

^{61}Cu $Z = 29$ $N = 32$ [link to full NNDC output](#)

Based on ENSDF from Dec 2018, and mass evaluation from 2016

BE = 531.646 (0.001) MeV

Qbeta+ = 2.238 (0.001) MeV

	Energy T	J+	J-	J-other	T1/2
61CU 1			0.000	3/2-	1 3.339 H 8
61CU 2			0.475	1/2-	2 0.66 PS 9
61CU 3			0.970	5/2-	3 0.69 PS 13
61CU 4			1.310	7/2-	4 0.53 PS 7
61CU 5			1.394	5/2-	5 0.85 PS 14
61CU 6			1.660	3/2-	6 0.182 PS 19
61CU 7			1.701	7/2-	7
61CU 8			1.733	7/2-	8 1.4 PS GT
61CU 9			1.904	5/2-	9 180 FS 19
61CU 10				1.919	10
61CU 11			1.933	3/2-	11 87 FS 10
61CU 12			1.943	7/2-	12 1.2 PS +11-4
61CU 13				2.089 (1/2)-	13 40 FS 4
61CU 14			2.203	5/2-	14 173 FS 20
61CU 15			2.295	9/2-	15 1.8 PS 6
61CU 16			2.336	9/2-	16 430 FS 50
61CU 17			2.358	3/2-	17 197 FS 24
61CU 18			2.399	7/2-	18 121 FS 14
61CU 19			2.472	3/2-	19 75 FS 8
61CU 20				2.584 3/2,5/2	20 102 FS 12
61CU 21				2.585 3/2,5/2	21 98 FS 12
61CU 22			2.612	9/2-	22 280 FS 40
61CU 23			2.627	11/2-	23 350 FS GT
61CU 24			2.684	3/2-	24 85 FS 12
61CU 25	2.706	9/2+			25
61CU 26	2.720	9/2+			26 2.8 PS GT
61CU 27			2.728	7/2-	27 0.23 PS 3
61CU 28			2.793	5/2-	28 116 FS +20-40
61CU 29				2.841 1/2-,3/2-	29
61CU 30				2.857 (3/2)-	30
61CU 31				2.924 (5/2,7/2)-	31 0.27 PS 4
61CU 32			2.933	3/2-	32 65 FS 13
61CU 33				3.002 5/2	33 0.17 PS 6
61CU 34			3.016	11/2-	34 0.29 PS 4
61CU 35			3.019	3/2-	35 69 FS 11
61CU 36			3.042	3/2-	36
61CU 37			3.066	3/2-	37 40 FS 6

61CU 38				3.092	3/2-			38	33 FS	5
61CU 39						3.199		39		
61CU 40						3.249		40		

61CU 41				3.260	11/2-			41	0.35 PS	5
61CU 42						3.277		42		
61CU 43						3.323	(3/2)	43		
61CU 44						3.358		44		
61CU 45						3.364		45		
61CU 46						3.373	(9/2)	46		
61CU 47						3.412	(5/2)+	47		
61CU 48						3.430		48		
61CU 49						3.437		49		
61CU 50						3.454	3/2+, 5/2+	50		

61CU 51						3.521	1/2-, 3/2-, 5/2-	51		
61CU 52						3.549	(11/2-)	52		
61CU 53						3.578	3/2+, 5/2+	53		
61CU 54						3.591	(5/2+)	54		
61CU 55						3.613		55		
61CU 56						3.647	(5/2, 7/2)	56		
61CU 57						3.653		57		
61CU 58						3.660		58		
61CU 59						3.686		59		
61CU 60						3.706		60		

61CU 61						3.730		61		
61CU 62						3.740	(11/2)	62		
61CU 63						3.748		63		
61CU 64				3.781	13/2-			64		
61CU 65						3.790		65		
61CU 66		3.820	1/2+					66		
61CU 67						3.853	(7/2, 5/2)	67		
61CU 68						3.863	1/2-, 3/2-	68		
61CU 69						3.943	(11/2+)	69		
61CU 70						3.944	(9/2+)	70		

61CU 71						3.947		71		
61CU 72						3.967	1/2-, 3/2-	72		
61CU 73						3.971	(13/2-)	73		
61CU 74						3.981	(7/2-, 5/2)	74		
61CU 75						4.008	(1/2)	75		
61CU 76						4.041	(7/2)	76		
61CU 77						4.052	(13/2-)	77		
61CU 78						4.060		78		
61CU 79		4.081	13/2+					79		
61CU 80						4.085	(9/2)	80		

