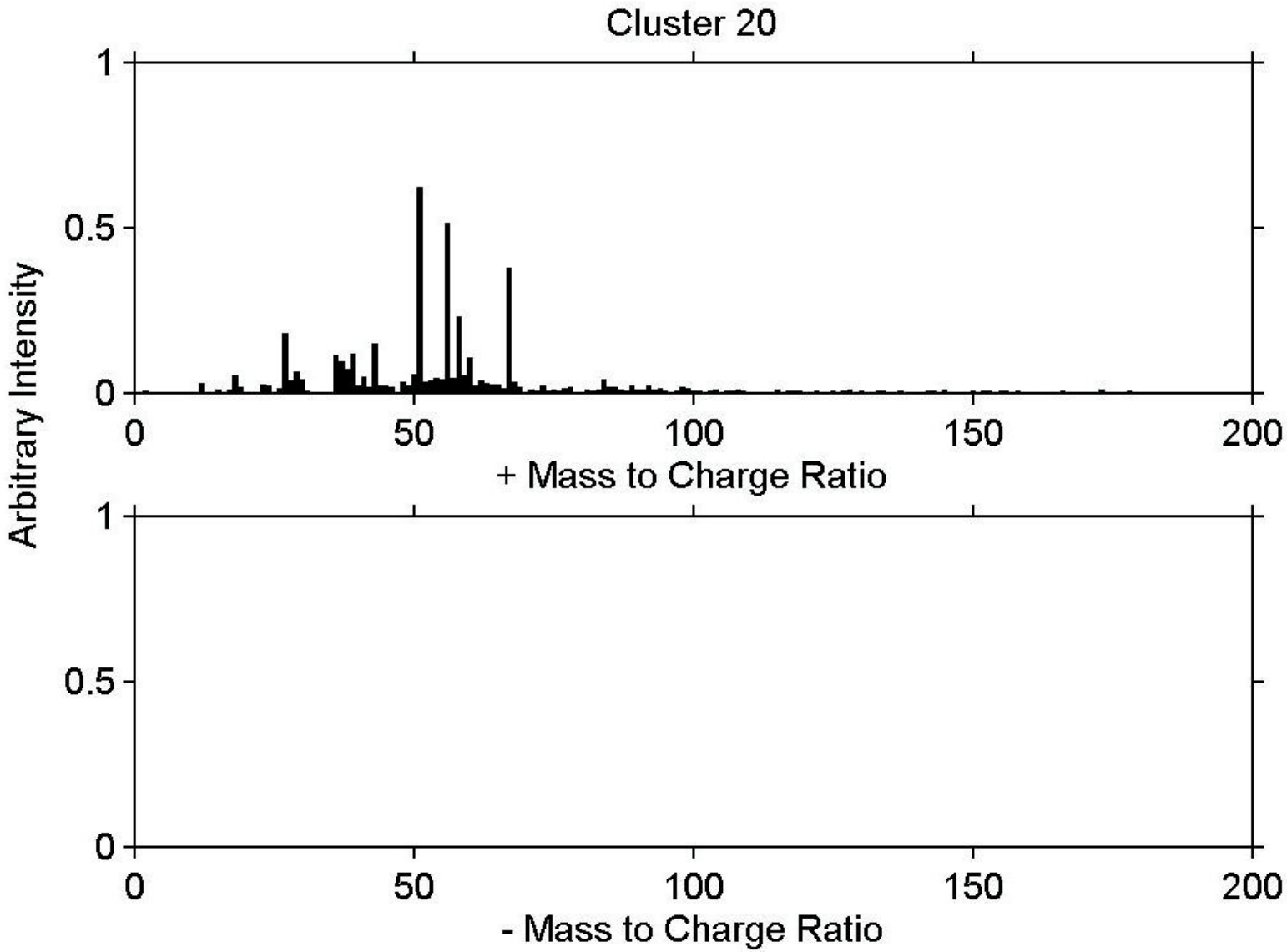
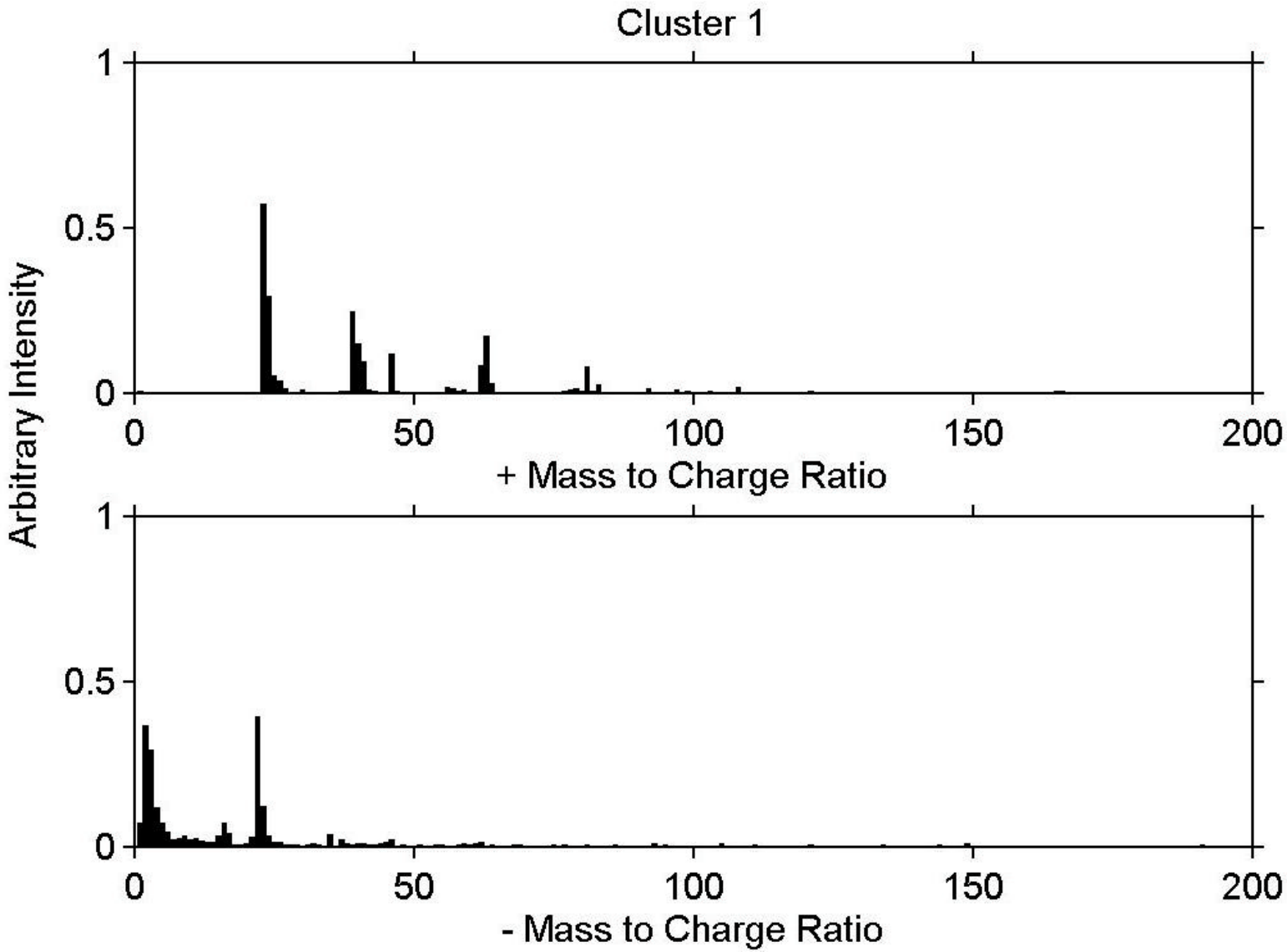
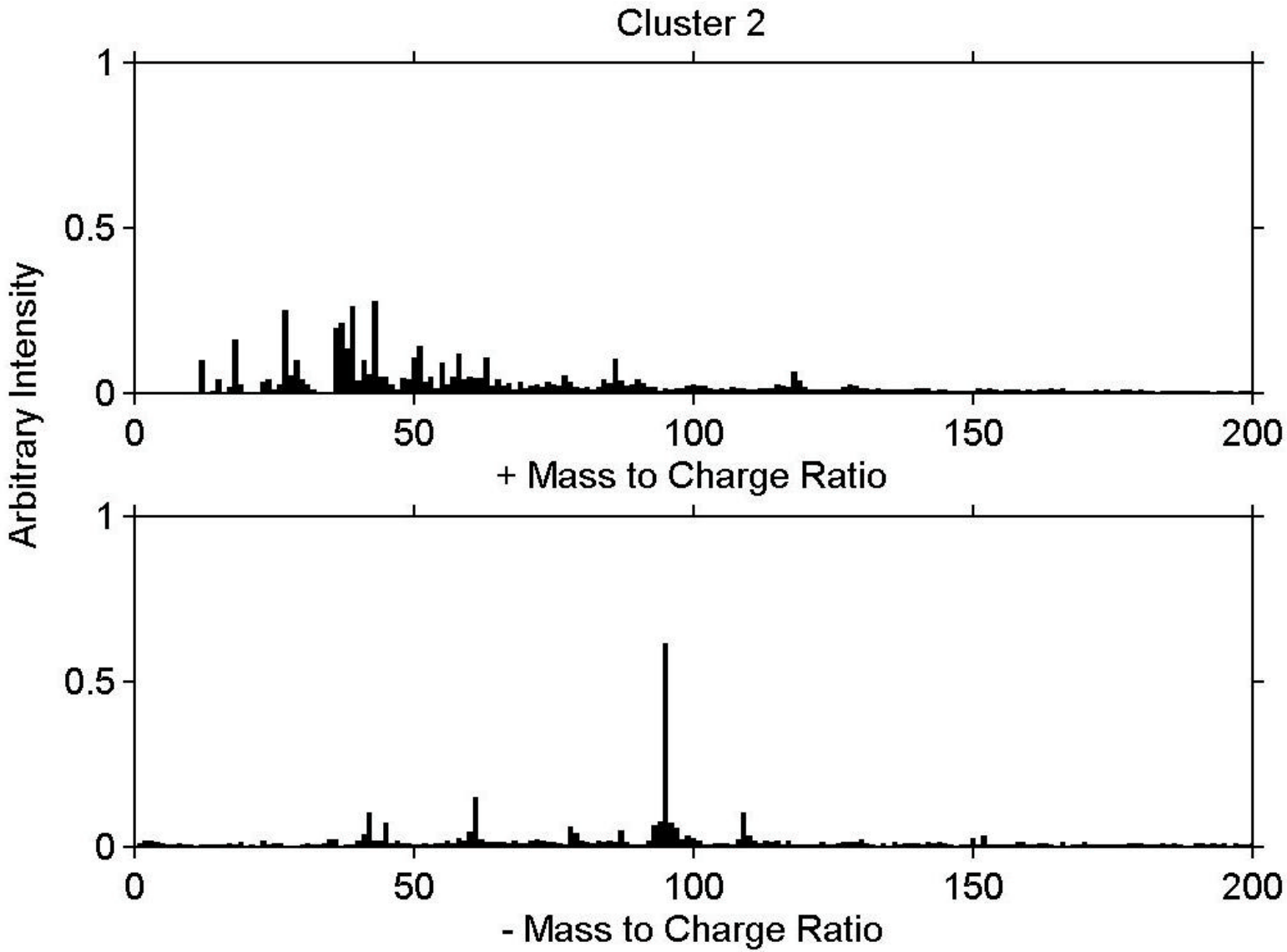
0
0
50
100
150
200
- Mass to Charge Ratio

