Table S1. Excitation energies (in eV) of the final residual Cr II states included into close-coupling expansions.

Index	Config.	Term	Present	NIST	Diff.
1	$3d^5$	$a\,^6S$	0.00000	0.00000	0.000
2	$3d^4(^5D)4s$	$a\,^6D$	1.52326	1.52226	0.001
3	$3d^4(^5D)4s$	$a\,^4D$	2.45936	2.45836	0.001
4	$3d^5$	$a\,^4G$	2.54358	2.54358	-0.000
5	$3d^5$	$a\,^4P$	2.70874	2.70574	0.003
6	$3d^5$	$b\,^4D$	3.10351	3.10451	-0.001
7	$3d^5$	$a\,^2I$	3.73773	3.73773	0.000
8	$3d^4(^3P)4s$	$b\,^4P$	3.78582	3.78482	0.001
9	$3d^4(^3H)4s$	$a\,^4H$	3.81119	3.75477	0.056
10	$3d^4(^3F)4s$	$a\,^4F$	3.86778	3.86378	0.004
11	$3d^5$	$a\,^2D$	3.90995	3.89595	0.014
12	$3d^5$	$b\,^4F$	4.07063	4.07263	-0.002
13	$3d^4(^3G)4s$	$b\,^4G$	4.16148	4.16448	-0.003
14	$3d^5$	$a\,^2F$	4.18702	4.02475	0.162
15	$3d^4(^3H)4s$	$a\,^2H$	4.30700	4.30600	0.001
16	$3d^4(^3P)4s$	$a\,^2P$	4.35478	4.35478	0.000
17	$3d^4(^3F)4s$	$b\,^2F$	4.41673	4.41273	0.004
18	$3d^5$	$b\,^2H$	4.42169	4.42169	0.000
19	$3d^5$	$a\,^2G$	4.47980	4.48780	-0.008
20	$3d^4(^3D)4s$	$c\,^4D$	4.75038	4.75038	-0.000
21	$3d^4(^3G)4s$	$b\,^2G$	4.77322	4.77822	-0.005
22	$3d^4(^1I)4s$	$b\,^2I$	4.98292	4.98592	-0.003
23	$3d^4(^1S)4s$	$a\,^2S$	5.00483	5.01083	-0.006
24	$3d^4(^1G)4s$	$c\,^2G$	5.07723	4.92984	0.147
25	$3d^5$	$c\,^2F$	5.08334	4.93695	0.146
26	$3d^4(^3D)4s$	$b\,^2D$	5.50234	5.32306	0.179
27	$3d^5$	$b\,^2S$	5.60739	5.49338	0.114
28	$3d^4(^1D)4s$	$c\,^2D$	5.74380	5.66684	0.077
29	$3d^4(^5D)4p$	$z\,^6F^o$	5.87151	5.87151	-0.000
30	$3d^4(^5D)4p$	$z\,^6P^o$	5.93772	6.01735	-0.080
31	$3d^4(^5D)4p$	$z\,^6D^o$	5.96387	6.15335	-0.189
32	$3d^4(^5D)4p$	$z\,^4P^o$	6.11507	6.11407	0.001
33	$3d^5$	$d\,^2D$	6.12220	5.87209	0.250
34	$3d^4(^5D)4p$	$z\,^4F^o$	6.42101	6.42101	0.000
35	$3d^4(^1F)4s$	$d\,^2F$	6.44629	6.28302	0.163
36	$3d^5$	$d\,^2G$	6.61223	6.48570	0.127
37	$3d^34s^2$	$c\,^4F$	6.64022	6.64022	-0.000
38	$3d^4(^5D)4p$	$z\,^4D^o$	6.77489	6.77489	-0.000
39	$3d^4(^3P)4s$	$c\,^4P$	6.84797	6.84997	-0.002
40	$3d^4(^3F)4s$	$d\,^4F$	6.85529	6.80387	0.051
41	$3d^4(^3P)4s$	$b\,^2P$	7.34461	7.34761	-0.003
42	$3d^4(^3F)4s$	$e\,^2F$	7.38416	7.38616	-0.002
43	$3d^4(^3H)4p$	$z\,^4H^o$	7.67458	7.91380	-0.239
44	$3d^4(^3P)4p$	$y\,^4D^o$	7.99860	7.99660	0.002
45	$3d^4(^1G)4s$	$e\,^2G$	8.02488	7.77314	0.252
46	$3d^4(^3P)4p$	$z\,^2S^o$	8.08561	8.06261	0.023
47	$3d^4(^3H)4p$	$z\,^4I^o$	8.10058	8.12779	-0.027