61CU 81		4.133	9/2+					81		
61CU 82						4.232	(11/2-)	82		

61CU 83				4.260	(7/2)	83
61CU 84				4.288	(13/2-)	84
61CU 85				4.296	(11/2-)	85
61CU 86				4.333	(7/2,5/2+)	86
61CU 87				4.357	(1/2)+	87
61CU 88				4.380		88
61CU 89				4.386	(9/2-)	89
61CU 90				4.423	7/2-,9/2-	90

61CU 91				4.463	(9/2-,7/2)	91
61CU 92				4.466	(15/2-)	92
61CU 93				4.470	3/2+,5/2+	93
61CU 94				4.484	5/2-,7/2-	94
61CU 95				4.516	(7/2)	95
61CU 96				4.560	(5/2,7/2)	96
61CU 97		4.591	13/2+			97
61CU 98				4.598	(7/2)	98
61CU 99				4.603	1/2-,3/2-	99
61CU 100				4.665	(7/2)	100

61CU 101				4.702	(7/2)	101
61CU 102				4.756	(7/2)	102
S-p =	4.800	(0.001)	-----			
61CU 103				4.817	(9/2)	103
61CU 104				4.820	(15/2-)	104
61CU 105				4.845	(9/2-,7/2)	105
61CU 106				4.859	5/2-,7/2-	106
61CU 107				4.879	(7/2)	107
61CU 108				4.909	(9/2,7/2)	108
61CU 109				4.943	(7/2)	109
61CU 110				4.991	(15/2+)	110

61CU 111				5.015	(9/2)	111
61CU 112				5.063		112
S-alpha=	5.063	(0.001)	-----			
61CU 113				5.072	7/2+,9/2+	113
61CU 114				5.101		114
61CU 115		5.120	17/2+			115
61CU 116				5.126		116
61CU 117				5.136	(15/2+)	117
61CU 118				5.153	(9/2-,7/2)	118
61CU 119				5.252		119
61CU 120				5.278	7/2+,9/2+	120

61CU 121				5.302		121
61CU 122				5.431	7/2+,9/2+	122
61CU 123				5.464		123
61CU 124				5.514		124
61CU 125				5.532	(13/2+)	125
61CU 126				5.580	(17/2-)	126

61CU 127	5.580	1/2+				127
61CU 128				5.681		128
61CU 129				5.702	(15/2+)	129
61CU 130	5.729	15/2+				130

61CU 131				5.732	3/2+,5/2+	131
61CU 132				5.749	(17/2-)	132
61CU 133	5.788	1/2+				133
61CU 134				5.813		134
61CU 135				5.850		135
61CU 136				5.853	(17/2+)	136
61CU 137	5.856	19/2+				137
61CU 138				5.861		138
61CU 139				5.914		139
61CU 140				5.917		140

61CU 141				5.948		141
61CU 142				5.960		142
61CU 143				5.972		143
61CU 144				5.978		144
61CU 145				5.987		145
61CU 146				6.019		146
61CU 147				6.027		147
61CU 148				6.056	(17/2+)	148
61CU 149	6.084	1/2+				149
61CU 150				6.092		150

61CU 151				6.098		151
61CU 152				6.102		152
61CU 153				6.110		153
61CU 154				6.124		154
61CU 155				6.125		155
61CU 156				6.150		156
61CU 157				6.159		157
61CU 158				6.193		158
61CU 159				6.208		159
61CU 160				6.227	(1/2)	160

61CU 161				6.237		161
61CU 162				6.241		162
61CU 163				6.259		163
61CU 164				6.267		164
61CU 165				6.291		165
61CU 166				6.294		166
61CU 167				6.304		167
61CU 168				6.314		168
61CU 169				6.341		169
61CU 170				6.351	(3/2)	170

61CU 171				6.362	3/2	171

61CU 172				6.373	3/2	172
61CU 173				6.378	3/2	173
61CU 174			6.393 3/2-			174
61CU 175				6.412		175
61CU 176				6.418		176
61CU 177				6.420	1/2-, 3/2-	177
61CU 178				6.422		178
61CU 179				6.430	(1/2)	179
61CU 180				6.442	5/2	180