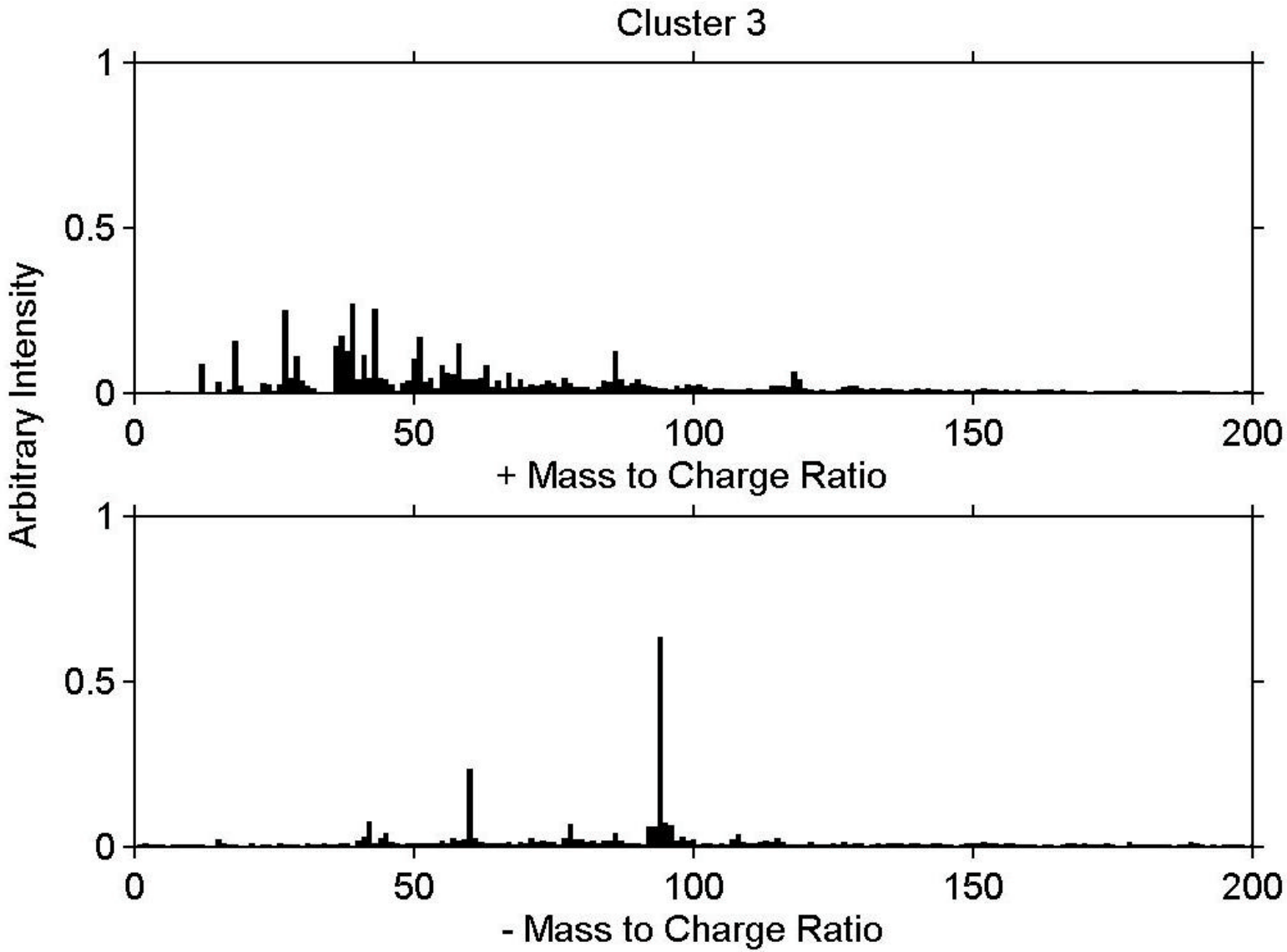

Cluster 20
Arbitrary Intensity
1
0.5
0
0
50
100
150
200
+ Mass to Charge Ratio
1
0.5
0
0
50
100
150
200
- Mass to Charge Ratio

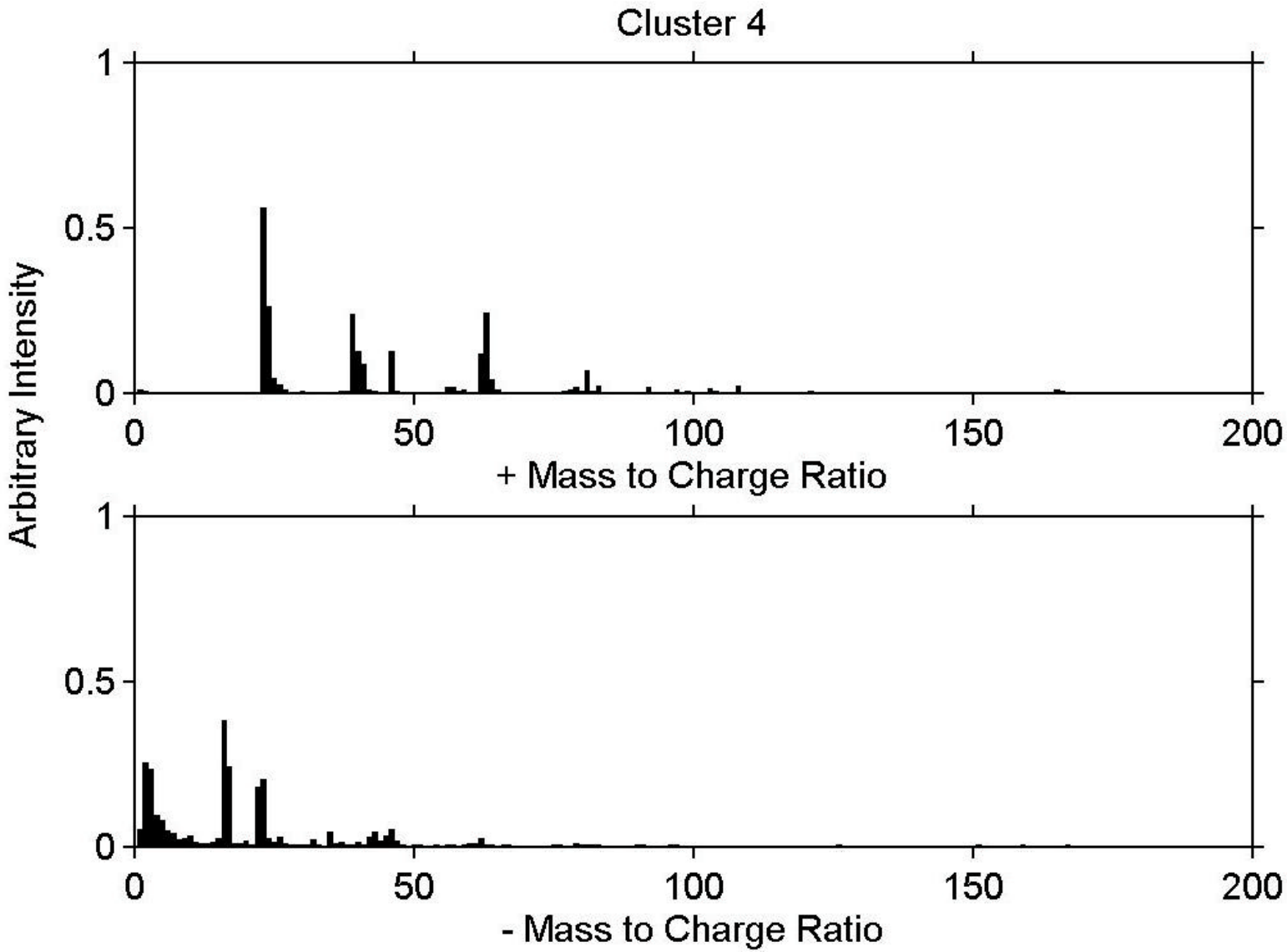
Appendix G: ART-2a dual-ion weight vectors for Azusa ambient August 21, 1997 17:30-22:30: m/z ratio and normalized intensity (vigilance factor = 0.7; 8 clusters). New clusters for particles not matching Los Angeles.

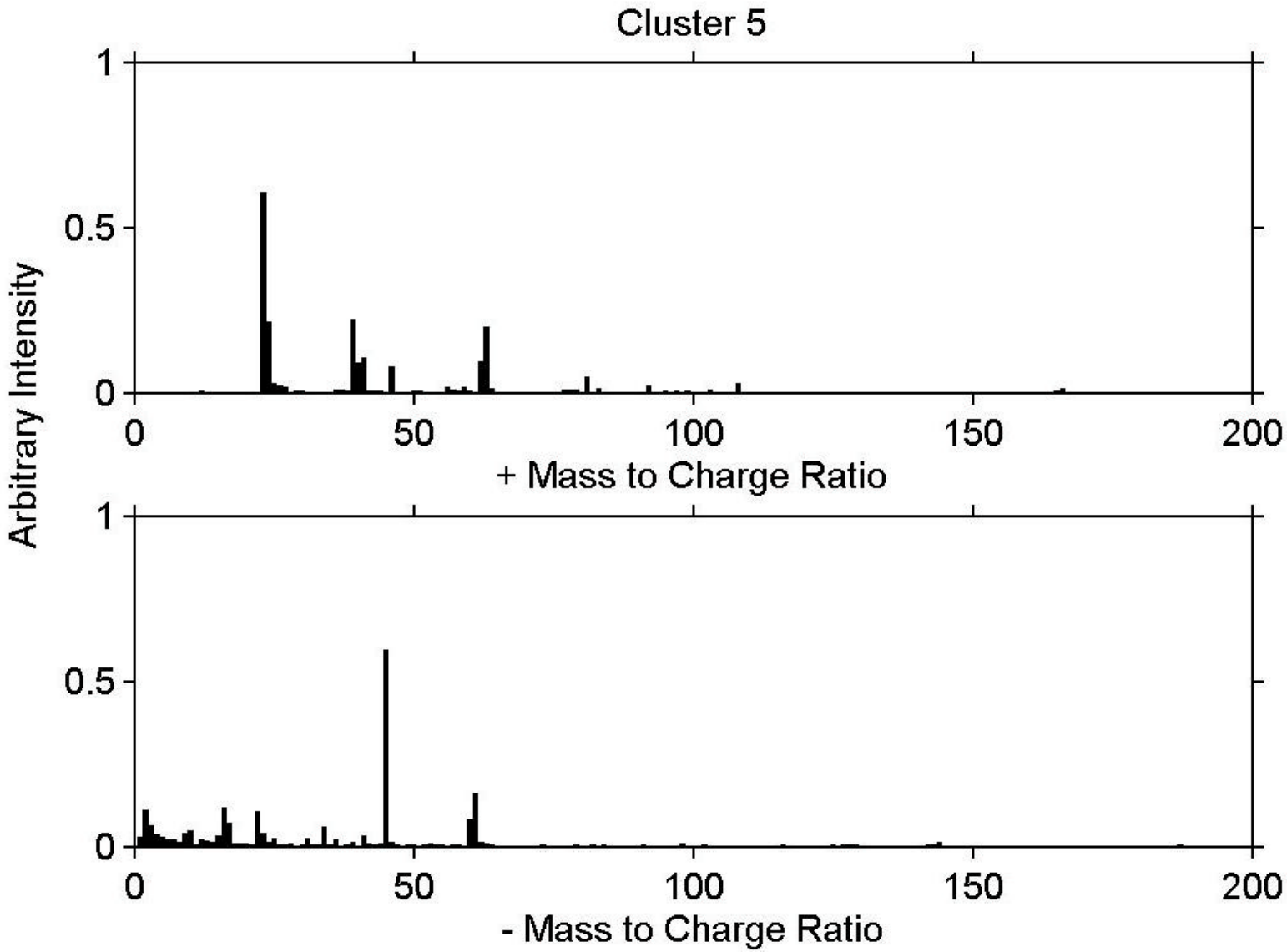
Class #	Number of particles in the class
	Azusa
1	42
2	40
3	39
4	26
5	21
6	21
7	13
8	13

