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Ferrenberg Swendsen Analysis of LLNL and NYBlue BG/L p4rhms Data

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Disclaimer

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Background

These results are from the continuing Lattice Quantum Chromodynamics runs on BG/L. These results are from the Ferrenberg-Swendsen analysis [**?**] of the combined data from LLNL and NYBlue BG/L runs for 32^3x8 runs with the p4rhmc v2.0 QMP_MPI.X (semi-optomized p4 code using qmp over mpi). The jobs include beta values ranging from 3.525 to 3.535 with an alternate analysis extending to 3.540. The NYBlue data sets are from 9k trajectories from Oct 2007, and the LLNL data are from two independent streams of ∼5k each, taking from the July 2007 runs.

The following outputs are produced by the fs_2+1_chiub.c program. All outputs have had checksums produced by addCks.pl and checked by the checkCks.pl perl script after scanning.

fs.beta output

```
1: 742:# fs.beta
2: 5457:# Ferrenberg Swensen fuer beta_c aus der Suszeptibilitaet
3: 870:# Plaq Sus:
4: 1259:3.525100 0.052454 0.001192
5: 838:3.524560 0.000449
6: 771:# Pol Sus:
7: 1270:3.525000 1.754450 0.108901
8: 811:3.525000 0.000000
9: 1716:# Chiral Sus (light):
10: 1296:3.528600 1.797024 0.188393
11: 835:3.523560 0.003831
12: 1721:# Chiral Sus (heavy):
13: 1278:3.527200 0.541569 0.043057
14: 848:3.506590 0.006558
```

histos output

```
1: 618:# histo
2: 894:0.845849 0.224983
3: 891:0.845909 0.224983
4: 900:0.845999 0.224983
5: 882:0.846029 0.326842
6: 889:0.846059 0.382817
7: 888:0.846089 0.326842
8: 886:0.846119 0.382817
9: 888:0.846149 0.157834
10: 891:0.846179 0.157834
11: 882:0.846209 1.261483
12: 878:0.846239 0.642510
13: 897:0.846269 2.793832
14: 901:0.846299 0.484676
15: 891:0.846329 1.475293
16: 887:0.846359 1.103649
```

```
17: 896:0.846389 0.315669
18: 887:0.846419 3.288600
19: 900:0.846449 0.867493
20: 887:0.846479 0.607800
21: 903:0.846509 1.867867
22: 893:0.846539 3.425169
23: 905:0.846569 3.244989
24: 893:0.846599 1.858110
25: 903:0.846629 3.469972
26: 892:0.846659 3.063617
27: 884:0.846689 4.325100
28: 891:0.846719 3.095830
29: 899:0.846749 6.625356
30: 905:0.846779 2.587617
31: 892:0.846809 5.392622
32: 889:0.846839 5.442305
33: 889:0.846869 6.035132
34: 903:0.846899 5.784115
35: 896:0.846929 7.400964
36: 906:0.846959 6.676561
37: 913:0.846989 7.927952
38: 885:0.847019 6.851530
39: 895:0.847049 7.408448
40: 888:0.847079 9.214054
41: 878:0.847109 9.244101
42: 886:0.847139 8.320526
43: 900:0.847169 5.459653
44: 907:0.847199 9.855365
45: 899:0.847229 5.268819
46: 900:0.847259 9.629191
47: 910:0.847289 7.088984
48: 925:0.847319 10.031750
49: 903:0.847348 9.736556
50: 901:0.847378 8.315757
51: 885:0.847408 8.451017
52: 904:0.847438 8.961945
53: 893:0.847468 9.030394
54: 913:0.847498 9.647838
55: 901:0.847528 6.442959
56: 892:0.847558 7.740450
57: 901:0.847588 9.032955
58: 933:0.847618 10.210289
59: 936:0.847648 11.263145
60: 946:0.847678 11.691615
61: 903:0.847708 7.828547
62: 902:0.847738 8.696530
63: 899:0.847768 8.159251
64: 920:0.847798 9.999382
65: 930:0.847828 11.313332
66: 906:0.847858 7.114889
```

67: 961:0.847888 11.599557
68: 910:0.847918 6.989553
69: 946:0.847948 12.079236
70: 906:0.847978 8.407268
71: 898:0.848008 8.467881
72: 893:0.848038 7.923427
73: 941:0.848068 11.658442
74: 895:0.848098 8.902803
75: 889:0.848128 9.129081
76: 948:0.848158 11.997632
77: 930:0.848188 10.422143
78: 946:0.848218 14.408967
79: 942:0.848248 12.940097
80: 947:0.848278 11.355595
81: 893:0.848308 9.642724
82: 905:0.848338 9.890647
83: 936:0.848368 12.070634
84: 943:0.848398 10.109358
85: 930:0.848428 12.145511
86: 943:0.848458 16.311684
87: 945:0.848488 12.931229
88: 942:0.848518 14.785322
89: 940:0.848548 12.549033
90: 953:0.848578 15.739903
91: 942:0.848608 10.776506
92: 954:0.848638 13.334999
93: 957:0.848668 12.859547
94: 947:0.848698 12.278080
