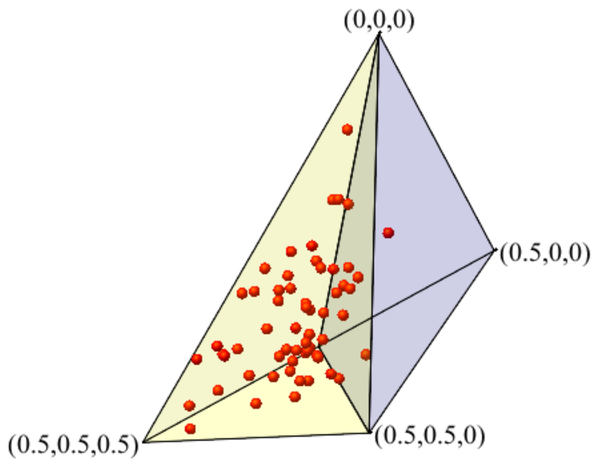
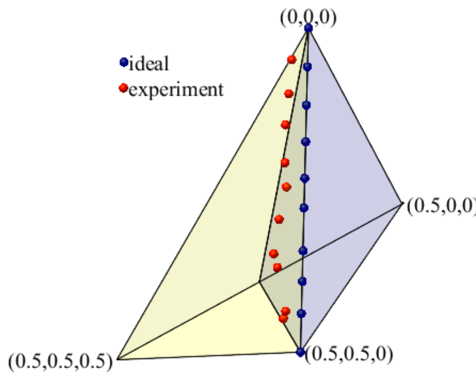
Supplementary Figures



Supplementary Figure 1: **Measured orbital occupations from longer quantum circuit verify generalized Pauli principle.** Each point represents the 3 largest eigenvalues of an experimental 1-RDM generated from the quantum computer. The algorithm used is the second quantum algorithm presented in the main text, equation 13, and the points represent executions of that algorithm with randomly selected parameters to achieve a total filling of the set. Note that two points did violate the generalized Pauli constraints, due to the propagation of error in the longer quantum circuit. There are a total of 59 points measured here, and so the validity of the confirmation of the generalized Pauli constraints still stands.



Supplementary Figure 2: **Effect of error on orbital occupations for rotated entangling gate.** Shows the experimental (red) and ideal (blue) 3 smallest eigenvalues of the 1-RDM generated by a single $C_i^j R_y$ sequence on qubits i and j. The values are all shifted away from the vertex upon which true bipartite or separable states lie. Additionally, the shift in error in this case causes shifts into the polytope.

Supplementary Tables

Run	Parameters (radians)			Run	Parameters (radians)		
	θ_1	θ_2	θ_3		θ_1	θ_2	θ_3
01	0.000000	0.000000	0.000000	32	0.258309	0.827286	0.921534
02	0.558505	0.792379	0.387463	33	0.733038	1.462586	1.305506
03	1.476549	1.361357	0.136136	34	0.387463	1.103048	1.378810
04	1.172861	0.359538	1.134464	35	0.150098	1.368338	1.089085
05	1.050688	0.694641	0.516617	36	1.200787	0.219911	1.392773
06	1.322960	0.157080	0.474730	37	0.596903	1.305506	1.315978
07	1.403245	1.130973	0.561996	38	0.230383	1.064651	0.945968
08	1.284562	1.176352	0.191986	39	0.537561	1.005310	1.507964
09	0.272271	0.848230	0.467748	40	0.160570	1.246165	1.336922
10	0.534071	1.256637	0.150098	41	1.333432	1.445133	0.048869
11	1.361357	1.528908	0.568977	42	0.216421	1.204277	1.225221
12	0.879646	0.823795	0.373500	43	0.429351	1.249656	0.551524
13	0.551524	1.326450	0.680678	44	0.279253	0.073304	1.019272
14	0.855211	0.987856	1.528908	45	0.090757	0.781908	1.235693
15	0.879646	0.097738	0.970403	46	0.115192	1.036726	1.183333
16	0.031416	0.617847	0.104720	47	0.488692	1.249656	0.900590
17	0.094248	0.607375	0.492183	48	0.254818	0.788889	0.753982
18	1.434661	1.487021	1.120501	49	1.071632	1.490511	0.980875
19	1.354375	1.455605	0.342085	50	0.230383	1.022763	0.687660
20	0.914553	0.143117	0.101229	51	1.148427	0.691150	0.673697
21	0.680678	0.935496	0.394444	52	0.275762	1.134464	1.123992
22	0.767945	0.006981	0.080285	53	0.254818	0.649262	0.673697
23	1.029744	1.549852	0.017453	54	0.185005	1.406735	1.378810
24	1.434661	0.020944	0.254818	55	0.952950	1.570796	0.425860
25	0.952950	0.568977	1.392773	56	0.066323	1.459095	1.054179
26	1.567306	1.197296	0.411898	57	0.293215	0.443314	0.436332
27	0.139626	1.518436	1.542871	58	0.834267	1.036726	0.502655
28	0.090757	1.092576	0.600393	59	1.560324	1.570796	0.000000
29	0.013963	1.308997	0.652753	60	0.366519	1.424189	1.427679
30	0.638791	1.001819	1.078613	61	0.261799	1.473058	1.281072
31	0.164061	0.108210	0.408407	62	0.045379	1.504474	0.897099