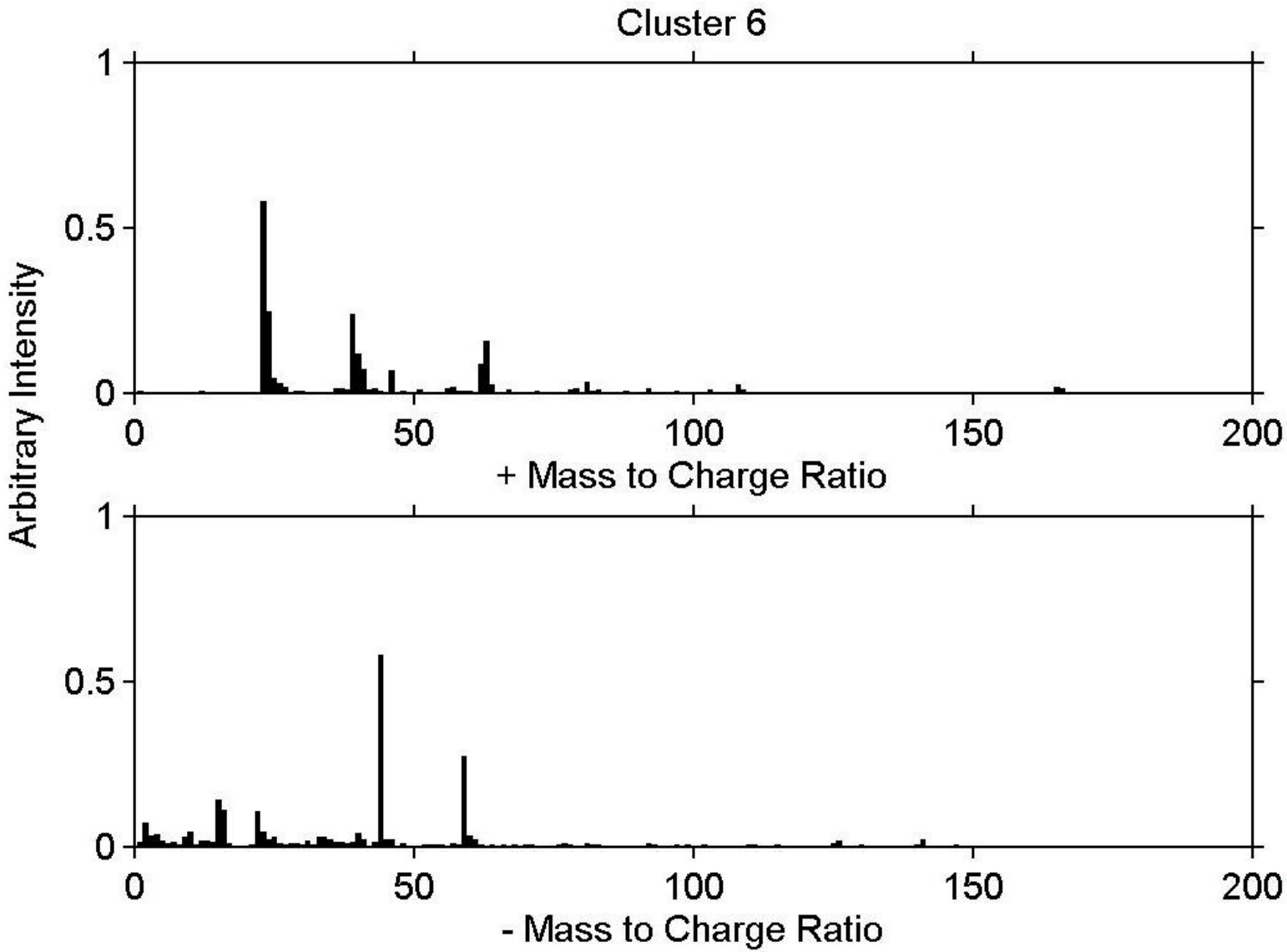

Cluster 1
Arbitrary Intensity
1
0.5
0
0
50
100
150
200
+ Mass to Charge Ratio
1
0.5
0
0
50
100
150
200
- Mass to Charge Ratio

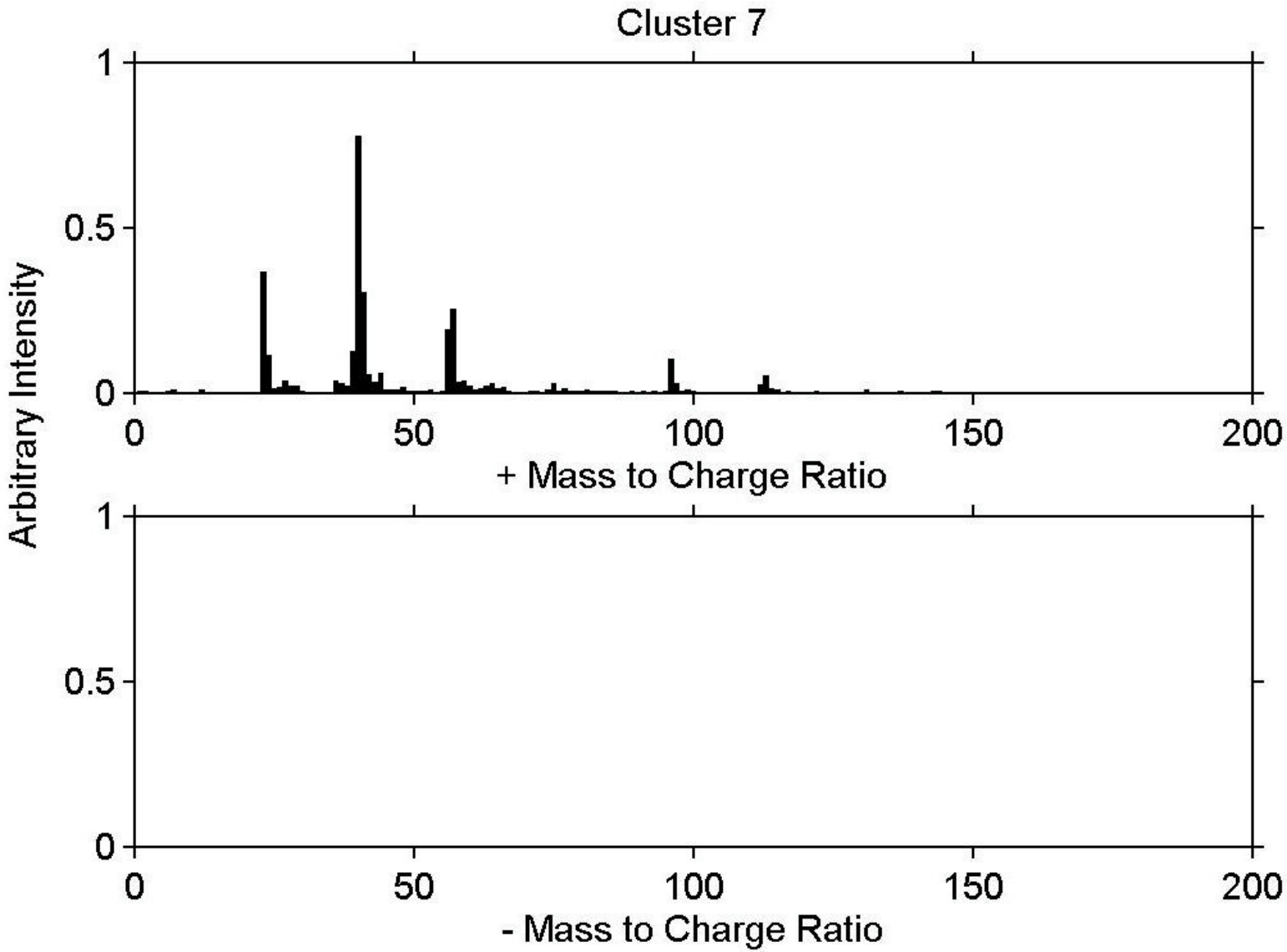

Cluster 2
Arbitrary Intensity
1
0.5
0
0
50
100
150
200
+ Mass to Charge Ratio
1
0.5
0
0
50
100
150
200
- Mass to Charge Ratio

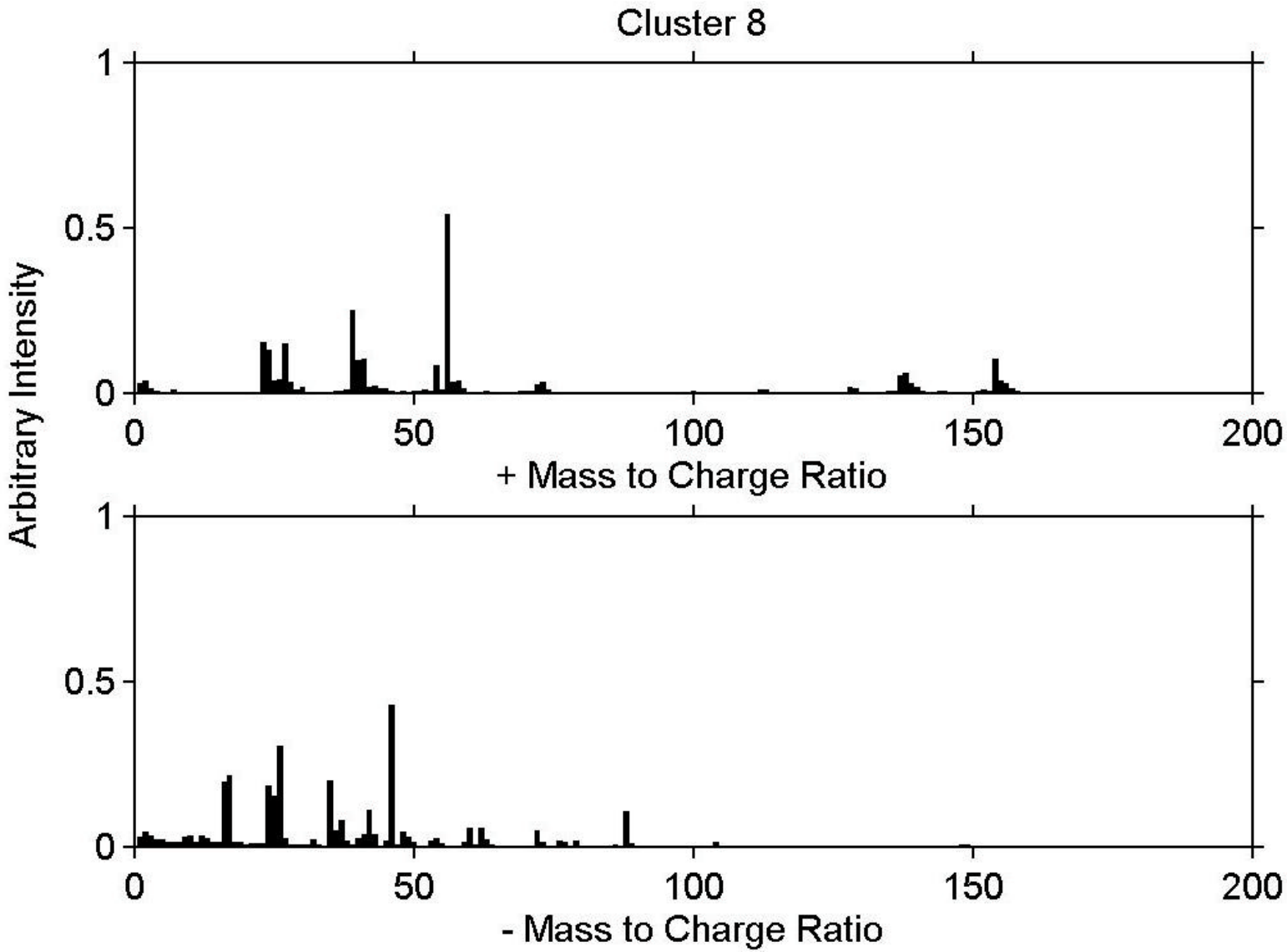

Cluster 3
Arbitrary Intensity
1
0.5
0
0
50
100
150
200
+ Mass to Charge Ratio
1
0.5
0
0
50
100
150
200
- Mass to Charge Ratio


Cluster 4
Arbitrary Intensity
1
0.5
0
0
50
100
150
200
+ Mass to Charge Ratio
1
0.5
0
0
50
100
150
200
- Mass to Charge Ratio


Cluster 5
Arbitrary Intensity
1
0.5
0
0
50
100
150
200
+ Mass to Charge Ratio
1
0.5
0
0
50
100
150
200
- Mass to Charge Ratio