61CU 181				6.446	5/2	181
61CU 182				6.452		182
61CU 183				6.457	(1/2:7/2)-	183
61CU 184				6.458	5/2	184
61CU 185				6.466	3/2	185
61CU 186				6.470		186
61CU 187				6.486		187
61CU 188				6.493		188
61CU 189				6.506	3/2	189
61CU 190				6.509		190

61CU 191				6.529	3/2	191
61CU 192				6.535	(3/2)	192
61CU 193				6.541	3/2	193
61CU 194				6.554		194
61CU 195				6.565	3/2	195
61CU 196				6.572	(19/2+)	196
61CU 197	6.584	1/2+				197
61CU 198				6.585	(3/2, 5/2)	198
61CU 199				6.591		199
61CU 200				6.605	3/2	200

61CU 201				6.620	3/2	201
61CU 202			6.627 1/2-			202
61CU 203				6.630		203
61CU 204			6.645 1/2-			204
61CU 205				6.678	(1/2-)	205
61CU 206				6.681	1/2-, 3/2-	206
61CU 207	6.694	1/2+				207
61CU 208				6.699	1/2-, 3/2-	208
61CU 209				6.707		209
61CU 210			6.712 3/2-			210

61CU 211				6.726		211
61CU 212				6.739	3/2-, 5/2-	212
61CU 213				6.745		213
61CU 214				6.763	3/2-, 5/2-	214
61CU 215				6.785		215
61CU 216				6.799		216
61CU 217	6.802	1/2+				217

61CU 218						6.804		218
61CU 219						6.814	(3/2,5/2,1/2)	219
61CU 220		6.822		21/2+				220

61CU 221						6.848		221
61CU 222						6.868		222
61CU 223						6.890		223
61CU 224						6.912		224
61CU 225						6.915	(3/2-)	225
61CU 226				6.937		3/2-		226
61CU 227						6.940		227
61CU 228		6.953		1/2+				228
61CU 229						6.972		229
61CU 230		6.992		1/2+				230

61CU 231						6.997		231
61CU 232				7.011		3/2-		232
61CU 233				7.016		3/2-		233
61CU 234						7.026	5/2	234
61CU 235		7.039		1/2+				235
61CU 236						7.044	(3/2,1/2-)	236
61CU 237		7.055		1/2+				237
61CU 238				7.060		3/2-		238
61CU 239						7.084	(1/2-,3/2-)	239
61CU 240						7.090		240

61CU 241						7.107	(1/2+)	241
61CU 242						7.114	(3/2-,1/2-)	242
61CU 243				7.121		3/2-		243
61CU 244						7.124	(19/2)	244
61CU 245						7.130	1/2-,3/2-	245
61CU 246						7.159	5/2	246
61CU 247						7.192		247
61CU 248		7.197		1/2+				248
61CU 249						7.201	(3/2-)	249
61CU 250				7.214		3/2-		250

61CU 251		7.223		1/2+				251
61CU 252						7.242	(1/2-,3/2-)	252
61CU 253		7.263		1/2+				253
61CU 254						7.274	(3/2-,1/2-)	254
61CU 255		7.283		1/2+				255
61CU 256		7.306		21/2+				256
61CU 257						7.313		257
61CU 258		7.316		1/2+				258
61CU 259						7.319		259
61CU 260						7.329	(1/2-,3/2-)	260

61CU 261						7.370	5/2-,7/2-	261
61CU 262		7.378		5/2+				262

61CU 263	7.387	23/2+					263
61CU 264					7.401	5/2-, 7/2-	264
61CU 265					7.415	(1/2-, 3/2-)	265
61CU 266					7.428		266
61CU 267	7.430	1/2+					267
61CU 268	7.438	1/2+					268
61CU 269					7.455	(21/2+)	269
61CU 270			7.475	1/2-			270

61CU 271			7.485	1/2-			271
61CU 272			7.489	1/2-			272
61CU 273			7.497	1/2-			273
61CU 274	7.510	1/2+					274
61CU 275					7.520	(3/2-, 1/2-)	275
61CU 276					7.526	(3/2+, 5/2+)	276
61CU 277					7.535	(21/2-)	277
61CU 278			7.542	1/2-			278
61CU 279	7.549	1/2+					279
61CU 280			7.554	1/2-			280