Supplementary Table 1: **Parameters used with minimal algorithm.** Includes the parameters used for the standard $R_{y,i}(\theta)$ gates (equation 11) of the algorithm in equation 10 which are seen in Figure 2. Parameters are given in radians.

Run	Parameters (radians)					
	θ_6	θ_5	θ_4	θ_3	θ_2	θ_1
01	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
02	1.123992	1.155408	0.565487	1.089085	0.586431	1.497492
03	1.452114	0.383972	0.603884	0.467748	0.258309	0.544543
04	1.200787	1.514946	0.024435	1.214749	1.403245	0.987856
05	0.921534	0.705113	1.075123	0.952950	0.722566	0.024435
06	0.760964	0.272271	0.066323	1.567306	0.104720	0.328122
07	1.459095	1.288053	0.457276	1.249656	1.158899	0.376991
08	0.397935	1.110029	1.043707	0.352557	0.083776	0.139626
09	0.321141	0.513127	0.027925	1.298525	0.851721	0.561996
10	0.942478	1.099557	0.181514	0.150098	0.020944	0.376991
11	0.247837	0.904081	1.165880	0.897099	1.521927	1.462586
12	1.068142	1.542871	0.125664	1.036726	0.216421	0.244346
13	0.167552	1.350885	0.139626	0.994838	0.317650	0.013963
14	0.544543	1.340413	0.356047	0.244346	1.036726	0.373500
15	1.064651	1.462586	0.010472	1.207768	1.078613	1.560324
16	0.335103	0.020944	0.792379	1.162389	0.411898	0.150098
17	1.151917	1.172861	0.589921	0.247837	0.925025	1.434661
18	0.226893	0.027925	0.394444	1.211259	0.760964	0.541052
19	0.443314	1.497492	0.380482	0.530580	0.492183	0.694641
20	0.157080	1.525418	0.136136	1.347394	0.705113	0.460767
21	0.338594	0.390954	0.474730	0.443314	1.085595	0.443314
22	0.555015	1.110029	0.383972	0.275762	1.385791	0.024435
23	0.000000	1.445133	1.452114	0.010472	0.024435	1.096067
24	0.006981	1.410226	0.038397	1.305506	0.897099	0.219911
25	0.041888	1.553343	0.027925	0.621337	0.370010	1.071632
26	0.006981	0.520108	0.247837	1.434661	0.188496	0.380482
27	1.308997	1.434661	0.132645	0.300197	1.127483	1.448623
28	0.108210	0.240855	1.560324	1.403245	0.139626	1.340413
29	1.040216	1.214749	0.115192	0.904081	0.740020	0.331613
30	0.324631	1.033235	0.502655	0.555015	1.392773	1.057670

Supplementary Table 2: **Parameters used with extended algorithm.** Includes the parameters used for the standard $R_{y,i}(\theta)$ gates (equation 11) of the algorithm in equation 13 which are seen in Supplementary Figure 1. Parameters are given in radians.