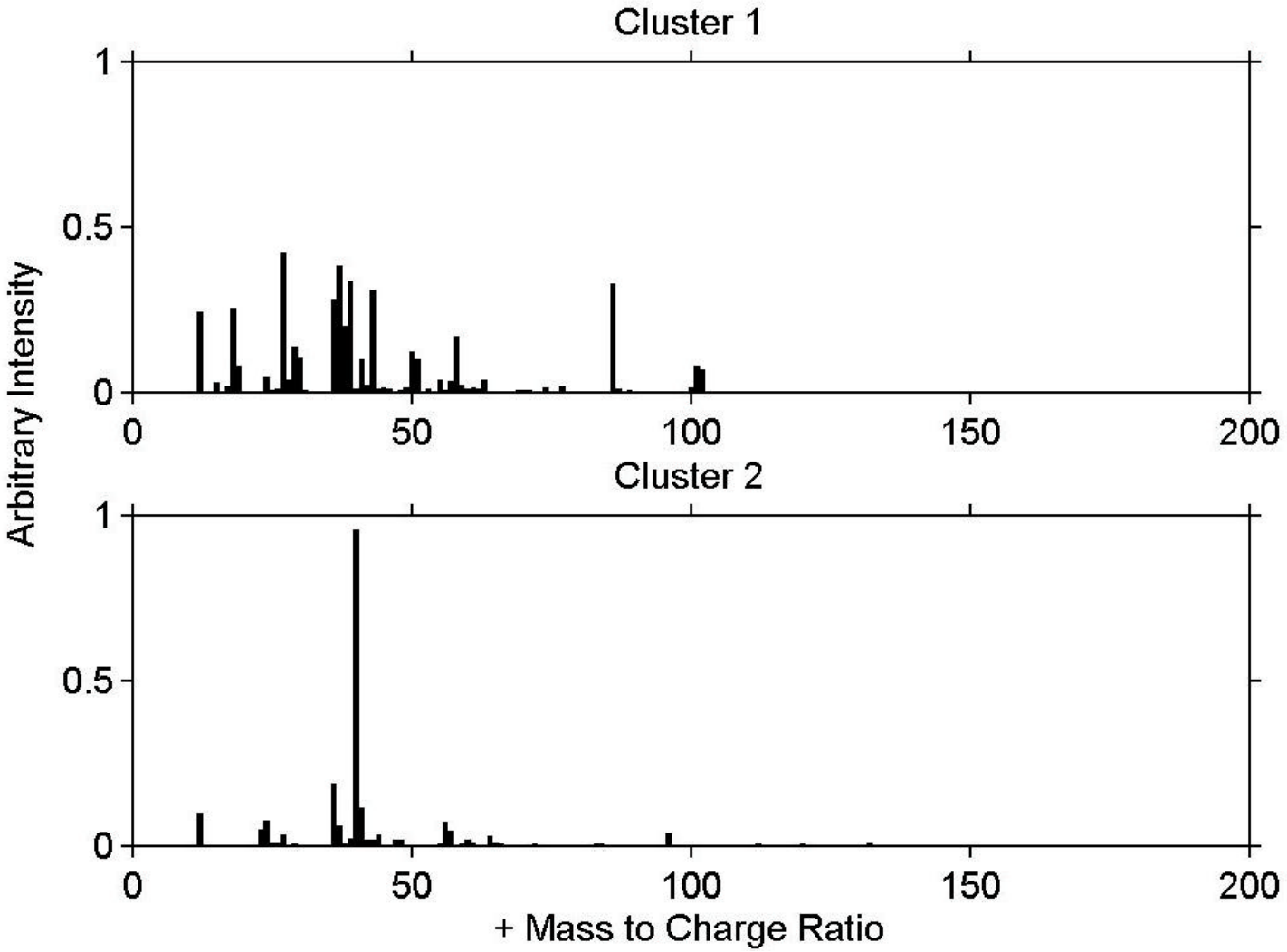

Cluster 6
Arbitrary Intensity
1
0.5
0
0
50
100
150
200
+ Mass to Charge Ratio
1
0.5
0
0
50
100
150
200
- Mass to Charge Ratio

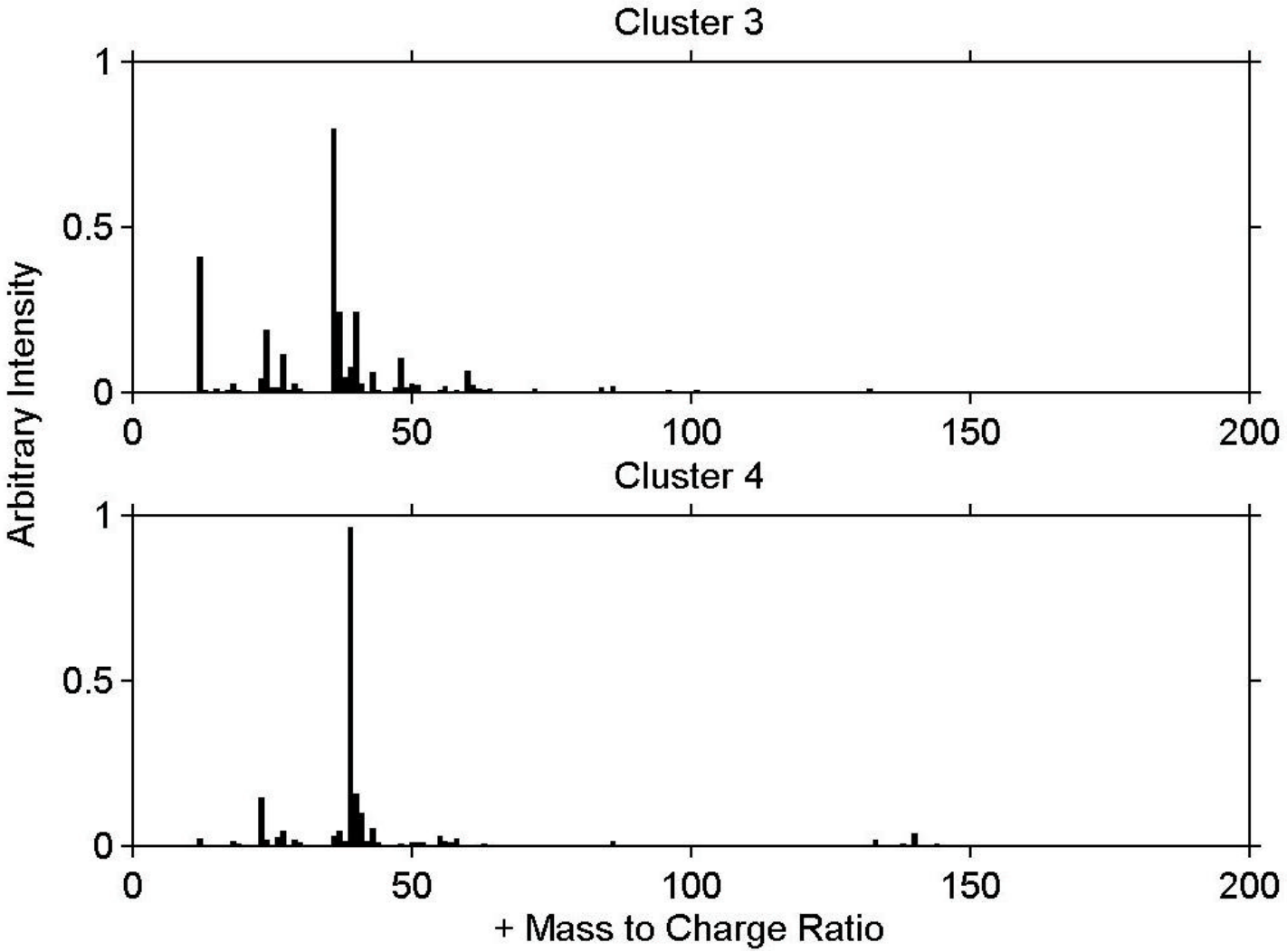

Cluster 7
Arbitrary Intensity
1
0.5
0
0
50
100
150
200
+ Mass to Charge Ratio
1
0.5
0
0
50
100
150
200
- Mass to Charge Ratio

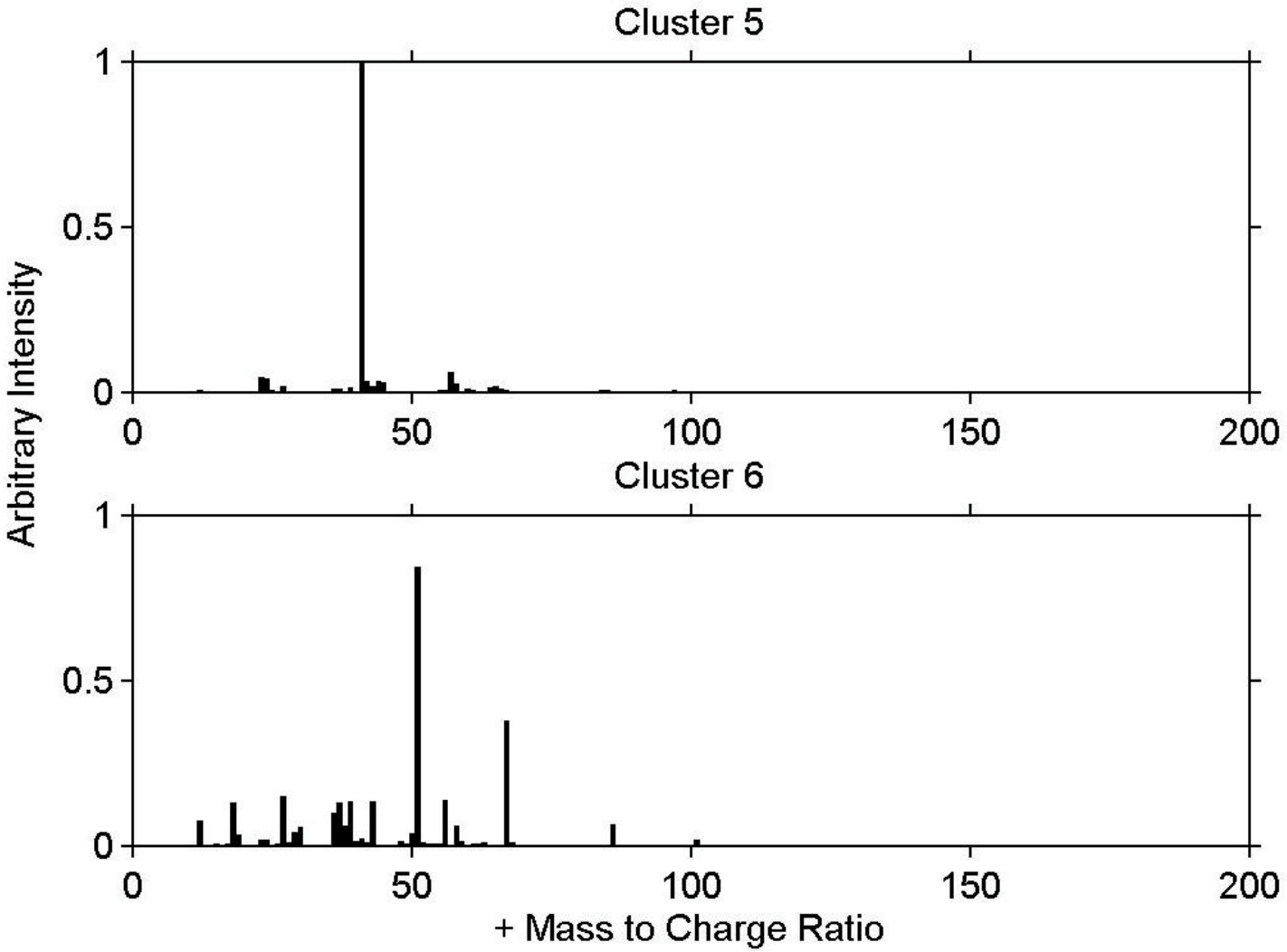

Cluster 8
Arbitrary Intensity
1
0.5
0
0
50
100
150
200
+ Mass to Charge Ratio
1
0.5
0
0
50
100
150
200
- Mass to Charge Ratio

Appendix H: ART-2a positive-ion weight vectors for diesel vehicle dynamometer: mass-to-charge ratio and normalized intensity (vigilance factor = 0.5; 6 clusters)

Class #	Number of particles in the class Diesel	Number of particles matched to the class Azusa
1	102	630
2	90	115
3	74	269
4	28	303
5	22	17
6	10	153