48	$3d^4(^3F)4p$	$z\ ^4G^o$	8.11882	8.11182	0.007
49	$3d^4(^3P)4p$	$y\ ^4P^o$	8.12608	8.24797	-0.122
50	$3d^4(^3H)4p$	$z\ ^2G^o$	8.13573	8.13573	0.000
51	$3d^4(^3P)4p$	$z\ ^2P^o$	8.27866	8.34231	0.006
52	$3d^4(^3F)4p$	$y\ ^4F^o$	8.34231	8.19685	-0.000
53	$3d^34s^2$	$d\ ^4P$	8.34291	8.37521	0.146
54	$3d^4(^3H)4p$	$z\ ^2I^o$	8.35100	8.41487	-0.024
55	$3d^4(^3F)4p$	$x\ ^4D^o$	8.35256	8.35455	-0.062
56	$3d^4(^3F)4p$	$z\ ^2D^o$	8.35353	8.35067	-0.001
57	$3d^4(^3H)4p$	$y\ ^4G^o$	8.35467	8.46881	0.004
58	$3d^4(^3P)4p$	$z\ ^4S^o$	8.46081	8.50769	-0.008
59	$3d^4(^3H)4p$	$z\ ^2H^o$	8.50469		-0.003
60	$3d^5$	^2P	8.50623	8.57223	
61	$3d^4(^3G)4p$	$y\ ^4H^o$	8.56923	8.61891	-0.003
62	$3d^4(^3G)4p$	$^4F^o$	8.62391	8.72808	0.005
63	$3d^4(^3G)4p$	$y\ ^2H^o$	8.64192	8.75695	-0.086
64	$3d^4(^3G)4p$	$x\ ^4G^o$	8.64943		-0.108
65	$3d^34s^2$	^2G	8.65984	8.51575	
66	$3d^4(^3F)4p$	$z\ ^2F^o$	8.66710	8.64315	0.151
67	$3d^4(^3P)4p$	$^2D^o$	8.70648	8.68099	0.063
68	$3d^4(^3F)4p$	$y\ ^2G^o$	8.74027	8.77032	0.059
69	$3d^4(^3G)4p$	$y\ ^2F^o$	8.87807	9.01197	0.108
70	$3d^4(^3G)4p$	$x\ ^2G^o$	8.88131	9.10641	-0.131
71	$3d^4(^3D)4p$	$w\ ^4D^o$	8.97230		-0.134
72	$3d^5$	^2D	9.06751		
73	$3d^34s^2$	^2H	9.10229		
74	$3d^34s^2$	^2P	9.12841	9.25350	
75	$3d^4(^3D)4p$	$x\ ^4P^o$	9.13372	9.26278	-0.120
76	$3d^4(^1I)4p$	$^2K^o$	9.15384	9.24858	-0.109
77	$3d^4(^1I)4p$	$^2I^o$	9.17350	9.24836	-0.075
78	$3d^4(^1G)4p$	$x\ ^2H^o$	9.17775	9.22547	-0.071
79	$3d^4(^3D)4p$	$w\ ^4F^o$	9.19108	9.39409	-0.034
80	$3d^4(^1G)4p$	$w\ ^2G^o$	9.37764	9.29151	-0.016
81	$3d^4(^3D)4p$	$y\ ^2P^o$	9.37881	9.56734	0.087
82	$3d^4(^1I)4p$	$w\ ^2H^o$	9.39494	9.20611	-0.172
83	$3d^4(^1G)4p$	$x\ ^2F^o$	9.43805		0.232
84	$3d^34s^2$	^2D	9.49973		
85	$3d^3(^4P)4s4p$	$z\ ^6G^o$	9.53920	9.53755	
86	$3d^4(^3D)4p$	$w\ ^2F^o$	9.83775	9.63786	0.300
87	$3d^4(^1S)4p$	$x\ ^2P^o$	9.90053	9.67138	0.263
88	$3d^4(^3D)4p$	$x\ ^2D^o$	9.96322	10.16159	0.292
89	$3d^3(^4F)4s4p$	$y\ ^6D^o$	9.98572	10.08572	-0.176
90	$3d^4(^1D)4p$	$v\ ^2F^o$	10.07068	9.96428	-0.015
91	$3d^4(^1D)4p$	$w\ ^2D^o$	10.12494	10.19814	0.161
92	$3d^3(^4F)4s4p$	$y\ ^6F^o$	10.14502		-0.053
93	$3d^4(^1D)4s$	^2D	10.43278	10.27803	
94	$3d^4(^1D)4p$	$w\ ^2P^o$	10.51830	10.63492	0.240
95	$3d^4(^1F)4p$	$v\ ^2G^o$	10.54995	10.49477	-0.085
96	$3d^4(^1F)4p$	$u\ ^2F^o$	10.56086	10.79388	0.066