Run	Parameters (radians)					
	θ_1	θ_2	θ_3	θ_4	θ_5	θ_6
31	0.324631	1.141445	0.052360	0.258309	0.621337	0.254818
32	0.610865	0.265290	1.427679	0.593412	0.555015	0.198968
33	0.146608	0.774926	0.638791	0.830777	1.075123	1.480039
34	0.293215	1.521927	0.003491	1.560324	0.991347	0.820305
35	0.352557	1.148427	0.715585	0.740020	0.527089	0.000000
36	0.010472	0.471239	1.567306	1.075123	0.289725	1.504474
37	0.474730	0.760964	1.549852	0.949459	0.181514	1.521927
38	0.160570	0.066323	0.048869	1.385791	0.816814	0.188496
39	0.034907	0.432842	1.497492	1.158899	0.984366	1.235693
40	0.781908	1.057670	0.157080	0.719076	0.897099	0.911062
41	1.497492	1.497492	0.090757	1.148427	0.041888	0.471239
42	0.125664	0.373500	1.385791	1.448623	0.858702	0.108210
43	0.289725	0.471239	0.205949	1.494002	0.558505	0.020944
44	1.291544	0.370010	0.855211	1.270600	0.010472	1.518436
45	0.628319	1.329941	0.841249	0.446804	1.183333	1.057670
46	0.076794	1.120501	0.205949	1.232202	0.254818	0.446804
47	0.764454	1.071632	1.473058	0.628319	0.429351	1.179843
48	0.198968	1.410226	0.876155	1.228712	0.181514	0.048869
49	0.219911	0.883137	0.314159	1.047198	1.242674	0.733038
50	1.452114	1.033235	0.223402	1.455605	0.188496	1.396263
51	1.539380	0.617847	0.122173	1.403245	0.136136	1.556834
52	0.132645	0.502655	0.474730	0.719076	0.893609	0.307178
53	0.373500	0.387463	0.013963	1.466077	0.310669	0.349066
54	0.045379	1.068142	0.247837	1.197296	0.663225	0.080285
55	0.069813	0.729548	1.190315	1.563815	1.302016	0.911062
56	0.415388	0.303687	1.406735	1.260128	0.240855	1.322960
57	0.010472	0.020944	0.108210	1.567306	1.448623	0.136136
58	0.286234	1.242674	0.167552	0.890118	0.013963	1.424189
59	0.635300	1.431170	0.174533	1.085595	1.350885	1.288053

Supplementary Table 3: **Parameters used with extended algorithm (continued).** Includes the remaining parameters used for the standard $R_{y,i}(\theta)$ gates (equation 11) of the algorithm in equation 13 which are seen in Supplementary Figure 1. Parameters are given in radians.