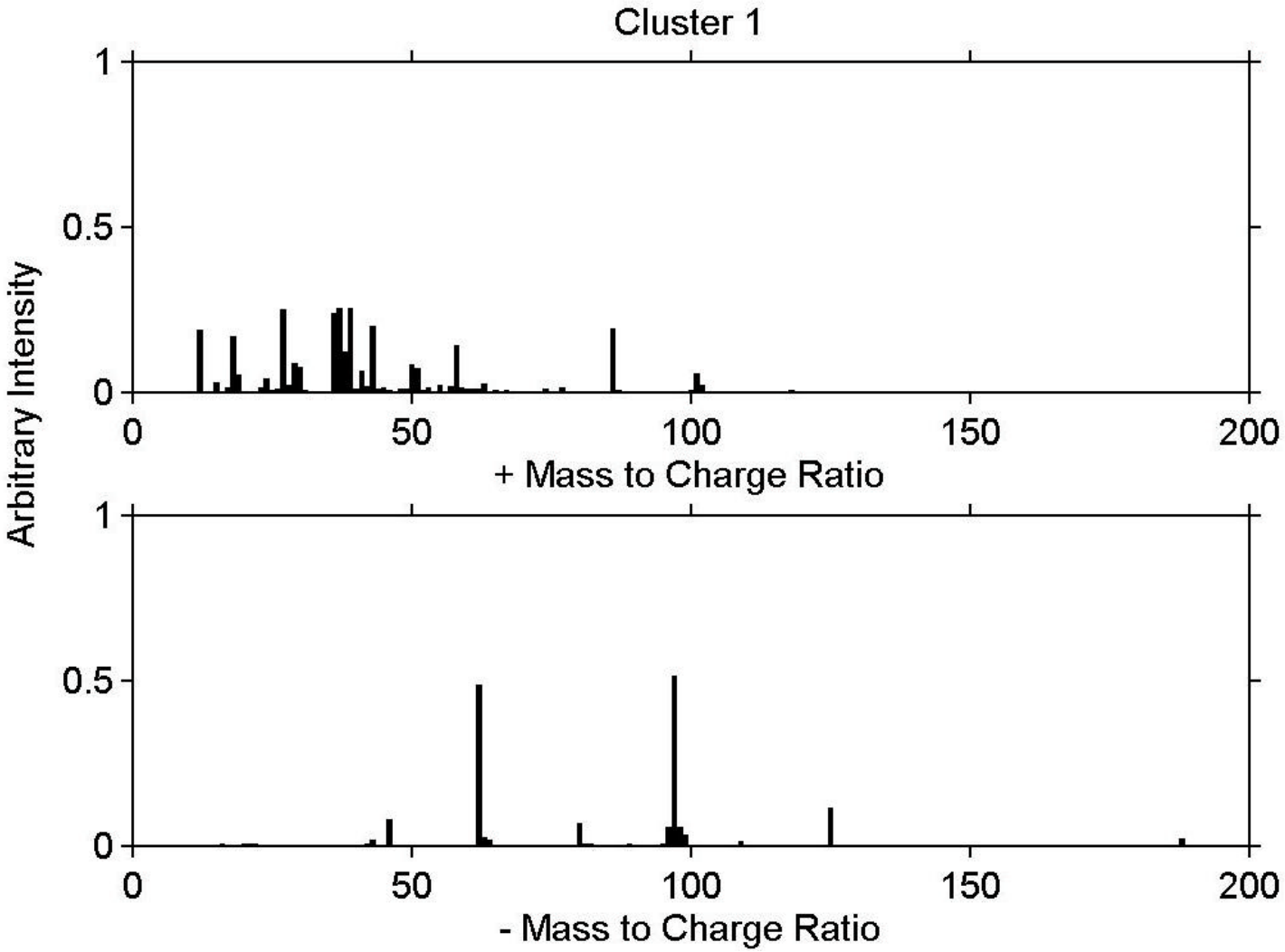

Cluster 1
Cluster 2
Arbitrary Intensity
+ Mass to Charge Ratio
0
0.5
1
0
50
100
150
200

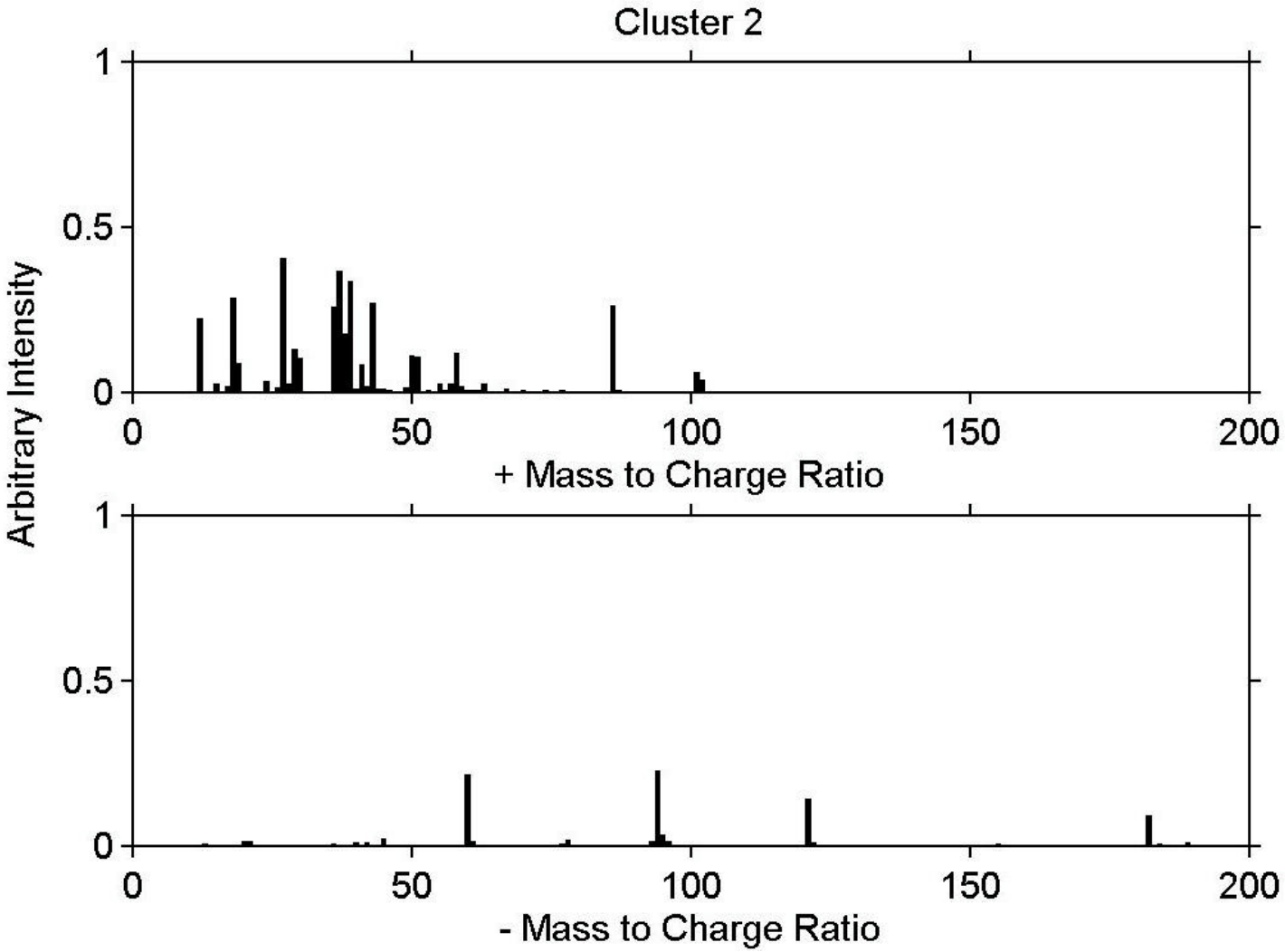

Cluster 3
Cluster 4
Arbitrary Intensity
+ Mass to Charge Ratio
0
0.5
1
0
50
100
150
200

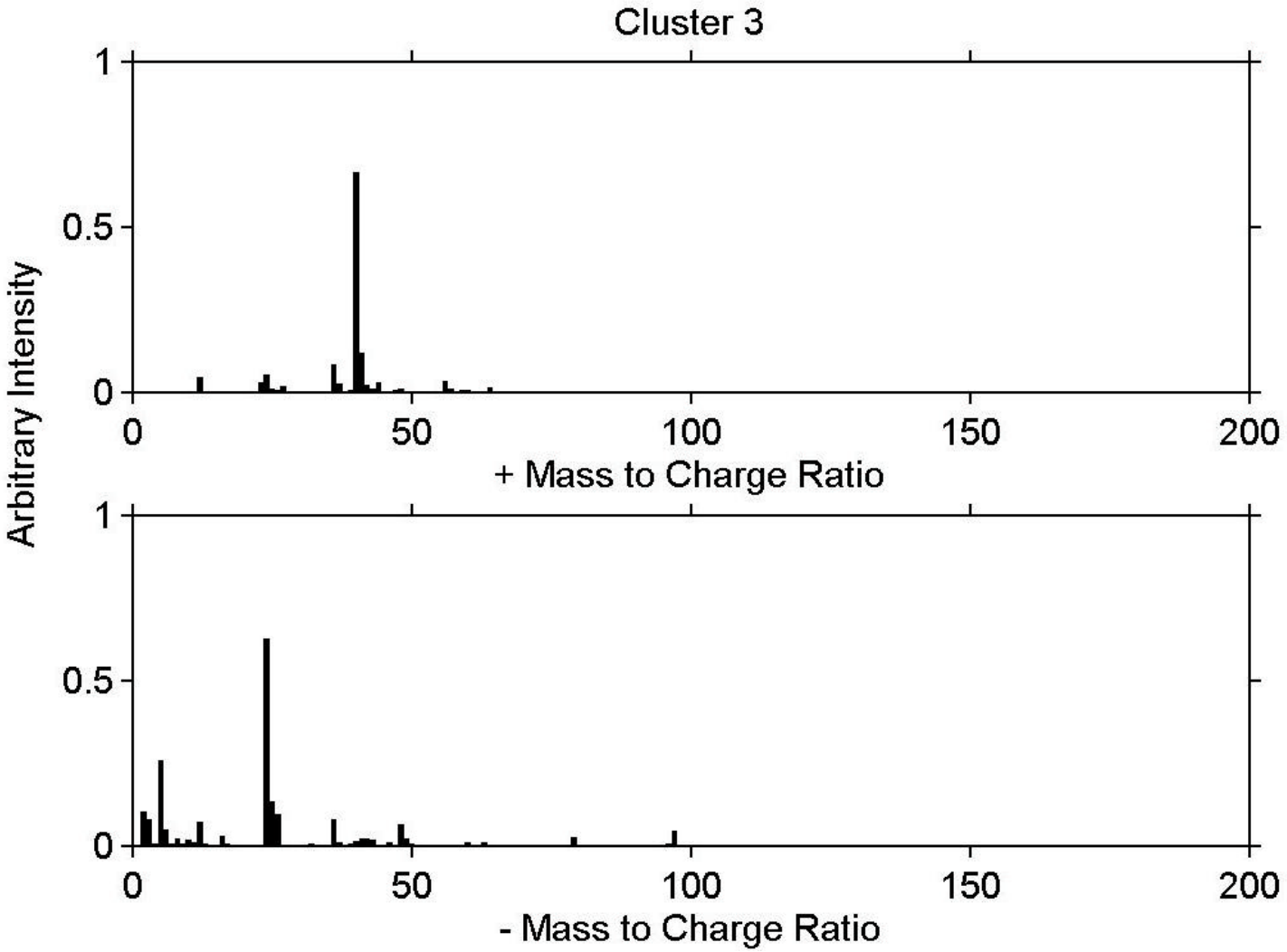

Cluster 5
Cluster 6
Arbitrary Intensity
+ Mass to Charge Ratio
0
0.5
1
0
50
100
150
200