95: 948:0.848728 13.473728
96: 904:0.848758 8.947071
97: 961:0.848788 13.968933
98: 928:0.848818 10.702320
99: 934:0.848848 11.352303
100: 903:0.848878 9.837311
101: 944:0.848908 12.037639
102: 942:0.848938 11.465243
103: 946:0.848968 11.943711
104: 956:0.848998 11.665942
105: 907:0.849028 7.889763
106: 937:0.849058 12.271176
107: 921:0.849088 11.003003
108: 889:0.849118 8.335407
109: 885:0.849148 8.851010
110: 907:0.849178 9.758706
111: 935:0.849208 10.306864
112: 894:0.849238 8.741363
113: 899:0.849268 7.101997
114: 911:0.849298 7.155889
115: 894:0.849328 7.742840
116: 902:0.849358 6.973534

```
117: 903:0.849388 8.626283
118: 904:0.849418 5.576874
119: 900:0.849448 6.873731
120: 902:0.849478 7.028476
121: 887:0.849508 7.432702
122: 897:0.849537 8.954403
123: 896:0.849567 4.447190
124: 901:0.849597 6.243538
125: 884:0.849627 7.215410
126: 900:0.849657 5.921934
127: 912:0.849687 7.381797
128: 900:0.849717 6.884037
129: 899:0.849747 5.345951
130: 906:0.849777 8.328726
131: 906:0.849807 7.595457
132: 900:0.849837 8.484027
133: 935:0.849867 10.215701
134: 912:0.849897 7.524993
135: 939:0.849927 10.032990
136: 907:0.849957 6.714829
137: 947:0.849987 10.265840
138: 886:0.850017 7.725439
139: 880:0.850047 6.170743
140: 898:0.850077 7.839628
141: 879:0.850107 7.164552
142: 883:0.850137 7.811824
143: 888:0.850167 6.837126
144: 887:0.850197 5.760614
145: 883:0.850227 6.191833
146: 878:0.850257 7.251026
147: 888:0.850287 6.812049
148: 880:0.850317 6.425209
149: 884:0.850347 4.926152
150: 891:0.850377 6.632529
151: 879:0.850407 5.106681
152: 869:0.850437 6.300320
153: 889:0.850467 4.177192
154: 885:0.850497 5.365005
155: 878:0.850527 3.005654
156: 885:0.850557 4.715802
157: 892:0.850587 4.451827
158: 887:0.850617 5.514791
159: 877:0.850647 4.330801
160: 879:0.850677 3.711420
161: 890:0.850707 3.339791
162: 884:0.850737 1.808153
163: 888:0.850767 1.708308
164: 884:0.850797 1.430822
165: 878:0.850827 2.923040
166: 895:0.850857 0.826792
```

```
167: 887:0.850887 0.721157
168: 883:0.850917 0.865204
169: 881:0.850947 1.176320
170: 887:0.850977 1.320368
171: 878:0.851007 0.743258
172: 888:0.851037 0.942948
173: 876:0.851067 0.615522
174: 884:0.851097 0.227582
175: 876:0.851127 0.455163
176: 884:0.851187 0.227582
177: 880:0.851307 0.371629
178: 875:0.851337 0.144047
179: 893:0.851367 0.265994
180: 887:0.851397 0.227582
181: 887:0.851427 0.288095
182: 881:0.851457 0.121946
183: 884:0.851487 0.121946
184: 877:0.851816 0.144047
```

fs.out output

```
1: 2603:#Ferrenberg Swendsen fs.out
2:11205:#beta Action error Sus(Action) error Wline error Sus(Wline) error Pbp_l error Sus(Pbp_l) e
3:11395:3.525000 8.472027e-01 2.071667e-05 5.243209e-02 1.123886e-03 1.836045e-02 2.793156e-04 1.7
4:11344:3.525100 8.472341e-01 2.035013e-05 5.245382e-02 1.191743e-03 1.834852e-02 2.749201e-04 1.7
5:11375:3.525200 8.472656e-01 1.992266e-05 5.245201e-02 1.271445e-03 1.833731e-02 2.710849e-04 1.7
6:11401:3.525300 8.472970e-01 1.943881e-05 5.242838e-02 1.356940e-03 1.832699e-02 2.678471e-04 1.6
7:11392:3.525400 8.473285e-01 1.890454e-05 5.238460e-02 1.443278e-03 1.831774e-02 2.652348e-04 1.6
8:11442:3.525500 8.473599e-01 1.832774e-05 5.232228e-02 1.526546e-03 1.830969e-02 2.632634e-04 1.6
9:11386:3.525600 8.473912e-01 1.771744e-05 5.224301e-02 1.603700e-03 1.830299e-02 2.619324e-04 1.6
10:11504:3.525700 8.474225e-01 1.708419e-05 5.214839e-02 1.672393e-03 1.829776e-02 2.612246e-04 1.
11:11425:3.525800 8.474538e-01 1.643974e-05 5.204002e-02 1.730837e-03 1.829411e-02 2.611056e-04 1.
12:11512:3.525900 8.474850e-01 1.579659e-05 5.191954e-02 1.777681e-03 1.829214e-02 2.615256e-04 1.
13:11480:3.526000 8.475161e-01 1.516815e-05 5.178858e-02 1.811944e-03 1.829194e-02 2.624207e-04 1.
14:11473:3.526100 8.475471e-01 1.456767e-05 5.164876e-02 1.832936e-03 1.829356e-02 2.637167e-04 1.
15:11461:3.526200 8.475780e-01 1.400866e-05 5.150172e-02 1.840216e-03 1.829709e-02 2.653320e-04 1.