Run	Ideal Occupation Numbers						Experimental Occupation Numbers					
	n_6	n_5	n_4	n_3	n_2	n_1	n_6	n_5	n_4	n_3	n_2	n_1
01	0.000000	0.000000	0.000000	1.000000	1.000000	1.000000	0.039226	0.042805	0.048070	0.951930	0.957195	0.960774
02	0.103666	0.107409	0.202271	0.797729	0.892591	0.896334	0.142815	0.171985	0.264524	0.735476	0.828015	0.857185
03	0.330926	0.453381	0.490217	0.509783	0.546619	0.669074	0.360998	0.422781	0.454477	0.545523	0.577219	0.639002
04	0.155221	0.318631	0.418114	0.581886	0.681369	0.844779	0.213472	0.368537	0.412302	0.587698	0.631463	0.786528
05	0.028807	0.283942	0.309091	0.690909	0.716058	0.971193	0.118396	0.323277	0.402069	0.597931	0.676723	0.881604
06	0.026106	0.378856	0.390910	0.609090	0.621144	0.973894	0.111018	0.396069	0.422190	0.577810	0.603931	0.888982
07	0.082150	0.429441	0.464497	0.535503	0.570559	0.917850	0.149040	0.422178	0.491197	0.508803	0.577822	0.850960
08	0.226888	0.361423	0.445749	0.554251	0.638577	0.773112	0.239581	0.377324	0.440578	0.559422	0.622676	0.760419
09	0.070147	0.159385	0.181524	0.818476	0.840615	0.929853	0.160462	0.213392	0.268486	0.731514	0.786608	0.839538
10	0.074468	0.311032	0.367008	0.632992	0.688968	0.925532	0.130611	0.342262	0.379911	0.620089	0.657738	0.869389
11	0.219093	0.412422	0.495647	0.504353	0.587578	0.780907	0.270010	0.401232	0.446930	0.553070	0.598768	0.729990
12	0.080560	0.203262	0.283454	0.716546	0.796738	0.919440	0.161982	0.227369	0.334648	0.665352	0.772631	0.838018
13	0.169042	0.246016	0.396974	0.603026	0.753984	0.830958	0.202822	0.284957	0.408051	0.591949	0.715043	0.797178
14	0.173717	0.319426	0.486263	0.513737	0.680574	0.826283	0.207205	0.386298	0.421381	0.578619	0.613702	0.792795
15	0.182809	0.187845	0.319938	0.680062	0.812155	0.817191	0.227857	0.234617	0.345949	0.654051	0.765383	0.772143
16	0.002985	0.092637	0.093718	0.906282	0.907363	0.997015	0.064065	0.173661	0.191931	0.808069	0.826339	0.935935
17	0.061304	0.091247	0.125469	0.874531	0.908753	0.938696	0.146833	0.187845	0.193038	0.806962	0.812155	0.853167
18	0.037360	0.470466	0.494322	0.505678	0.529534	0.962640	0.118134	0.452276	0.467773	0.532227	0.547724	0.881866
19	0.283134	0.398854	0.487660	0.512340	0.601146	0.716866	0.289524	0.438042	0.461802	0.538198	0.561958	0.710476
20	0.001935	0.196489	0.198046	0.801954	0.803511	0.998065	0.115279	0.268338	0.286740	0.713260	0.731662	0.884721
21	0.128746	0.141266	0.269414	0.730586	0.858734	0.871254	0.197218	0.223855	0.339909	0.660091	0.776145	0.802782
22	0.001428	0.140339	0.141489	0.858511	0.859661	0.998572	0.085035	0.220149	0.225024	0.774976	0.779851	0.914965
23	0.242520	0.482052	0.494606	0.505394	0.517948	0.757480	0.299350	0.413123	0.417757	0.582243	0.586877	0.700650
24	0.013636	0.432157	0.434333	0.565667	0.567843	0.986364	0.116998	0.435517	0.446824	0.553176	0.564483	0.883002
25	0.209294	0.255991	0.448709	0.551291	0.744009	0.790706	0.276032	0.355805	0.465789	0.534211	0.644195	0.723968
26	0.146448	0.498401	0.499363	0.500637	0.501599	0.853552	0.206289	0.468853	0.477280	0.522720	0.531147	0.793711
27	0.429805	0.474086	0.486175	0.513825	0.525914	0.570195	0.403176	0.439546	0.445398	0.554602	0.560454	0.596824
28	0.089141	0.270847	0.287412	0.712588	0.729153	0.910859	0.142018	0.342894	0.362646	0.637354	0.657106	0.857982
29	0.102831	0.370603	0.393100	0.606900	0.629397	0.897169	0.134512	0.361751	0.392268	0.607732	0.638249	0.865488
30	0.151367	0.283733	0.310314	0.689686	0.716267	0.848633	0.214534	0.317372	0.362894	0.637106	0.682628	0.785466
31	0.009599	0.040304	0.047285	0.952715	0.959696	0.990401	0.089871	0.120461	0.140598	0.859402	0.879539	0.910129

Supplementary Table 4: **Results from minimal algorithm.** Includes the ordered occupation numbers which result from the algorithm in equation 10 which are seen in Figure 2. Includes the ideal and experimental results.