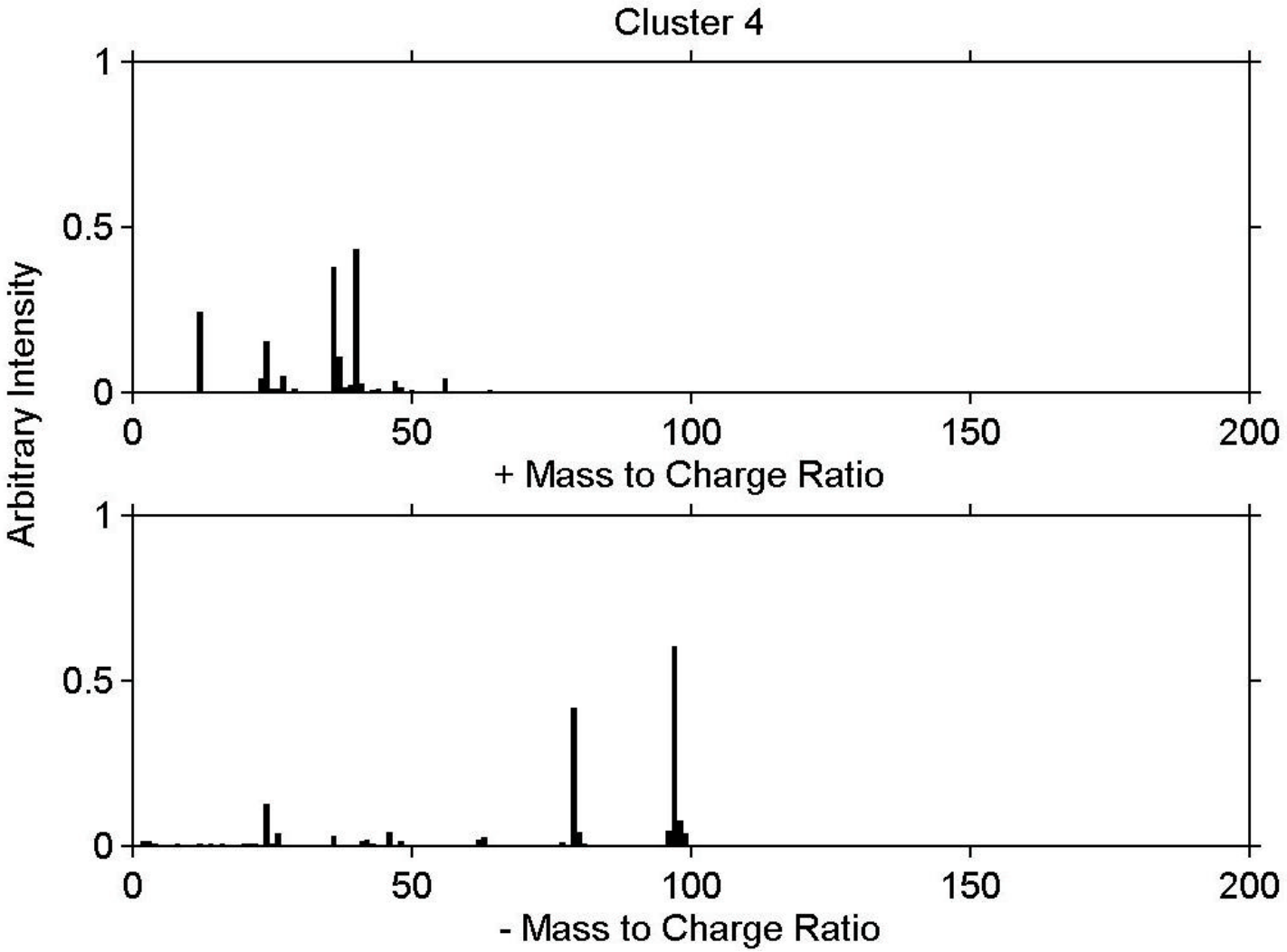
Appendix I: ART-2a dual-ion weight vectors for diesel vehicle dynamometer: mass-to-charge ratio and normalized intensity (vigilance factor = 0.5; 12 clusters)

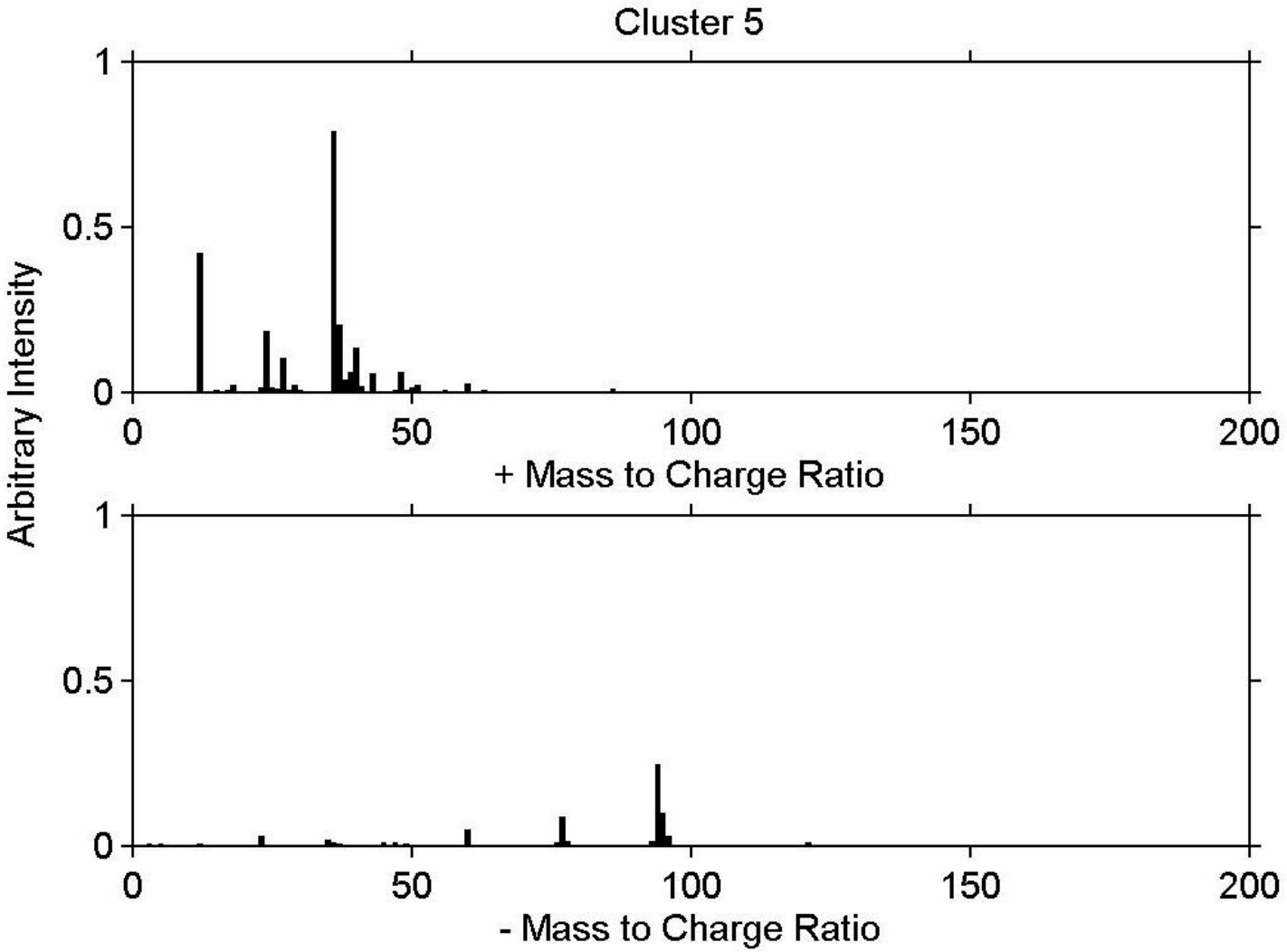
Class #	Number of particles in the class Diesel	Number of particles matched to the class Azusa
1	61	390
2	53	562
3	42	32
4	39	30
5	31	201
6	30	37
7	25	22
8	24	148
9	22	92
10	19	84
11	11	293
12	10	21

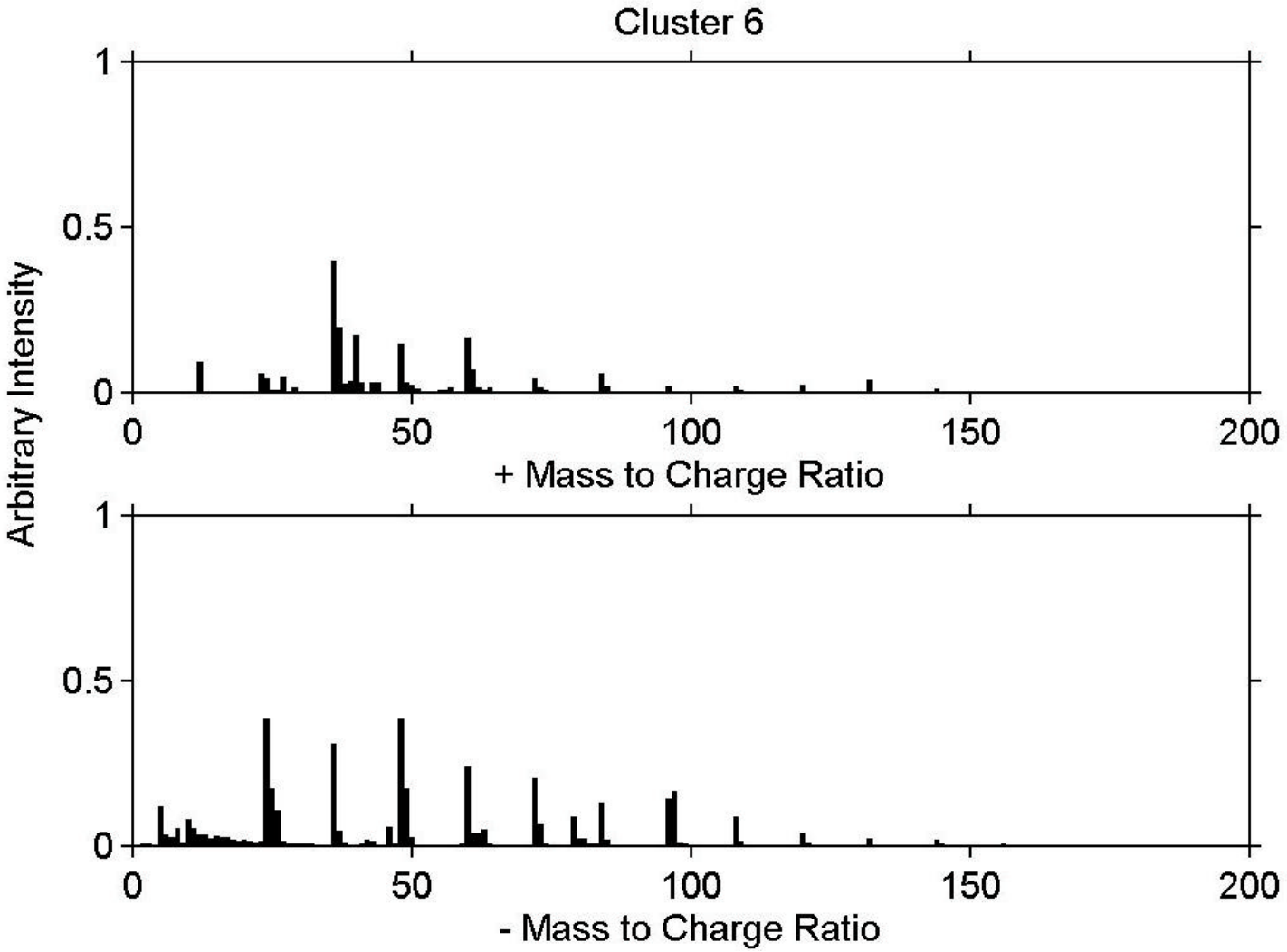

Cluster 1
Arbitrary Intensity
1
0.5
0
0
50
100
150
200
+ Mass to Charge Ratio
1
0.5
0
0
50
100
150
200
- Mass to Charge Ratio