16:11458:3.526300 8.476089e-01 1.350360e-05 5.134900e-02 1.833553e-03 1.830256e-02 2.671806e-04 1.
17:11440:3.526400 8.476396e-01 1.306273e-05 5.119212e-02 1.812905e-03 1.831003e-02 2.691754e-04 1.
18:11438:3.526500 8.476703e-01 1.269413e-05 5.103248e-02 1.778400e-03 1.831953e-02 2.712310e-04 1.
19:11412:3.526600 8.477008e-01 1.240251e-05 5.087142e-02 1.730340e-03 1.833108e-02 2.732652e-04 1.
20:11440:3.526700 8.477313e-01 1.218811e-05 5.071012e-02 1.669208e-03 1.834470e-02 2.752016e-04 1.
21:11512:3.526800 8.477617e-01 1.204758e-05 5.054965e-02 1.595688e-03 1.836039e-02 2.769699e-04 1.
22:11502:3.526900 8.477919e-01 1.197294e-05 5.039096e-02 1.510694e-03 1.837816e-02 2.785072e-04 1.
23:11490:3.527000 8.478221e-01 1.195347e-05 5.023486e-02 1.415425e-03 1.839798e-02 2.797581e-04 1.
24:11409:3.527100 8.478522e-01 1.197637e-05 5.008208e-02 1.311418e-03 1.841984e-02 2.806752e-04 1.
25:11428:3.527200 8.478822e-01 1.202736e-05 4.993323e-02 1.200649e-03 1.844368e-02 2.812186e-04 1.
26:11493:3.527300 8.479121e-01 1.209228e-05 4.978888e-02 1.085668e-03 1.846947e-02 2.813560e-04 1.
27:11482:3.527400 8.479419e-01 1.215797e-05 4.964954e-02 9.698232e-04 1.849713e-02 2.810627e-04 1.
28:11477:3.527500 8.479717e-01 1.221255e-05 4.951570e-02 8.575948e-04 1.852658e-02 2.803209e-04 1.
29:11467:3.527600 8.480013e-01 1.224641e-05 4.938789e-02 7.550444e-04 1.855773e-02 2.791194e-04 1.
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```
30:11474:3.527700 8.480309e-01 1.225175e-05 4.926663e-02 6.701918e-04 1.859046e-02 2.774539e-04 1.
31:11468:3.527800 8.480604e-01 1.222325e-05 4.915251e-02 6.124998e-04 1.862465e-02 2.753262e-04 1.
32:11505:3.527900 8.480899e-01 1.215765e-05 4.904613e-02 5.900837e-04 1.866015e-02 2.727445e-04 1.
33:11456:3.528000 8.481193e-01 1.205460e-05 4.894820e-02 6.049976e-04 1.869682e-02 2.697231e-04 1.
34:11499:3.528100 8.481486e-01 1.191494e-05 4.885945e-02 6.512670e-04 1.873448e-02 2.662821e-04 1.
35:11464:3.528200 8.481779e-01 1.174239e-05 4.878062e-02 7.184587e-04 1.877295e-02 2.624478e-04 1.
36:11462:3.528300 8.482071e-01 1.154207e-05 4.871252e-02 7.963886e-04 1.881205e-02 2.582528e-04 1.
37:11508:3.528400 8.482363e-01 1.132057e-05 4.865589e-02 8.771694e-04 1.885158e-02 2.537356e-04 1.
38:11472:3.528500 8.482655e-01 1.108616e-05 4.861149e-02 9.552177e-04 1.889134e-02 2.489411e-04 1.
39:11493:3.528600 8.482946e-01 1.084781e-05 4.857997e-02 1.026686e-03 1.893112e-02 2.439208e-04 1.
40:11464:3.528700 8.483237e-01 1.061552e-05 4.856189e-02 1.088947e-03 1.897072e-02 2.387327e-04 1.
41:11511:3.528800 8.483529e-01 1.039868e-05 4.855771e-02 1.140244e-03 1.900996e-02 2.334417e-04 1.
42:11513:3.528900 8.483820e-01 1.020649e-05 4.856768e-02 1.179473e-03 1.904862e-02 2.281199e-04 1.
43:11480:3.529000 8.484111e-01 1.004704e-05 4.859193e-02 1.206046e-03 1.908655e-02 2.228460e-04 1.
44:11476:3.529100 8.484403e-01 9.926165e-06 4.863035e-02 1.219812e-03 1.912357e-02 2.177057e-04 1.
45:11501:3.529200 8.484695e-01 9.848612e-06 4.868267e-02 1.221003e-03 1.915953e-02 2.127905e-04 1.
46:11497:3.529300 8.484987e-01 9.815245e-06 4.874838e-02 1.210211e-03 1.919432e-02 2.081973e-04 1.
47:11483:3.529400 8.485279e-01 9.825191e-06 4.882682e-02 1.188373e-03 1.922782e-02 2.040260e-04 1.
48:11473:3.529500 8.485573e-01 9.875201e-06 4.891707e-02 1.156784e-03 1.925997e-02 2.003769e-04 1.
49:11460:3.529600 8.485866e-01 9.959794e-06 4.901810e-02 1.117110e-03 1.929071e-02 1.973476e-04 1.
50:11452:3.529700 8.486161e-01 1.007295e-05 4.912872e-02 1.071429e-03 1.932002e-02 1.950281e-04 1.