Run	Ideal Occupation Numbers						Experimental Occupation Numbers					
	n_6	n_5	n_4	n_3	n_2	n_1	n_6	n_5	n_4	n_3	n_2	n_1
32	0.172790	0.207730	0.220494	0.779506	0.792270	0.827210	0.265751	0.279746	0.287422	0.712578	0.720254	0.734249
33	0.164869	0.402577	0.459870	0.540130	0.597423	0.835131	0.221842	0.436499	0.452213	0.547787	0.563501	0.778158
34	0.291273	0.291455	0.411668	0.588332	0.708545	0.708727	0.321680	0.410045	0.413394	0.586606	0.589955	0.678320
35	0.270957	0.388515	0.400592	0.599408	0.611485	0.729043	0.284673	0.403027	0.450136	0.549864	0.596973	0.715327
36	0.313507	0.323542	0.467981	0.532019	0.676458	0.686493	0.360241	0.370191	0.458419	0.541581	0.629809	0.639759
37	0.204503	0.391574	0.395759	0.604241	0.608426	0.795497	0.249603	0.428764	0.487990	0.512010	0.571236	0.750397
38	0.215249	0.264000	0.277211	0.722789	0.736000	0.784751	0.248703	0.314914	0.354721	0.645279	0.685086	0.751297
39	0.267438	0.269873	0.473033	0.526967	0.730127	0.732562	0.294148	0.392426	0.450836	0.549164	0.607574	0.705852
40	0.342572	0.385617	0.389339	0.610661	0.614383	0.657428	0.376866	0.386204	0.429381	0.570619	0.613796	0.623134
41	0.382569	0.413855	0.485264	0.514736	0.586145	0.617431	0.359820	0.414965	0.424881	0.575119	0.585035	0.640180
42	0.324996	0.334582	0.344994	0.655006	0.665418	0.675004	0.355994	0.362831	0.438770	0.561230	0.637169	0.644006
43	0.112789	0.262089	0.356500	0.643500	0.737911	0.887211	0.175564	0.310471	0.384153	0.615847	0.689529	0.824436
44	0.020660	0.230114	0.248156	0.751844	0.769886	0.979340	0.141410	0.288038	0.320565	0.679435	0.711962	0.858590
45	0.146675	0.336243	0.353168	0.646832	0.663757	0.853325	0.282895	0.358960	0.410858	0.589142	0.641040	0.717105
46	0.247166	0.312331	0.358033	0.641967	0.687669	0.752834	0.360707	0.364623	0.376387	0.623613	0.635377	0.639293
47	0.225780	0.227412	0.360650	0.639350	0.772588	0.774220	0.264616	0.330907	0.423545	0.576455	0.669093	0.735384
48	0.147285	0.159059	0.181952	0.818048	0.840941	0.852715	0.239695	0.245027	0.278932	0.721068	0.754973	0.760305
49	0.114072	0.366852	0.480804	0.519196	0.633148	0.885928	0.183038	0.429483	0.484103	0.515897	0.570517	0.816962
50	0.123842	0.236842	0.246378	0.753622	0.763158	0.876158	0.219272	0.293998	0.345027	0.654973	0.706002	0.780728
51	0.017550	0.339818	0.342074	0.657926	0.660182	0.982450	0.112681	0.418504	0.429415	0.570585	0.581496	0.887319
52	0.292119	0.296674	0.297423	0.702577	0.703326	0.707881	0.317226	0.381252	0.426031	0.573969	0.618748	0.682774
53	0.114596	0.121858	0.141208	0.858792	0.878142	0.885404	0.209758	0.221236	0.234184	0.765816	0.778764	0.790242
54	0.395345	0.406224	0.419731	0.580269	0.593776	0.604655	0.368352	0.469881	0.472849	0.527151	0.530119	0.631648
55	0.236229	0.331633	0.500000	0.500000	0.668367	0.763771	0.328794	0.337507	0.422116	0.577884	0.662493	0.671206
56	0.253572	0.443838	0.444388	0.555612	0.556162	0.746428	0.344103	0.396047	0.412213	0.587787	0.603953	0.655897
57	0.064453	0.066187	0.067610	0.932390	0.933813	0.935547	0.159067	0.176161	0.185379	0.814621	0.823839	0.840933
58	0.123368	0.205683	0.329033	0.670967	0.794317	0.876632	0.181197	0.320269	0.412500	0.587500	0.679731	0.818803
59	0.494764	0.500000	0.500000	0.500000	0.500000	0.505236	0.442669	0.445291	0.480561	0.519439	0.554709	0.557331
60	0.314133	0.431810	0.433423	0.566577	0.568190	0.685867	0.314887	0.466136	0.492611	0.507389	0.533864	0.685113
61	0.362023	0.362636	0.452871	0.547129	0.637364	0.637977	0.327875	0.453837	0.457293	0.542707	0.546163	0.672125
62	0.188382	0.461640	0.466898	0.533102	0.538360	0.811618	0.286137	0.410971	0.419101	0.580899	0.589029	0.713863