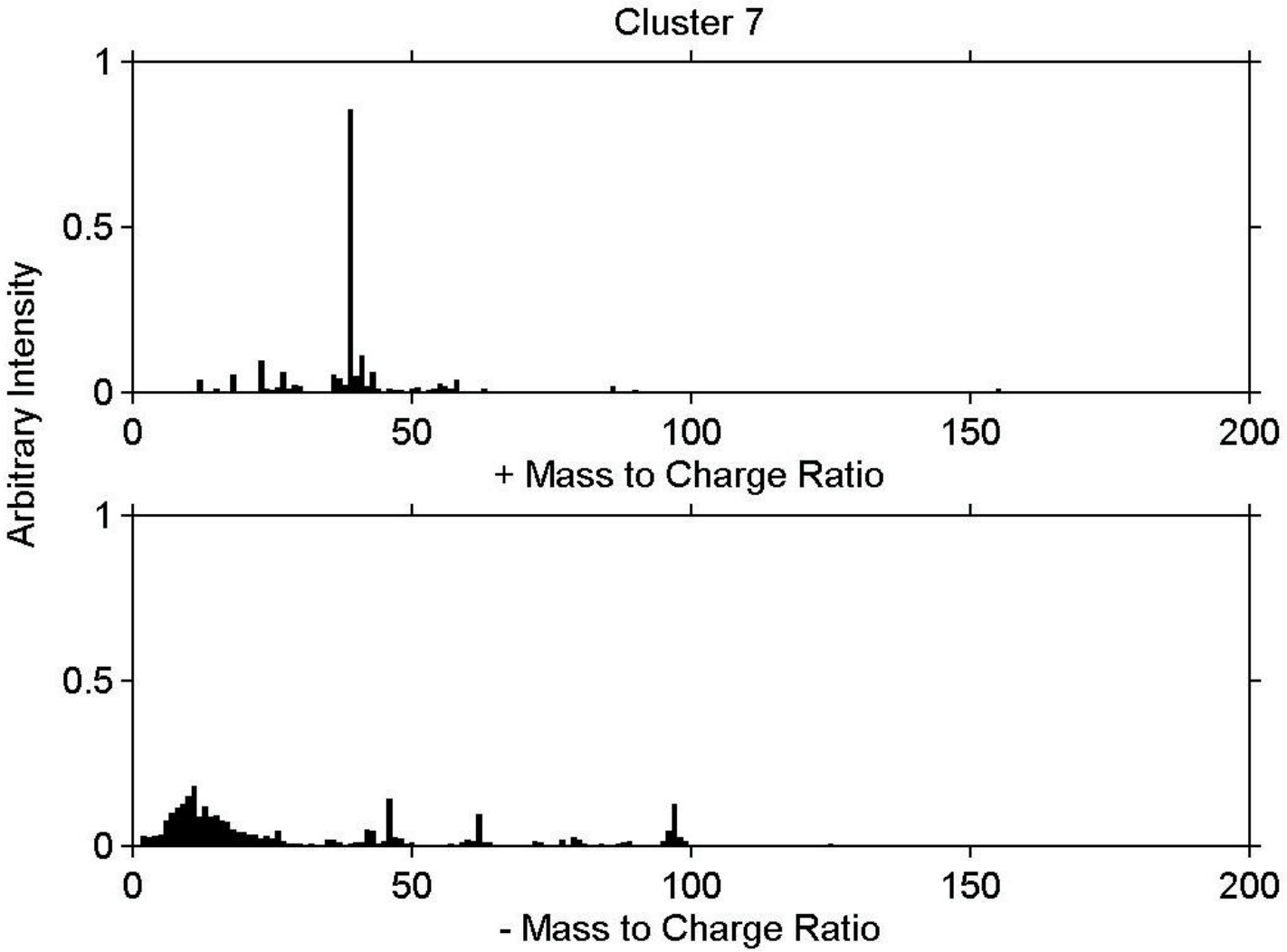

Cluster 2
Arbitrary Intensity
1
0.5
0
0
50
100
150
200
+ Mass to Charge Ratio
1
0.5
0
0
50
100
150
200
- Mass to Charge Ratio

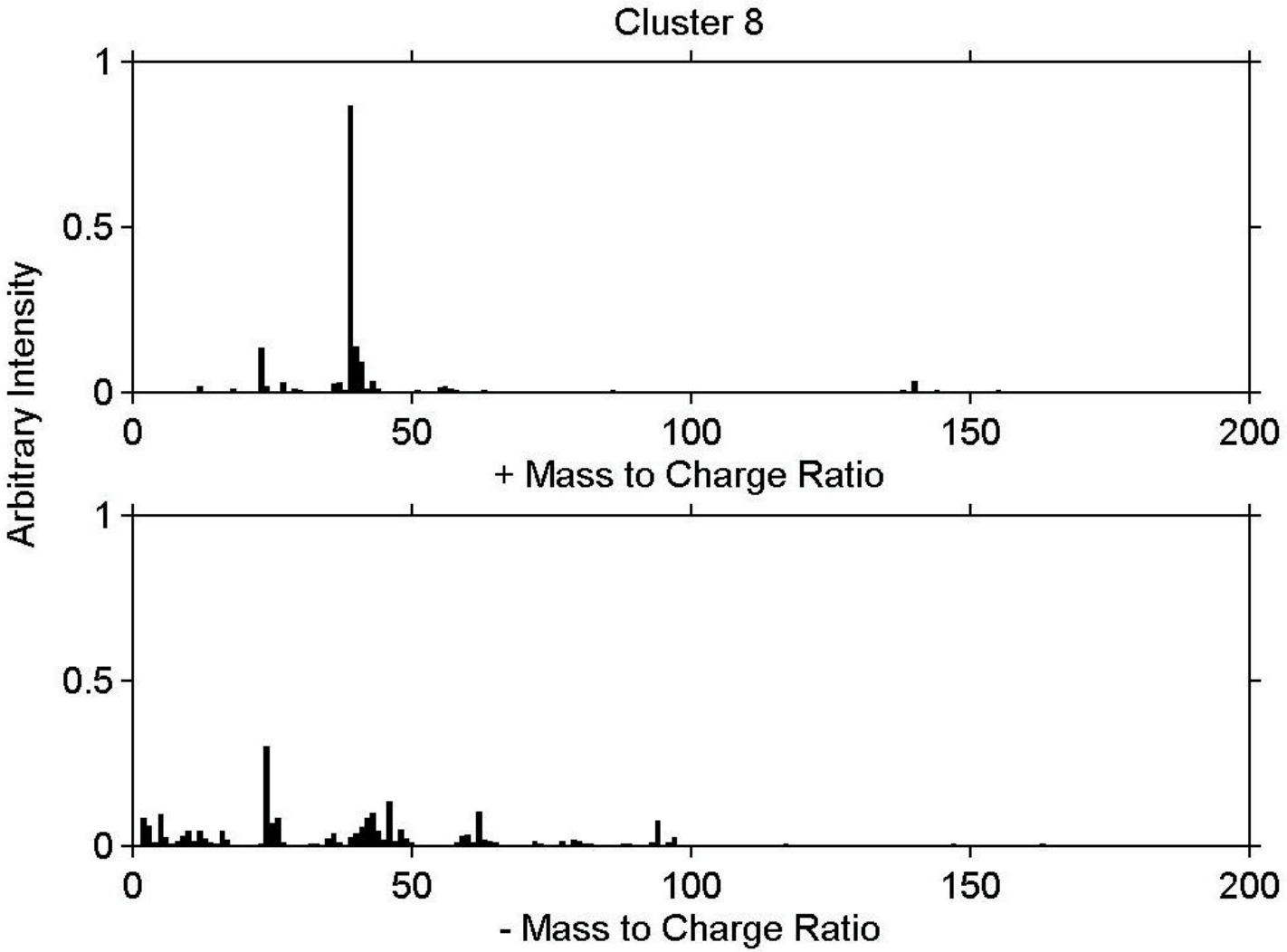

Cluster 3
Arbitrary Intensity
1
0.5
0
0
50
100
150
200
+ Mass to Charge Ratio
1
0.5
0
0
50
100
150
200
- Mass to Charge Ratio

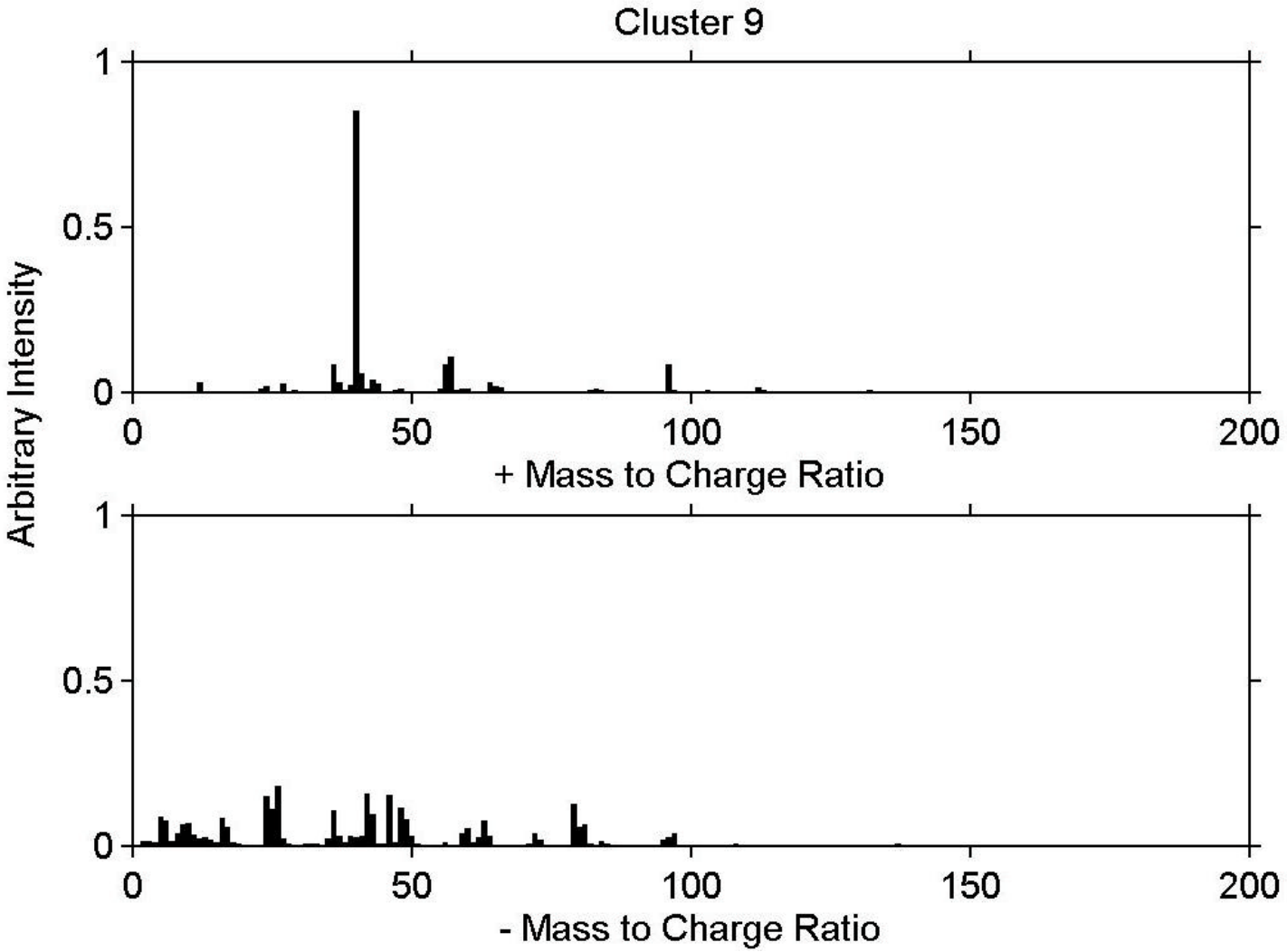

Cluster 4
Arbitrary Intensity
1
0.5
0
0
50
100
150
200
+ Mass to Charge Ratio
1
0.5
0
0
50
100
150
200
- Mass to Charge Ratio