51:11444:3.529800 8.486456e-01 1.020754e-05 4.924757e-02 1.022266e-03 1.934791e-02 1.934961e-04 1.
52:11536:3.529900 8.486751e-01 1.035692e-05 4.937324e-02 9.726358e-04 1.937444e-02 1.928118e-04 1.
53:11427:3.530000 8.487048e-01 1.051515e-05 4.950420e-02 9.260255e-04 1.939965e-02 1.930137e-04 1.
54:11483:3.530100 8.487345e-01 1.067713e-05 4.963889e-02 8.862836e-04 1.942367e-02 1.941152e-04 1.
55:11467:3.530200 8.487643e-01 1.083914e-05 4.977568e-02 8.573091e-04 1.944662e-02 1.961034e-04 1.
56:11513:3.530300 8.487942e-01 1.099921e-05 4.991296e-02 8.425105e-04 1.946864e-02 1.989396e-04 1.
57:11473:3.530400 8.488242e-01 1.115659e-05 5.004907e-02 8.441144e-04 1.948993e-02 2.025622e-04 1.
58:11484:3.530500 8.488543e-01 1.131181e-05 5.018237e-02 8.626264e-04 1.951068e-02 2.068911e-04 1.
59:11460:3.530600 8.488844e-01 1.146680e-05 5.031120e-02 8.967318e-04 1.953110e-02 2.118325e-04 1.
60:11482:3.530700 8.489146e-01 1.162502e-05 5.043392e-02 9.437163e-04 1.955142e-02 2.172842e-04 1.
61:11429:3.530800 8.489449e-01 1.179000e-05 5.054884e-02 1.000130e-03 1.957186e-02 2.231411e-04 1.
62:11469:3.530900 8.489752e-01 1.196577e-05 5.065430e-02 1.062389e-03 1.959266e-02 2.292989e-04 1.
63:11410:3.531000 8.490056e-01 1.215702e-05 5.074862e-02 1.127154e-03 1.961404e-02 2.356580e-04 1.
64:11436:3.531100 8.490361e-01 1.236705e-05 5.083009e-02 1.191507e-03 1.963623e-02 2.421260e-04 1.
65:11461:3.531200 8.490666e-01 1.259889e-05 5.089700e-02 1.252987e-03 1.965944e-02 2.486193e-04 1.
66:11440:3.531300 8.490971e-01 1.285483e-05 5.094767e-02 1.309573e-03 1.968385e-02 2.550639e-04 1.
67:11459:3.531400 8.491277e-01 1.313497e-05 5.098043e-02 1.359638e-03 1.970964e-02 2.613960e-04 1.
68:11417:3.531500 8.491582e-01 1.343890e-05 5.099367e-02 1.401907e-03 1.973695e-02 2.675615e-04 1.
69:11470:3.531600 8.491888e-01 1.376392e-05 5.098589e-02 1.435421e-03 1.976589e-02 2.735155e-04 1.
70:11482:3.531700 8.492194e-01 1.410666e-05 5.095573e-02 1.459515e-03 1.979656e-02 2.792211e-04 1.
71:11453:3.531800 8.492499e-01 1.446207e-05 5.090201e-02 1.473803e-03 1.982902e-02 2.846483e-04 1.
72:11429:3.531900 8.492804e-01 1.482457e-05 5.082381e-02 1.478171e-03 1.986328e-02 2.897725e-04 1.
73:11447:3.532000 8.493108e-01 1.518740e-05 5.072050e-02 1.472783e-03 1.989933e-02 2.945734e-04 1.
74:11423:3.532100 8.493412e-01 1.554402e-05 5.059183e-02 1.458089e-03 1.993716e-02 2.990337e-04 1.
75:11436:3.532200 8.493715e-01 1.588740e-05 5.043792e-02 1.434830e-03 1.997668e-02 3.031377e-04 1.
76:11400:3.532300 8.494017e-01 1.621089e-05 5.025932e-02 1.404053e-03 2.001780e-02 3.068705e-04 1.
77:11406:3.532400 8.494317e-01 1.650779e-05 5.005705e-02 1.367111e-03 2.006041e-02 3.102176e-04 1.
78:11446:3.532500 8.494617e-01 1.677267e-05 4.983259e-02 1.325657e-03 2.010436e-02 3.131641e-04 1.
79:11465:3.532600 8.494915e-01 1.700013e-05 4.958787e-02 1.281620e-03 2.014951e-02 3.156949e-04 1.
```

```
80:11464:3.532700 8.495211e-01 1.718634e-05 4.932525e-02 1.237145e-03 2.019567e-02 3.177949e-04 1.
81:11492:3.532800 8.495506e-01 1.732777e-05 4.904748e-02 1.194508e-03 2.024268e-02 3.194488e-04 1.
82:11470:3.532900 8.495800e-01 1.742249e-05 4.875763e-02 1.155976e-03 2.029034e-02 3.206424e-04 1.
83:11442:3.533000 8.496091e-01 1.746940e-05 4.845904e-02 1.123618e-03 2.033846e-02 3.213623e-04 1.
84:11434:3.533100 8.496381e-01 1.746845e-05 4.815523e-02 1.099102e-03 2.038686e-02 3.215975e-04 1.