97	$3d^3(^4F)4s4p$	$u\ ^4G^o$	10.70227	10.64169	-0.092

98	$3d^3(^4F)4s4p$	$u\ ^4D^o$	10.72919	10.89813	0.087
99	$3d^3(^4F)4s4p$	$u\ ^4F^o$	10.91136	10.74596	0.013
100	$3d^3(^4F)4s4p$	$v\ ^2D^o$	11.01825	11.09063	0.272
101	$3d^4(^3P)4p$	$y\ ^4P^o$	11.03273	11.02720	-0.058
102	$3d^4(^1F)4p$	$u\ ^2D^o$	11.06132		0.034
103	$3d^34s^2$	^2F	11.08903	11.40282	
104	$3d^3(^4F)4s4p$	$t\ ^2G^o$	11.23613	11.21837	-0.167
105	$3d^4(^3F)4p$	$v\ ^4F^o$	11.25344	11.30616	0.035
106	$3d^4(^3F)4p$	$w\ ^4G^o$	11.34824	11.48245	0.042
107	$3d^4(^3P)4p$	$y\ ^4S^o$	11.37251	11.19608	-0.110
108	$3d^4(^3P)4p$	$v\ ^4D^o$	11.40168	11.25500	0.206
109	$3d^4(^3F)4p$	$t\ ^2F^o$	11.40440	11.46629	0.149
110	$3d^3(^4P)4s4p$	$x\ ^6P^o$	11.47526	11.34185	0.009
111	$3d^4(^3P)4p$	$t\ ^2D^o$	11.62119	11.61889	0.279
112	$3d^4(^3F)4p$	$u\ ^2G^o$	11.70160	11.71200	0.083
113	$3d^4(^3P)4p$	$v\ ^2P^o$	11.77042	11.66420	0.058
114	$3d^3(^4F)4s4p$	$s\ ^2F^o$	11.81129	11.61087	0.147
115	$3d^4(^4F)4p$	$t\ ^4D^o$	11.84228	11.93290	0.231
116	$3d^4(^3P)4p$	$y\ ^2S^o$	11.84302	11.70456	-0.090
117	$3d^3(^4P)4s4p$	$x\ ^6D^o$	11.85113	12.13495	0.147
118	$3d^3(^4P)4s4p$	$z\ ^6S^o$	12.02157		-0.113
119	$3d^3(^2G)4s4p$	$x\ ^4H^o$	12.14215	12.11435	
120	$3d^4(^1G)4p$	$v\ ^2H^o$	12.18237	12.05342	0.068
121	$3d^3(^4P)4s4p$	$w\ ^4P^o$	12.19731	12.18150	0.144
122	$3d^4(^3F)4p$	$s\ ^2D^o$	12.25595	12.06496	0.074
123	$3d^3(^2G)4s4p$	$t\ ^4G^o$	12.25943	12.12889	0.194
124	$3d^4(^1G)4p$	$s\ ^2G^o$	12.26267	12.23921	0.134
125	$3d^3(^2G)4s4p$	$t\ ^4F^o$	12.40722	12.29230	0.168
126	$3d^4(^1G)4p$	$r\ ^2F^o$	12.62523		0.333
127	$3d^3(^2P)4s4p$	$^2S^o$	12.72305		
128	$3d^3(^2P)4s4p$	$^4P^o$	12.72675	12.54196	
129	$3d^3(^4P)4s4p$	$u\ ^2P^o$	12.76928		0.227
130	$3d^4(^1S)4s$	^2S	12.82942	12.73124	
131	$3d^3(^2P)4s4p$	$x\ ^4S^o$	12.84183	12.59660	0.111
132	$3d^3(^2H)4s4p$	$w\ ^4H^o$	12.85609	12.78200	0.259
133	$3d^3(^2H)4s4p$	$^4I^o$	12.86526	12.64884	0.083
134	$3d^3(^2G)4s4p$	$r\ ^2G^o$	12.97954	12.54533	0.331
135	$3d^3(^2P)4s4p$	$r\ ^4D^o$	13.05506	12.70362	0.510
136	$3d^3(^2D)4s4p$	$s\ ^4F^o$	13.06075	12.62468	0.357
137	$3d^3(^2G)4s4p$	$u\ ^2H^o$	13.06850	12.64450	0.444
138	$3d^3(^2G)4s4p$	$p\ ^2F^o$	13.19612	13.00331	0.552
139	$3d^3(^4F)4s4p$	$r\ ^4F^o$	13.19827	12.73464	0.195
140	$3d^3(^4P)4s4p$	$q\ ^4D^o$	13.22931	12.78950	0.495