61CU 281			7.556	1/2-			281
61CU 282	7.560	1/2+					282
61CU 283					7.569	(5/2+, 3/2+)	283
61CU 284					7.572		284
61CU 285			7.579	1/2-			285
61CU 286			7.582	1/2-			286
61CU 287			7.584	1/2-			287
61CU 288			7.589	1/2-			288
61CU 289					7.607	(21/2+)	289
61CU 290					7.608	(3/2-, 1/2-)	290

61CU 291					7.620	1/2-, 3/2-	291
61CU 292					7.631	(5/2+, 3/2+)	292
61CU 293	7.637	1/2+					293
61CU 294					7.639	(5/2+)	294
61CU 295					7.643	(1/2:7/2)-	295
61CU 296					7.646		296
61CU 297	7.648	1/2+					297
61CU 298					7.658	(3/2-, 1/2-)	298
61CU 299					7.662	(5/2+, 3/2+)	299
61CU 300					7.672	(5/2+, 3/2+)	300

61CU 301	7.681	1/2+					301
61CU 302	7.702	3/2+					302
61CU 303					7.703	(5/2+)	303
61CU 304					7.705	(1/2-)	304
61CU 305					7.722	(3/2+)	305
61CU 306					7.729	(1/2-)	306
61CU 307	7.744	1/2+					307
61CU 308					7.746	(5/2+)	308

61CU 309					7.762	(5/2+)	309
61CU 310	7.767	1/2+					310

61CU 311					7.782	(3/2-)	311
61CU 312					7.785	(5/2+)	312
61CU 313	7.806	3/2+					313
61CU 314	7.807	1/2+					314
61CU 315					7.838	(3/2+)	315
61CU 316	7.843	1/2+					316
61CU 317	7.847	3/2+					317
61CU 318					7.850	(1/2-)	318
61CU 319			7.855	3/2-			319
61CU 320					7.859	(21/2)	320

61CU 321					7.886	(1/2-)	321
61CU 322					7.894	(1/2-)	322
61CU 323	7.896	1/2+					323
61CU 324	7.919	1/2+					324
61CU 325			7.921	1/2-			325
61CU 326					7.931	(5/2+)	326
61CU 327			7.937	23/2-			327
61CU 328	7.944	1/2+					328
61CU 329	7.947	3/2+					329
61CU 330			7.951	1/2-			330

61CU 331	7.962	1/2+					331
61CU 332	7.970	1/2+					332
61CU 333			7.972	3/2-			333
61CU 334	7.988	1/2+					334
61CU 335	7.997	1/2+					335
61CU 336			8.006	3/2-			336
61CU 337	8.015	3/2+					337
61CU 338			8.016	1/2-			338
61CU 339			8.020	1/2-			339
61CU 340	8.023	5/2+					340

61CU 341					8.028	(5/2+)	341
61CU 342					8.030	(23/2+)	342
61CU 343					8.032	(5/2+)	343
61CU 344					8.043	(5/2+)	344
61CU 345					8.055	(1/2-)	345
61CU 346	8.057	1/2+					346
61CU 347					8.068	(5/2+)	347
61CU 348			8.075	3/2-			348
61CU 349	8.076	1/2+					349
61CU 350	8.087	1/2+					350

61CU 351	8.090	5/2+					351
61CU 352			8.097	3/2-			352
61CU 353	8.102	1/2+					353

61CU 354					8.103	(1/2-)	354
61CU 355	8.109	1/2+					355
61CU 356	8.113	5/2+					356
61CU 357			8.118	1/2-			357
61CU 358					8.121	(5/2+)	358
61CU 359	8.122	1/2+					359
61CU 360			8.123	3/2-			360

61CU 361					8.128	(5/2+)	361
61CU 362	8.132	1/2+					362
61CU 363					8.139	(1/2-)	363
61CU 364					8.140	(5/2+)	364
61CU 365	8.149	1/2+					365
61CU 366					8.151	(5/2+)	366
61CU 367	8.156	5/2+					367
61CU 368	8.162	5/2+					368
61CU 369					8.165	(1/2-)	369
61CU 370	8.168	5/2+					370

61CU 371					8.169	(1/2-)	371
61CU 372			8.170	1/2-			372
61CU 373	8.171	5/2+					373
61CU 374	8.174	1/2+					374
61CU 375	8.175	1/2+					375
61CU 376			8.178	3/2-			376
61CU 377			8.181	1/2-			377
61CU 378					8.188	(5/2+)	378
61CU 379					8.194	(5/2+)	379
61CU 380					8.212	(21/2-)	380