Supplementary Table 5: **Results from minimal algorithm (continued).** Includes the remaining ordered occupation numbers which result from the algorithm in equation 10 which are seen in Figure 2. Includes the ideal and experimental results.

Run	Ideal Occupation Numbers						Experimental Occupation Numbers					
	n_6	n_5	n_4	n_3	n_2	n_1	n_6	n_5	n_4	n_3	n_2	n_1
01	0.000000	0.000000	0.000000	1.000000	1.000000	1.000000	0.078918	0.103023	0.131014	0.868986	0.896977	0.921082
02	0.153752	0.178404	0.208726	0.791274	0.821596	0.846248	0.240566	0.281498	0.343991	0.656009	0.718502	0.759434
03	0.025727	0.059079	0.059165	0.940835	0.940921	0.974273	0.123507	0.144244	0.266019	0.733981	0.855756	0.876493
04	0.038914	0.461198	0.471595	0.528405	0.538802	0.961086	0.064995	0.345330	0.446503	0.553497	0.654670	0.935005
05	0.055095	0.121064	0.140590	0.859410	0.878936	0.944905	0.073973	0.140226	0.338111	0.661889	0.859774	0.926027
06	0.167793	0.313775	0.374869	0.625131	0.686225	0.832207	0.187331	0.263089	0.272831	0.727169	0.736911	0.812669
07	0.033269	0.247206	0.247961	0.752039	0.752794	0.966731	0.096152	0.248068	0.325796	0.674204	0.751932	0.903848
08	0.009385	0.313721	0.316522	0.683478	0.686279	0.990615	0.091431	0.289006	0.296026	0.703974	0.710994	0.908569
09	0.248148	0.327048	0.436849	0.563151	0.672952	0.751852	0.171985	0.359896	0.368431	0.631569	0.640104	0.828015
10	0.184375	0.268598	0.320818	0.679182	0.731402	0.815625	0.285247	0.291111	0.336145	0.663855	0.708889	0.714753
11	0.293896	0.334283	0.354728	0.645272	0.665717	0.706104	0.302153	0.303650	0.329716	0.670284	0.696350	0.697847
12	0.323457	0.382480	0.439406	0.560594	0.617520	0.676543	0.341624	0.378933	0.405459	0.594541	0.621067	0.658376
13	0.237938	0.386440	0.478436	0.521564	0.613560	0.762062	0.185962	0.380418	0.471692	0.528308	0.619582	0.814038
14	0.229383	0.272568	0.378417	0.621583	0.727432	0.770617	0.222411	0.255855	0.397135	0.602865	0.744145	0.777589
15	0.105973	0.377052	0.452047	0.547953	0.622948	0.894027	0.126462	0.371115	0.477491	0.522509	0.628885	0.873538
16	0.090537	0.255454	0.294904	0.705096	0.744546	0.909463	0.056796	0.279712	0.324183	0.675817	0.720288	0.943204
17	0.089874	0.202033	0.218673	0.781327	0.797967	0.910126	0.137379	0.261174	0.263192	0.736808	0.738826	0.862621
18	0.096342	0.299131	0.340936	0.659064	0.700869	0.903658	0.065250	0.302003	0.331250	0.668750	0.697997	0.934750
19	0.080144	0.323003	0.401482	0.598518	0.676997	0.919856	0.166959	0.284433	0.396663	0.603337	0.715567	0.833041
20	0.242000	0.252059	0.438646	0.561354	0.747941	0.758000	0.223434	0.253290	0.413447	0.586553	0.746710	0.776566
21	0.108800	0.112709	0.213934	0.786066	0.887291	0.891200	0.120789	0.177183	0.228617	0.771383	0.822817	0.879211
22	0.267209	0.295098	0.304648	0.695352	0.704902	0.732791	0.213359	0.281179	0.341171	0.658829	0.718821	0.786641
23	0.265265	0.442480	0.442495	0.557505	0.557520	0.734735	0.371460	0.402289	0.467888	0.532112	0.597711	0.628540
24	0.159837	0.351466	0.497264	0.502736	0.648534	0.840163	0.241584	0.295702	0.477004	0.522996	0.704298	0.758416
25	0.080576	0.420363	0.498761	0.501239	0.579637	0.919424	0.190154	0.394846	0.460341	0.539659	0.605154	0.809846
26	0.193884	0.466044	0.496590	0.503410	0.533956	0.806116	0.092236	0.418655	0.428171	0.571829	0.581345	0.907764
27	0.047548	0.396358	0.408133	0.591867	0.603642	0.952452	0.124018	0.394527	0.408970	0.591030	0.605473	0.875982
28	0.373493	0.434878	0.454897	0.545103	0.565122	0.626507	0.324202	0.395647	0.395970	0.604030	0.604353	0.675798
29	0.233465	0.339212	0.370342	0.629658	0.660788	0.766535	0.244771	0.330616	0.439020	0.560980	0.669384	0.755229
30	0.176315	0.201138	0.352996	0.647004	0.798862	0.823685	0.218504	0.303902	0.457869	0.542131	0.696098	0.781496