85:11444:3.533200 8.496669e-01 1.742105e-05 4.784981e-02 1.083501e-03 2.043534e-02 3.213392e-04 1.
86:11407:3.533300 8.496955e-01 1.732900e-05 4.754640e-02 1.077165e-03 2.048374e-02 3.205817e-04 1.
87:11455:3.533400 8.497239e-01 1.719569e-05 4.724853e-02 1.079726e-03 2.053186e-02 3.193230e-04 1.
88:11474:3.533500 8.497522e-01 1.702472e-05 4.695958e-02 1.090231e-03 2.057955e-02 3.175649e-04 1.
89:11472:3.533600 8.497803e-01 1.682095e-05 4.668268e-02 1.107363e-03 2.062667e-02 3.153133e-04 1.
90:11429:3.533700 8.498082e-01 1.658936e-05 4.642070e-02 1.129701e-03 2.067305e-02 3.125782e-04 1.
91:11460:3.533800 8.498360e-01 1.633550e-05 4.617616e-02 1.155958e-03 2.071859e-02 3.093737e-04 1.
92:11459:3.533900 8.498636e-01 1.606515e-05 4.595124e-02 1.185135e-03 2.076317e-02 3.057176e-04 1.
93:11392:3.534000 8.498911e-01 1.578425e-05 4.574776e-02 1.216627e-03 2.080668e-02 3.016313e-04 1.
94:11460:3.534100 8.499185e-01 1.549875e-05 4.556722e-02 1.250235e-03 2.084903e-02 2.971389e-04 1.
95:11429:3.534200 8.499458e-01 1.521454e-05 4.541084e-02 1.286139e-03 2.089016e-02 2.922671e-04 1.
96:11452:3.534300 8.499731e-01 1.493720e-05 4.527958e-02 1.324828e-03 2.093002e-02 2.870440e-04 1.
97:11459:3.534400 8.500002e-01 1.467239e-05 4.517427e-02 1.367003e-03 2.096855e-02 2.814985e-04 1.
98:11431:3.534500 8.500273e-01 1.442552e-05 4.509565e-02 1.413484e-03 2.100573e-02 2.756596e-04 1.
99:11440:3.534600 8.500544e-01 1.420147e-05 4.504448e-02 1.465120e-03 2.104156e-02 2.695556e-04 1.
100:11365:3.534700 8.500814e-01 1.400523e-05 4.502166e-02 1.522742e-03 2.107606e-02 2.632132e-04 1
101:11448:3.534800 8.501085e-01 1.384153e-05 4.502829e-02 1.587163e-03 2.110924e-02 2.566574e-04 1
102:11434:3.534900 8.501355e-01 1.371517e-05 4.506579e-02 1.659235e-03 2.114118e-02 2.499110e-04 1
103:11434:3.535000 8.501626e-01 1.363041e-05 4.513599e-02 1.739971e-03 2.117195e-02 2.429952e-04 1
```

fs.info output

```
1: 758:# fs.info
2: 1315:# 4 32 8 1.666667 -0.166667
3: 1718:# 3.525000 0.000100 100 1 10 200 20000
4: 8841:# files: ../test/plaq_b3.525000.dat ../test/rect_b3.525000.dat ../test/wline_b3.525000.dat
5: 2113:#  tau_int    6.3358   6.335758e+00
6: 3354:# 1: Beta(0) = 3.525000, 615 Daten, Wirkung = 0.847268
7: 2361:# 1: S_min = 0.846061, S_max = 0.848473
8: 7342:3.525000 8.472678e-01 8.472678e-01 5.106896e-02 1.000001e+00 1.739921e-02 7.079246e-01 2.9
9: 9137:# files: ../../data/p4c3.525/plaq.dat ../../data/p4c3.525/rect.dat ../../data/p4c3.525/wli
10: 2110:#  tau_int    3.0596   3.059586e+00
11: 3355:# 2: Beta(1) = 3.525000, 337 Daten, Wirkung = 0.847158
12: 2364:# 2: S_min = 0.846043, S_max = 0.848448
13: 7293:3.525000 8.471576e-01 8.471576e-01 4.591146e-02 1.000001e+00 1.991358e-02 2.569928e+00 3.
14: 9157:# files: ../../data/p4h3.525/plaq.dat ../../data/p4h3.525/rect.dat ../../data/p4h3.525/wl
15: 2113:#  tau_int    4.4448   4.444787e+00
16: 3352:# 3: Beta(2) = 3.525000, 290 Daten, Wirkung = 0.847155
17: 2370:# 3: S_min = 0.845834, S_max = 0.848356
18: 7265:3.525000 8.471550e-01 8.471550e-01 5.697326e-02 1.000001e+00 1.851091e-02 2.388449e+00 3.
19: 8869:# files: ../test/plaq_b3.527500.dat ../test/rect_b3.527500.dat ../test/wline_b3.527500.da
20: 2099:#  tau_int    3.9062   3.906181e+00
21: 3381:# 4: Beta(3) = 3.527500, 772 Daten, Wirkung = 0.847989
22: 2366:# 4: S_min = 0.846510, S_max = 0.849790
23: 7358:3.527500 8.479886e-01 8.479886e-01 4.946770e-02 1.000001e+00 1.769498e-02 7.515619e-01 2.