61CU 381			8.222	1/2-			381
61CU 382			8.250	1/2-			382
61CU 383			8.272	1/2-			383
61CU 384			8.290	3/2-			384
61CU 385			8.308	1/2-			385
61CU 386					8.334	(23/2+)	386
61CU 387					8.358		387
61CU 388			8.361	1/2-			388
61CU 389			8.365	1/2-			389
61CU 390			8.415	1/2-			390

61CU 391			8.427	1/2-			391
61CU 392					8.431	5/2	392
61CU 393					8.436	1/2	393
61CU 394					8.440	1/2	394
61CU 395					8.443	3/2,5/2	395
61CU 396					8.446		396
61CU 397	8.447	9/2+					397
61CU 398	8.448	9/2+					398
61CU 399			8.448	3/2-			399

61CU 400	8.449	9/2+				400	

61CU 401	8.455	9/2+				401	
61CU 402					8.456	1/2,3/2	402
61CU 403	8.459	9/2+					403
61CU 404	8.460	9/2+					404
61CU 405	8.464	9/2+					405
61CU 406	8.466	9/2+					406
61CU 407					8.466	1/2	407
61CU 408			8.469	1/2-			408
61CU 409					8.469	5/2	409
61CU 410	8.473	9/2+					410

61CU 411	8.476	9/2+					411
61CU 412			8.478	1/2-			412
61CU 413	8.478	9/2+					413
61CU 414	8.481	9/2+					414
61CU 415					8.482	3/2	415
61CU 416	8.483	9/2+					416
61CU 417	8.485	9/2+					417
61CU 418			8.488	1/2-			418
61CU 419					8.490	1/2	419
61CU 420					8.492	3/2	420

61CU 421			8.498	3/2-			421
61CU 422					8.500	5/2	422
61CU 423					8.504		423
61CU 424					8.507	1/2	424
61CU 425					8.508	1/2	425
61CU 426					8.510		426
61CU 427					8.515		427
61CU 428					8.523	1/2,3/2	428
61CU 429					8.561	7/2+,9/2+	429
61CU 430			8.591	3/2-			430

61CU 431					8.625	(23/2)	431
61CU 432			8.631	3/2-			432
61CU 433					8.670		433
61CU 434					8.679	(21/2-)	434
61CU 435			8.693	1/2-			435
61CU 436			8.732	1/2-			436
61CU 437			8.734	1/2-			437
61CU 438			8.743	1/2-			438
61CU 439					8.789	(25/2+)	439
61CU 440					8.885	(25/2+)	440

61CU 441					9.139		441
61CU 442					9.142	(3/2:9/2)+	442
61CU 443					9.287	(23/2-)	443
61CU 444			9.408	27/2-			444

61CU 445				9.474	(25/2)	445
61CU 446				9.644	(25/2-)	446
61CU 447				9.693	(25/2-)	447
61CU 448				9.725	(27/2+)	448
61CU 449				9.790	(27/2-)	449
61CU 450				9.958	(25/2-)	450

61CU 451				9.963	7/2+,9/2+	451
61CU 452				10.342	(27/2)	452
61CU 453				10.347	(25/2+)	453
61CU 454				10.410	(25/2+)	454
61CU 455				10.463	(25/2+)	455
61CU 456		10.672	1/2+			456
61CU 457				10.688	(27/2-)	457
61CU 458				10.907	(29/2+)	458
61CU 459				11.019		459
61CU 460				11.133	(31/2-)	460

61CU 461				11.144		461
61CU 462				11.237	(27/2-)	462
61CU 463				11.255		463
61CU 464				11.302	(29/2-)	464
61CU 465				11.303	(27/2-)	465
61CU 466				11.370	(29/2)	466
61CU 467				11.449	(25/2+)	467

S-n	=	11.710	(0.002)	-----		
61CU 468				11.753	(29/2-)	468
61CU 469				11.768		469
61CU 470				11.776	(29/2+)	470

61CU 471				11.798		471
61CU 472				11.822		472
61CU 473				11.831		473
61CU 474				11.852		474
61CU 475				11.881		475
61CU 476				11.902		476
61CU 477				11.919		477
61CU 478				11.935		478
61CU 479				11.946		479
61CU 480				11.969		480