Supplementary Table 6: **Results from extended algorithm.** Includes the ordered occupation numbers which result from the algorithm in equation 13 which are seen in Supplemental Figure 1. Includes the ideal and experimental results.

Run	Ideal Occupation Numbers						Experimental Occupation Numbers					
	n_6	n_5	n_4	n_3	n_2	n_1	n_6	n_5	n_4	n_3	n_2	n_1
31	0.146941	0.303335	0.434666	0.565334	0.696665	0.853059	0.226388	0.411901	0.434399	0.565601	0.588099	0.773612
32	0.001246	0.107464	0.107722	0.892278	0.892536	0.998754	0.138326	0.266476	0.309763	0.690237	0.733524	0.861674
33	0.171730	0.251651	0.394950	0.605050	0.748349	0.828270	0.268670	0.330075	0.454461	0.545539	0.669925	0.731330
34	0.206812	0.309447	0.492781	0.507219	0.690553	0.793188	0.216635	0.264843	0.398720	0.601280	0.735157	0.783365
35	0.116246	0.366136	0.372274	0.627726	0.633864	0.883754	0.086600	0.327322	0.369614	0.630386	0.672678	0.913400
36	0.463862	0.486709	0.489756	0.510244	0.513291	0.536138	0.284285	0.404775	0.435434	0.564566	0.595225	0.715715
37	0.263257	0.392842	0.396853	0.603147	0.607158	0.736743	0.238765	0.297279	0.355256	0.644744	0.702721	0.761235
38	0.380470	0.382360	0.493998	0.506002	0.617640	0.619530	0.194689	0.420481	0.474902	0.525098	0.579519	0.805311
39	0.303408	0.476487	0.479921	0.520079	0.523513	0.696592	0.340724	0.382721	0.383292	0.616708	0.617279	0.659276
40	0.220524	0.220913	0.294919	0.705081	0.779087	0.779476	0.231396	0.283722	0.493359	0.506641	0.716278	0.768604
41	0.436609	0.439744	0.441957	0.558043	0.560256	0.563391	0.400117	0.480684	0.489734	0.510266	0.519316	0.599883
42	0.001990	0.363695	0.364423	0.635577	0.636305	0.998010	0.107581	0.293300	0.345993	0.654007	0.706700	0.892419
43	0.371511	0.380129	0.384290	0.615710	0.619871	0.628489	0.220629	0.334427	0.438848	0.561152	0.665573	0.779371
44	0.033087	0.173960	0.187170	0.812830	0.826040	0.966913	0.409690	0.445214	0.465246	0.534754	0.554786	0.590310
45	0.147571	0.155183	0.272524	0.727476	0.844817	0.852429	0.186937	0.218045	0.331956	0.668044	0.781955	0.813063
46	0.139847	0.434040	0.476786	0.523214	0.565960	0.860153	0.122467	0.364806	0.393065	0.606935	0.635194	0.877533