```

```
24: 8825:# files: ../test/plaq_b3.530000.dat ../test/rect_b3.530000.dat ../test/wline_b3.530000.da
25: 2103:#  tau_int    4.5373   4.537263e+00
26: 3360:# 5: Beta(4) = 3.530000, 775 Daten, Wirkung = 0.848712
27: 2371:# 5: S_min = 0.847214, S_max = 0.849954
28: 7304:3.530000 8.487125e-01 8.487125e-01 5.078489e-02 1.000001e+00 1.829317e-02 6.748898e-01 2.
29: 9121:# files: ../../data/p4c3.530/plaq.dat ../../data/p4c3.530/rect.dat ../../data/p4c3.530/wl
30: 2099:#  tau_int    2.2650   2.264955e+00
31: 3360:# 6: Beta(5) = 3.530000, 305 Daten, Wirkung = 0.848658
32: 2381:# 6: S_min = 0.847476, S_max = 0.849908
33: 7282:3.530000 8.486578e-01 8.486578e-01 5.112970e-02 1.000001e+00 2.133409e-02 2.772633e+00 2.
34: 9141:# files: ../../data/p4h3.530/plaq.dat ../../data/p4h3.530/rect.dat ../../data/p4h3.530/wl
35: 2095:#  tau_int    3.2482   3.248152e+00
36: 3360:# 7: Beta(6) = 3.530000, 271 Daten, Wirkung = 0.848735
37: 2379:# 7: S_min = 0.847642, S_max = 0.849973
38: 7257:3.530000 8.487353e-01 8.487353e-01 4.841971e-02 1.000001e+00 2.004915e-02 2.303156e+00 2.
39: 8853:# files: ../test/plaq_b3.532500.dat ../test/rect_b3.532500.dat ../test/wline_b3.532500.da
40: 2105:#  tau_int    4.9351   4.935119e+00
41: 3380:# 8: Beta(7) = 3.532500, 578 Daten, Wirkung = 0.849483
42: 2369:# 8: S_min = 0.848304, S_max = 0.850785
43: 7317:3.532500 8.494831e-01 8.494831e-01 4.608832e-02 1.000001e+00 1.981860e-02 7.888368e-01 2.
44: 8845:# files: ../test/plaq_b3.535000.dat ../test/rect_b3.535000.dat ../test/wline_b3.535000.da
45: 2101:#  tau_int    4.3940   4.394028e+00
46: 3358:# 9: Beta(8) = 3.535000, 642 Daten, Wirkung = 0.850135
47: 2376:# 9: S_min = 0.848760, S_max = 0.851388
48: 7293:3.535000 8.501354e-01 8.501354e-01 4.774162e-02 1.000001e+00 2.031882e-02 6.718136e-01 2.
49: 9141:# files: ../../data/p4c3.535/plaq.dat ../../data/p4c3.535/rect.dat ../../data/p4c3.535/wl
50: 2081:#  tau_int    8.2003   8.200331e+00
51: 3392:# 10: Beta(9) = 3.535000, 311 Daten, Wirkung = 0.850153
52: 2413:# 10: S_min = 0.849047, S_max = 0.851485
53: 7246:3.535000 8.501532e-01 8.501532e-01 4.725325e-02 1.000001e+00 2.204067e-02 2.570313e+00 2.
54: 9161:# files: ../../data/p4h3.535/plaq.dat ../../data/p4h3.535/rect.dat ../../data/p4h3.535/wl
55: 2110:#  tau_int    6.9422   6.942159e+00
56: 3439:# 11: Beta(10) = 3.535000, 284 Daten, Wirkung = 0.850240
57: 2398:# 11: S_min = 0.849120, S_max = 0.851801
58: 7272:3.535000 8.502405e-01 8.502405e-01 4.221993e-02 1.000001e+00 2.303828e-02 2.569770e+00 2.
59: 535:# init
60: 1858:# N = 5180 , 11 Datensaetze
61: 4554:# Ave_Action = 0.848699 , Ave_Beta = 3.530000, Ave_ActBet = 2.995907
62: 1127:# DIFF = 0.000000e+00
63: 2741:# Iteration ist konvergiert !!!
64: 1433:# beta_c: 3.525100e+00
65: 1432:# beta_c: 3.525000e+00
66: 1441:# beta_c: 3.528600e+00
67: 1436:# beta_c: 3.527200e+00
68: 1366:# Alle Daten - ENDE
69: 1646:# anf ber. hist vor
70: 535:# init
71: 1858:# N = 5180 , 11 Datensaetze
72: 4554:# Ave_Action = 0.848699 , Ave_Beta = 3.530000, Ave_ActBet = 2.995907
73: 1127:# DIFF = 0.000000e+00
```

```
74: 2741:# Iteration ist konvergiert !!!
75: 1305:# ber. hist vor
76: 1435:# beta_c: 3.525300e+00
77: 1432:# beta_c: 3.525000e+00
78: 1435:# beta_c: 3.528000e+00
79: 1432:# beta_c: 3.532200e+00
80: 1646:# anf ber. hist vor
81: 535:# init
82: 1858:# N = 5180 , 11 Datensaetze
83: 4554:# Ave_Action = 0.848699 , Ave_Beta = 3.530000, Ave_ActBet = 2.995907
84: 1127:# DIFF = 0.000000e+00
85: 2741:# Iteration ist konvergiert !!!