61CU 481				11.994		481
61CU 482				12.004	(31/2-)	482
61CU 483				12.054		483
61CU 484				12.084		484
61CU 485				12.087	(31/2+)	485
61CU 486				12.090	(27/2+)	486
61CU 487				12.102		487
61CU 488				12.121		488
61CU 489				12.148		489

61CU 490			12.166		490

61CU 491			12.189		491
61CU 492			12.215		492
61CU 493			12.253		493
61CU 494			12.273		494
61CU 495			12.303		495
61CU 496			12.314		496
61CU 497			12.356	(31/2)	497
61CU 498			12.356		498
61CU 499			12.394		499
61CU 500			12.409		500

61CU 501			12.452		501
61CU 502			12.478		502
61CU 503			12.494		503
61CU 504			12.506		504
61CU 505			12.520		505
61CU 506			12.793	(31/2-)	506
61CU 507			12.839	(33/2-)	507
61CU 508			12.847	(29/2+)	508
61CU 509			13.146	(31/2-)	509
61CU 510			13.206	(29/2+)	510

61CU 511			13.285	(33/2+)	511
61CU 512			13.420	(33/2+)	512
61CU 513			13.678	(31/2+)	513
61CU 514			13.823	(29/2+)	514
61CU 515			13.874	(31/2+)	515
61CU 516			13.983	(33/2)	516
61CU 517			14.021	(33/2)	517
61CU 518			14.024	(35/2-)	518
61CU 519			14.068	(33/2-)	519
61CU 520			14.163		520

S-2p	=	14.332	(0.001)		

61CU 521			14.563	(33/2+)	521
61CU 522			14.587	(33/2+)	522
61CU 523			14.628	(35/2-)	523
61CU 524			14.800	(35/2)	524
61CU 525			15.202	(37/2-)	525
61CU 526			15.232	(37/2+)	526
61CU 527			15.311	(33/2+)	527
61CU 528			15.435	(35/2+)	528
61CU 529			15.524	(35/2+)	529
61CU 530			15.742	(37/2)	530

61CU 531			16.302	(37/2+)	531
61CU 532			16.571	(39/2)	532
61CU 533			16.588	(37/2+)	533

61CU 534			16.615	(37/2-)	534
61CU 535			16.921	(39/2-)	535
61CU 536			17.039	(39/2-)	536
61CU 537			17.067	(37/2+)	537
61CU 538			17.311	(39/2+)	538
61CU 539			17.431	(41/2+)	539
61CU 540			17.618	(41/2)	540

61CU 541			17.750	(39/2+)	541
61CU 542			18.353	(41/2+)	542
61CU 543			18.857	(43/2)	543
61CU 544			18.995	(41/2+)	544
61CU 545			19.134	(41/2+)	545
61CU 546			19.472	(41/2-)	546
61CU 547			19.562	(43/2+)	547
61CU 548			19.878	(43/2-)	548
61CU 549			19.970	(45/2+)	549
61CU 550			X		550

61CU 551			339+X		551
61CU 552			790+X		552
61CU 553			2037.0+X		553
61CU 554			2520+X		554
61CU 555			4288+X		555
61CU 556			4465+X		556
61CU 557			6674+X		557
61CU 558			6735+X		558
61CU 559			9261+X		559
61CU 560			9434+X		560

61CU 561			12369+X		561
61CU 562			12482+X		562
61CU 563			15897+X		563
61CU 564			Y		564
61CU 565			1833+Y		565
61CU 566			1846.1+Y		566
61CU 567			3998.3+Y		567
61CU 568			6459+Y		568
61CU 569			9258+Y		569
61CU 570			12432+Y		570

S-p = 4.800 (0.001)-----
S-n = 11.710 (0.002)-----
S-2p = 14.332 (0.001)-----
S-2n = 21.768 (0.001)-----
S-alpha= 5.063 (0.001)-----

S+p = -6.473 (0.001)

S+n = -8.875 (0.001)
S+2p = -9.141 (0.002)
S+2n = -19.738 (0.001)
S+alpha = -3.099 (0.001)

gap p = -1.673 (0.002)
gap n = 2.836 (0.002)
gap 2p = 5.191 (0.002)
gap 2n = 2.030 (0.002)
gap alpha = 1.965 (0.002)