141	$3d^3(^4F)4s4p$	$s\ ^4G^o$	13.27751	13.00726	0.488
142	$3d^3(^4F)4s4p$	$p\ ^4D^o$	13.39473	12.95877	0.387
143	$3d^3(^2D)4s4p$	$o\ ^4D^o$	13.40178		0.443
144	$3d^3(^4P)4s4p$	$w\ ^4S^o$	13.41770	13.30329	
145	$3d^3(^2P)4s4p$	$q\ ^2D^o$	13.42412		0.121
146	$3d^34s^2$	^2D	13.48834	13.16267	
147	$3d^3(^2H)4s4p$	$t\ ^2H^o$	13.50660	13.27833	0.344

148	$3d^3(^2D)4s4p$	$o\ ^2F^o$	13.57648	13.38378	0.298
149	$3d^3(^2H)4s4p$	$x\ ^2I^o$	13.58072		0.197
150	$3d^3(^2H)4s4p$	$r\ ^4G^o$	13.62828	13.62981	
151	$3d^3(^4P)4s4p$	$p\ ^2D^o$	13.65348		0.024
152	$3d^3(^2P)4s4p$	$^2P^o$	13.66175	13.36784	
153	$3d^3(^2H)4s4p$	$q\ ^2G^o$	13.66355		0.296
154	$3d^3(^2D)4s4p$	$^4P^o$	13.73541		
155	$3d^3(^4P)4s4p$	$^2S^o$	13.99980		
156	$3d^4(^1D)4p$	$^2P^o$	14.28799		
157	$3d^3(^2D)4s4p$	$^2D^o$	14.48981		
158	$3d^4(^1D)4p$	$^2F^o$	14.53591		
159	$3d^3(^2P)4s4p$	$^2P^o$	14.55006	14.38219	
160	$3d^3(^4P)4s4p$	$^4P^o$	14.59989	14.46379	0.218
161	$3d^3(^2F)4s4p$	$^4D^o$	14.66533		0.202
162	$3d^4(^1D)4p$	$^2D^o$	14.78375		
163	$3d^3(^2F)4s4p$	$^4F^o$	14.86677		
164	$3d^3(^2F)4s4p$	$^4G^o$	15.00590	14.71496	
165	$3d^3(^4P)4s4p$	$^4D^o$	15.05489	14.84119	0.340
166	$3d^3(^4P)4s4p$	$^4S^o$	15.13828	14.97900	0.297
167	$3d^3(^2G)4s4p$	$^2G^o$	15.16177		0.183
168	$3d^3(^2G)4s4p$	$^2H^o$	15.37271	15.40700	
169	$3d^3(^2F)4s4p$	$^2G^o$	15.48947		0.082
170	$3d^3(^2G)4s4p$	$^2F^o$	15.63984		
171	$3d^3(^2P)4s4p$	$^2S^o$	15.79799		
172	$3d^3(^2H)4s4p$	$^2H^o$	15.91799		
173	$3d^3(^2F)4s4p$	$^2D^o$	15.93511		
174	$3d^3(^2H)4s4p$	$^2I^o$	15.95214		
175	$3d^3(^2F)4s4p$	$^2F^o$	16.01932		
176	$3d^3(^2P)4s4p$	$^2D^o$	16.02768		
177	$3d^3(^2P)4s4p$	$^2P^o$	16.06428		
178	$3d^3(^2D)4s4p$	$^2F^o$	16.31908	15.89200	
179	$3d^3(^2H)4s4p$	$^2G^o$	16.37462		0.483
180	$3d^3(^2D)4s4p$	$^2D^o$	16.49889		
181	$3d^3(^2D)4s4p$	$^2P^o$	16.61655		
182	$3d^4(^1S)4p$	$^2P^o$	16.97024		
183	$3d^3(^2D)4s4p$	$^4D^o$	17.32377		
184	$3d^3(^2D)4s4p$	$^4F^o$	17.48725		
185	$3d^3(^2D)4s4p$	$^4P^o$	17.76127		
186	$3d^3(^2D)4s4p$	$^2D^o$	17.89730	17.52400	
187	$3d^3(^2F)4s4p$	$^2G^o$	18.00644		0.482
188	$3d^3(^2F)4s4p$	$^2F^o$	18.12674		
189	$3d^3(^2D)4s4p$	$^2F^o$	18.30900		
190	$3d^3(^2F)4s4p$	$^2D^o$	18.45366		
191	$3d^3(^2D)4s4p$	$^2P^o$	18.77162		
192	$3d^3(^2D)4s4p$	$^2D^o$	20.34853		
193	$3d^3(^2D)4s4p$	$^2F^o$	20.49732		
194	$3d^3(^2D)4s4p$	$^2P^o$	20.72358		