86: 1305:# ber. hist vor
87: 1435:# beta_c: 3.525300e+00
88: 1432:# beta_c: 3.525000e+00
89: 1437:# beta_c: 3.528200e+00
90: 1436:# beta_c: 3.527200e+00
91: 1646:# anf ber. hist vor
92: 535:# init
93: 1858:# N = 5180 , 11 Datensaetze
94: 4554:# Ave_Action = 0.848699 , Ave_Beta = 3.530000, Ave_ActBet = 2.995907
95: 1127:# DIFF = 0.000000e+00
96: 2741:# Iteration ist konvergiert !!!
97: 1305:# ber. hist vor
98: 1432:# beta_c: 3.525000e+00
99: 1432:# beta_c: 3.525000e+00
100: 1432:# beta_c: 3.531300e+00
101: 1436:# beta_c: 3.531700e+00
102: 1646:# anf ber. hist vor
103: 535:# init
104: 1858:# N = 5180 , 11 Datensaetze
105: 4554:# Ave_Action = 0.848699 , Ave_Beta = 3.530000, Ave_ActBet = 2.995907
106: 1127:# DIFF = 0.000000e+00
107: 2741:# Iteration ist konvergiert !!!
108: 1305:# ber. hist vor
109: 1436:# beta_c: 3.525400e+00
110: 1432:# beta_c: 3.525000e+00
111: 1436:# beta_c: 3.528100e+00
112: 1442:# beta_c: 3.526900e+00
113: 1646:# anf ber. hist vor
114: 535:# init
115: 1858:# N = 5180 , 11 Datensaetze
116: 4554:# Ave_Action = 0.848699 , Ave_Beta = 3.530000, Ave_ActBet = 2.995907
117: 1127:# DIFF = 0.000000e+00
118: 2741:# Iteration ist konvergiert !!!
119: 1305:# ber. hist vor
120: 1432:# beta_c: 3.525000e+00
121: 1432:# beta_c: 3.525000e+00
122: 1443:# beta_c: 3.528800e+00
123: 1439:# beta_c: 3.527500e+00
```

```
124: 1646:# anf ber. hist vor
125: 535:# init
126: 1858:# N = 5180 , 11 Datensaetze
127: 4554:# Ave_Action = 0.848699 , Ave_Beta = 3.530000, Ave_ActBet = 2.995907
128: 1127:# DIFF = 0.000000e+00
129: 2741:# Iteration ist konvergiert !!!
130: 1305:# ber. hist vor
131: 1433:# beta_c: 3.525100e+00
132: 1432:# beta_c: 3.525000e+00
133: 1436:# beta_c: 3.529000e+00
134: 1429:# beta_c: 3.530100e+00
135: 1646:# anf ber. hist vor
136: 535:# init
137: 1858:# N = 5180 , 11 Datensaetze
138: 4554:# Ave_Action = 0.848699 , Ave_Beta = 3.530000, Ave_ActBet = 2.995907
139: 1127:# DIFF = 0.000000e+00
140: 2741:# Iteration ist konvergiert !!!
141: 1305:# ber. hist vor
142: 1435:# beta_c: 3.525300e+00
143: 1432:# beta_c: 3.525000e+00
144: 1439:# beta_c: 3.528400e+00
145: 1435:# beta_c: 3.527100e+00
146: 1646:# anf ber. hist vor
147: 535:# init
148: 1858:# N = 5180 , 11 Datensaetze
149: 4554:# Ave_Action = 0.848699 , Ave_Beta = 3.530000, Ave_ActBet = 2.995907
150: 1127:# DIFF = 0.000000e+00
151: 2741:# Iteration ist konvergiert !!!
152: 1305:# ber. hist vor
153: 1432:# beta_c: 3.525000e+00
154: 1432:# beta_c: 3.525000e+00
155: 1436:# beta_c: 3.529000e+00
156: 1438:# beta_c: 3.528300e+00
157: 1646:# anf ber. hist vor
158: 535:# init
159: 1858:# N = 5180 , 11 Datensaetze
160: 4554:# Ave_Action = 0.848699 , Ave_Beta = 3.530000, Ave_ActBet = 2.995907
161: 1127:# DIFF = 0.000000e+00
162: 2741:# Iteration ist konvergiert !!!
163: 1305:# ber. hist vor
164: 1434:# beta_c: 3.525200e+00
165: 1432:# beta_c: 3.525000e+00
166: 1438:# beta_c: 3.531900e+00
167: 1431:# beta_c: 3.532100e+00
168: 1646:# anf ber. hist vor
169: 535:# init
170: 1858:# N = 5180 , 11 Datensaetze
171: 4554:# Ave_Action = 0.848699 , Ave_Beta = 3.530000, Ave_ActBet = 2.995907
172: 1127:# DIFF = 0.000000e+00
173: 2741:# Iteration ist konvergiert !!!