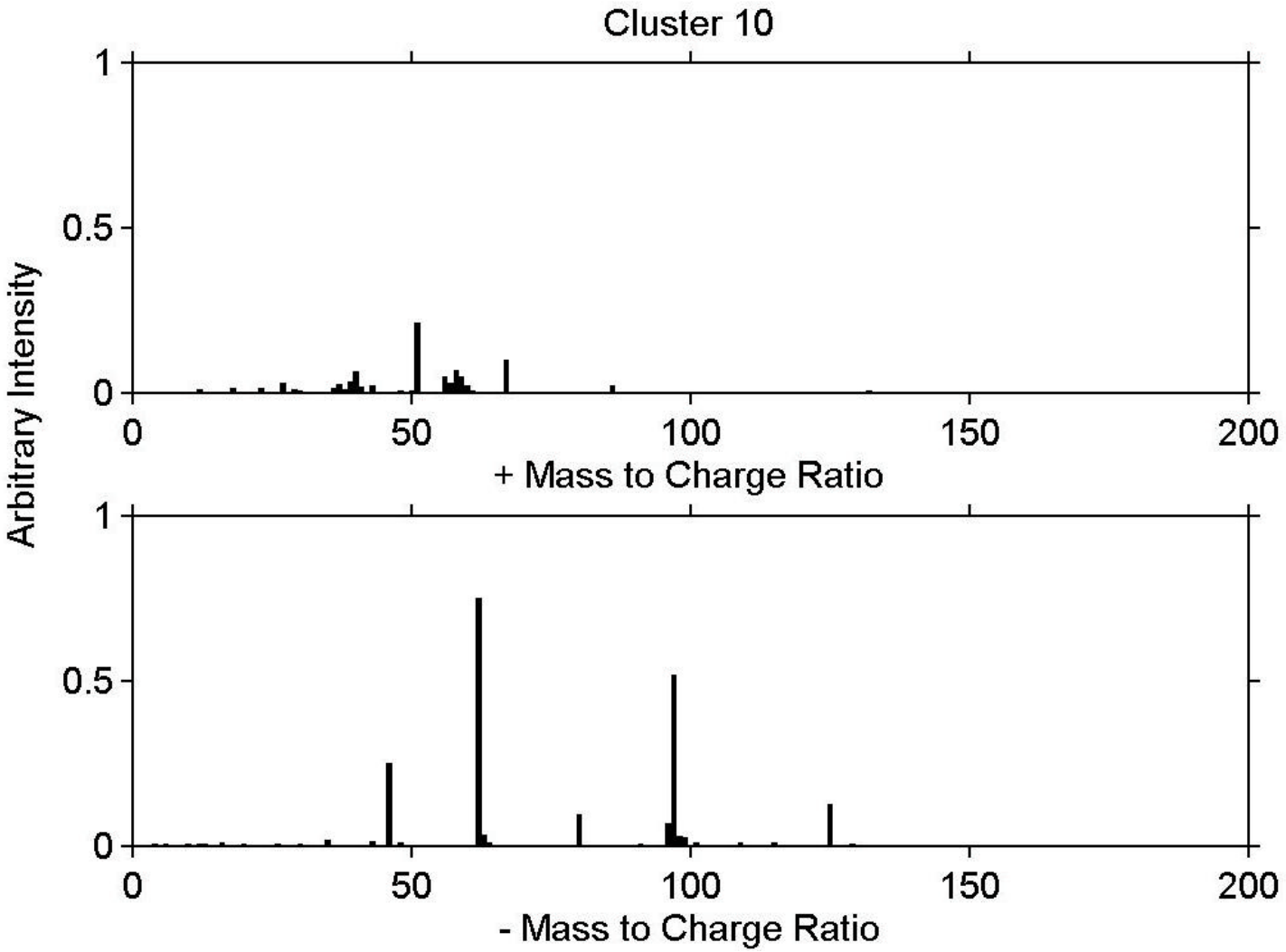

Cluster 5
Arbitrary Intensity
1
0.5
0
0
50
100
150
200
+ Mass to Charge Ratio
1
0.5
0
0
50
100
150
200
- Mass to Charge Ratio

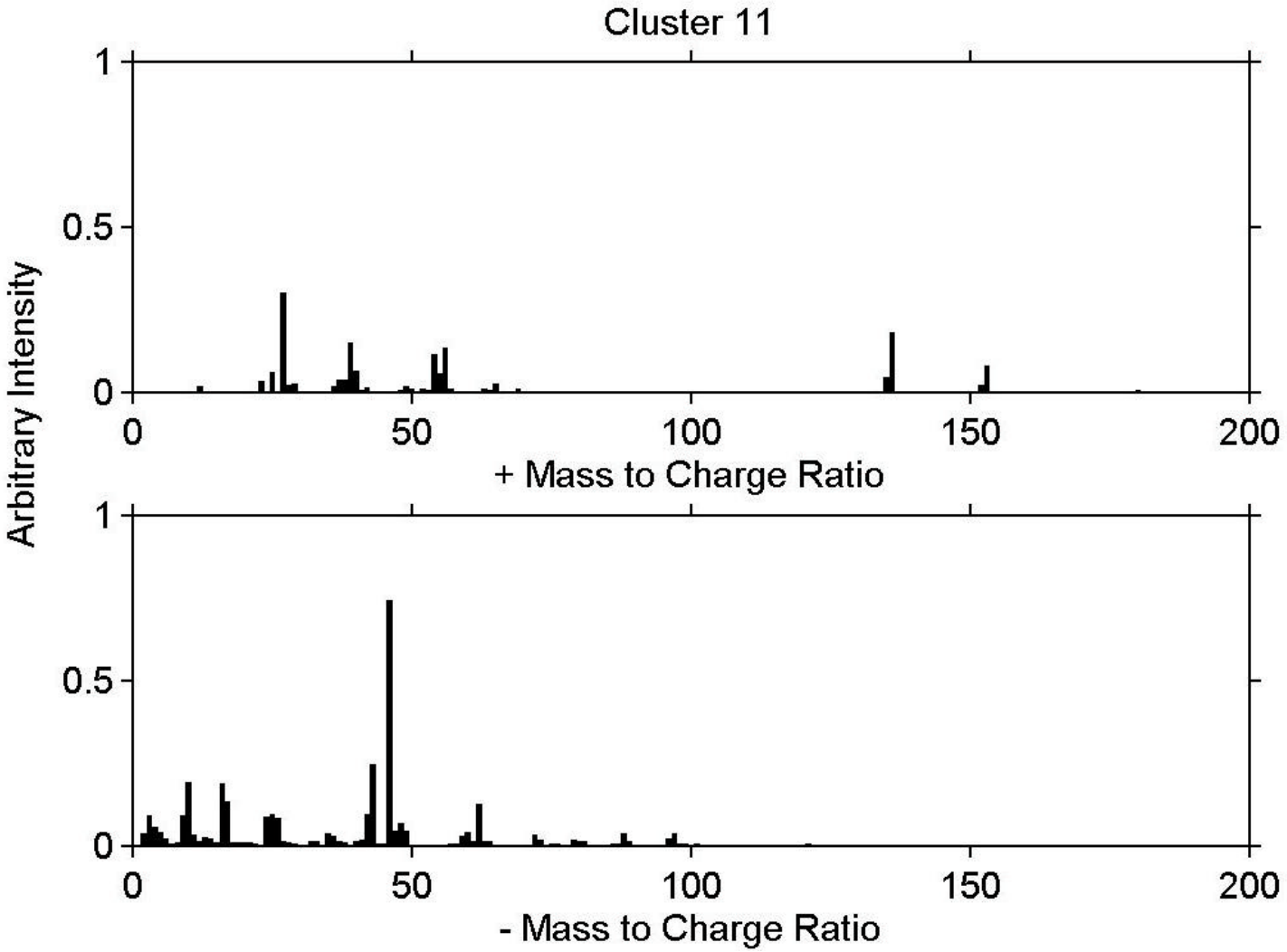

Cluster 6
Arbitrary Intensity
1
0.5
0
0
50
100
150
200
+ Mass to Charge Ratio
1
0.5
0
0
50
100
150
200
- Mass to Charge Ratio

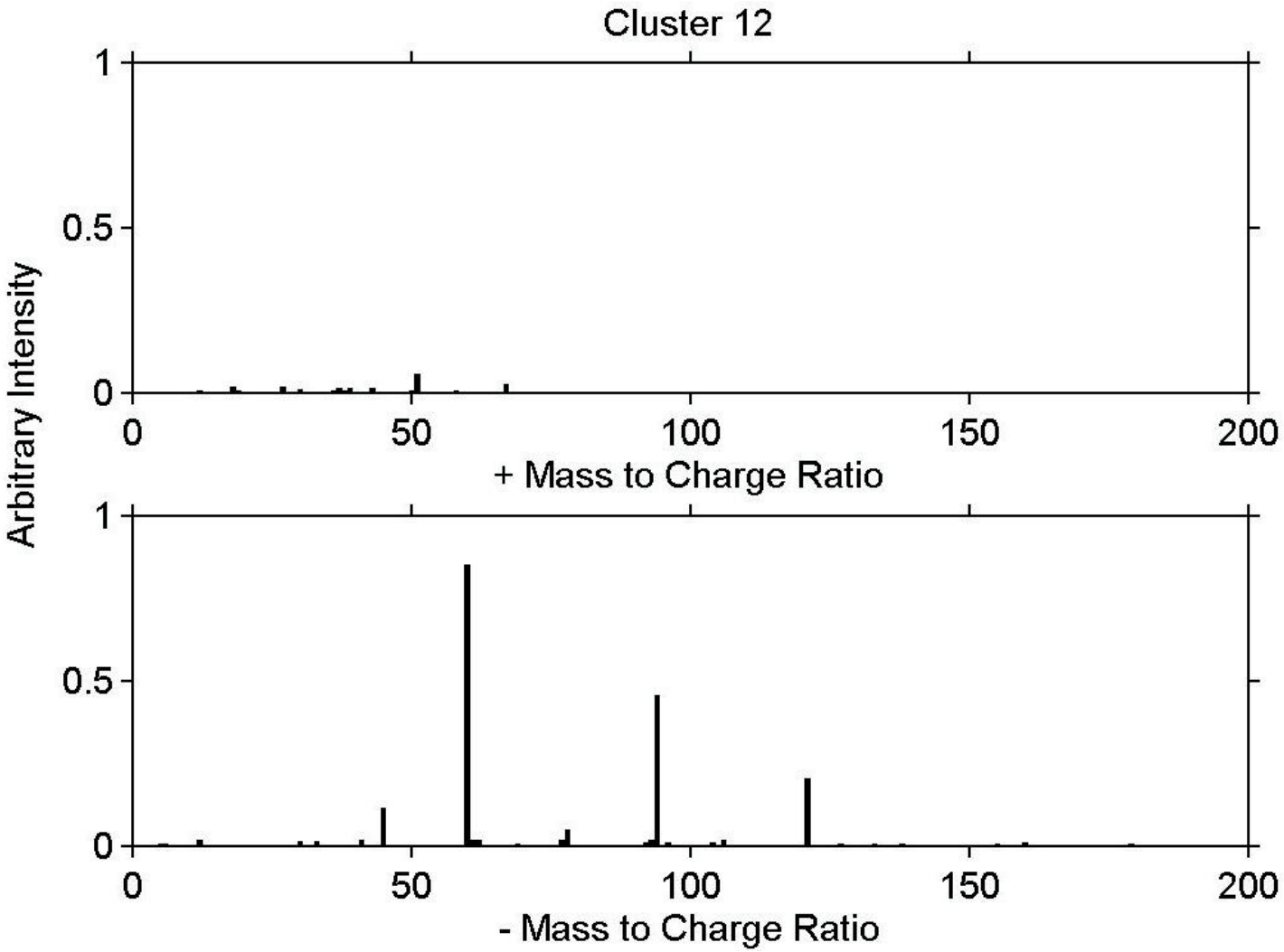

Cluster 7
Arbitrary Intensity
1
0.5
0
0
50
100
150
200
+ Mass to Charge Ratio
1
0.5
0
0
50
100
150
200
- Mass to Charge Ratio


Cluster 8
Arbitrary Intensity
1
0.5
0
0
50
100
150
200
+ Mass to Charge Ratio
1
0.5
0
0
50
100
150
200
- Mass to Charge Ratio


Cluster 9
Arbitrary Intensity
1
0.5
0
0
50
100
150
200
+ Mass to Charge Ratio
1
0.5
0
0
50
100
150
200
- Mass to Charge Ratio


Cluster 10
Arbitrary Intensity
1
0.5
0
0
50
100
150
200
+ Mass to Charge Ratio
1
0.5
0
0
50
100
150
200
- Mass to Charge Ratio


Cluster 11
Arbitrary Intensity
1
0.5
0
0
50
100
150
200
+ Mass to Charge Ratio
1
0.5
0
0
50
100
150
200
- Mass to Charge Ratio


Cluster 12
Arbitrary Intensity
1
0.5
0
0
50
100
150
200
+ Mass to Charge Ratio
1
0.5
0
0
50
100
150
200
- Mass to Charge Ratio