```

```
174: 1305:# ber. hist vor
175: 1432:# beta_c: 3.525000e+00
176: 1432:# beta_c: 3.525000e+00
177: 1444:# beta_c: 3.528900e+00
178: 1437:# beta_c: 3.531800e+00
```

fs.beta output for extended 3.540 range

```
1: 2438:# fs_ext.beta (with beta=3.54)
2: 5457:# Ferrenberg Swensen fuer beta_c aus der Suszeptibilitaet
3: 870:# Plaq Sus:
4: 1254:3.525100 0.052593 0.001210
5: 838:3.524560 0.000449
6: 771:# Pol Sus:
7: 1258:3.540000 2.732621 0.100363
8: 743:3.540000 nan
9: 1716:# Chiral Sus (light):
10: 1321:3.528600 1.799498 0.188869
11: 833:3.523650 0.003910
12: 1721:# Chiral Sus (heavy):
13: 1274:3.527200 0.541774 0.042911
14: 836:3.501910 0.006384
```

histos for extended 3.540 range

```
1: 1050:# histo_ext
2: 888:0.845852 0.224983
3: 887:0.845923 0.224983
4: 896:0.845995 0.224983
5: 874:0.846030 0.326842
6: 887:0.846066 0.382817
7: 885:0.846102 0.709659
8: 887:0.846173 0.315669
9: 883:0.846209 1.419317
10: 889:0.846244 1.746159
11: 890:0.846280 1.859191
12: 888:0.846316 0.923468
13: 878:0.846351 1.813307
14: 894:0.846387 0.315669
15: 882:0.846423 3.288600
16: 892:0.846458 1.092476
17: 891:0.846494 1.766008
18: 877:0.846530 3.583004
19: 890:0.846565 3.571831
20: 879:0.846601 2.240927
21: 888:0.846637 4.833314
22: 908:0.846672 3.896399
23: 886:0.846708 4.428151
24: 895:0.846744 7.039195
25: 895:0.846779 3.072293
```

```
26: 880:0.846815 6.035132
27: 897:0.846851 7.547743
28: 901:0.846886 6.063657
29: 893:0.846922 8.611576
30: 915:0.846958 7.988915
31: 910:0.846993 9.662938
32: 894:0.847029 8.185149
33: 935:0.847065 10.307828
34: 931:0.847100 11.299526
35: 883:0.847136 9.511172
36: 892:0.847172 7.808507
37: 916:0.847207 10.108200
38: 897:0.847243 8.579138
39: 900:0.847279 9.074870
40: 939:0.847314 11.447379
41: 939:0.847350 11.467854
42: 902:0.847386 9.871643
43: 928:0.847421 10.990025
44: 900:0.847457 9.323497
45: 945:0.847493 11.671486
46: 894:0.847528 8.129453
47: 957:0.847564 10.778996
48: 905:0.847600 8.846998
49: 946:0.847635 13.761982
50: 940:0.847671 13.595134
51: 919:0.847707 11.000080
52: 899:0.847742 9.079347
53: 938:0.847778 11.357220
54: 944:0.847814 13.267467
55: 904:0.847849 9.204849
56: 936:0.847885 13.206044
57: 892:0.847921 8.525580
58: 945:0.847956 14.834415
59: 895:0.847992 8.227540
60: 902:0.848028 9.994427
61: 942:0.848063 12.938464
62: 940:0.848099 10.640591
63: 925:0.848135 13.632410
64: 926:0.848170 11.026192
65: 934:0.848206 16.326840
66: 947:0.848242 16.237969
67: 945:0.848277 13.267473
68: 931:0.848313 11.876131
69: 937:0.848349 12.542434
70: 934:0.848384 13.158032
71: 928:0.848420 13.425533
72: 945:0.848456 18.612493
73: 947:0.848491 13.724686
74: 935:0.848527 18.444103
75: 934:0.848563 18.070530
```

```
76: 939:0.848598 13.341720
77: 939:0.848634 15.901716
78: 945:0.848670 14.659047
79: 937:0.848705 14.456090
80: 931:0.848741 13.912070
81: 947:0.848777 14.243349
82: 939:0.848812 14.430857
83: 945:0.848848 13.272653
84: 946:0.848884 13.048149
85: 941:0.848919 14.254442
86: 958:0.848955 12.852997
87: 940:0.848991 14.045623
88: 933:0.849026 10.197604
89: 933:0.849062 14.650804
90: 940:0.849098 12.225248
91: 932:0.849133 10.803772
92: 948:0.849169 10.857293
93: 932:0.849205 11.258155
94: 904:0.849240 9.488965
95: 895:0.849276 9.206149
96: 886:0.849312 8.814235
97: 889:0.849347 9.150407
98: 887:0.849383 9.031542
99: 900:0.849419 7.055767
100: 893:0.849454 7.790332
101: 928:0.849490 10.172403
102: 904:0.849526 7.788453
103: 888:0.849561 7.531371
104: 916:0.849597 7.396399
105: 901:0.849633 8.313997
106: 892:0.849668 8.001662
107: 898:0.849704 8.711696
108: 892:0.849740 6.417680
109: 893:0.849775 9.105613
110: 887:0.849811 9.005185
111: 954:0.849847 11.936648
112: 901:0.849882 8.142478
113: 950:0.849918 12.765707
114: 911:0.849954 8.287766
115: 958:0.849989 11.572784
116: 879:0.850025 9.065056
117: 890:0.850061 7.386396
118: 888:0.850096 9.616118
119: 878:0.850132 9.443308
120: 897:0.850168 7.965473
121: 872:0.850203 7.073261
122: 885:0.850239 8.735610
123: 889:0.850275 7.838620
124: 876:0.850310 6.902059
125: 879:0.850346 6.714223
```

126: 891:0.850382 7.755643
127: 893:0.850417 7.733992
128: 876:0.850453 5.213921
129: 899:0.850489 6.147595
130: 878:0.850524 4.085252
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