47	0.152199	0.222812	0.269730	0.730270	0.777188	0.847801	0.282675	0.310433	0.406442	0.593558	0.689567	0.717325
48	0.094651	0.163577	0.167172	0.832828	0.836423	0.905349	0.088010	0.197020	0.212054	0.787946	0.802980	0.911990
49	0.170485	0.408445	0.410048	0.589952	0.591555	0.829515	0.220707	0.355858	0.445915	0.554085	0.644142	0.779293
50	0.222912	0.227862	0.228681	0.771319	0.772138	0.777088	0.385862	0.396879	0.399569	0.600431	0.603121	0.614138
51	0.091112	0.092760	0.094342	0.905658	0.907240	0.908888	0.251955	0.274392	0.299091	0.700909	0.725608	0.748045
52	0.124431	0.238200	0.352610	0.647390	0.761800	0.875569	0.114666	0.260593	0.355927	0.644073	0.739407	0.885334
53	0.325790	0.327103	0.480450	0.519550	0.672897	0.674210	0.172065	0.355264	0.406289	0.593711	0.644736	0.827935
54	0.275652	0.289028	0.482934	0.517066	0.710972	0.724348	0.203269	0.327830	0.446083	0.553917	0.672170	0.796731
55	0.096284	0.192065	0.280743	0.719257	0.807935	0.903716	0.231994	0.252630	0.335351	0.664649	0.747370	0.768006
56	0.297597	0.298408	0.406909	0.593091	0.701592	0.702403	0.328527	0.353424	0.415444	0.584556	0.646576	0.671473
57	0.378964	0.489011	0.494729	0.505271	0.510989	0.621036	0.209195	0.385359	0.444718	0.555282	0.614641	0.790805
58	0.086966	0.436412	0.437119	0.562881	0.563588	0.913034	0.261557	0.446724	0.465678	0.534322	0.553276	0.738443
59	0.189415	0.348889	0.425569	0.574431	0.651111	0.810585	0.176874	0.331931	0.406250	0.593750	0.668069	0.823126

Supplementary Table 7: **Results from extended algorithm (continued).** Includes the remaining ordered occupation numbers which result from the algorithm in equation 13 which are seen in Supplemental Figure 1. Includes the ideal and experimental results.

Run	Parameter (radians)	Ideal Occupation Numbers			Experimental Occupation Numbers		
		n_6	n_5	n_4	n_6	n_5	n_4
1	0.000000	0.000000	0.000000	0.000000	0.044922	0.046366	0.049490
2	1.570796	0.000000	0.500000	0.500000	0.053365	0.442325	0.451055
3	0.865683	0.000000	0.17594	0.17594	0.056120	0.204929	0.208042
4	1.350885	0.000000	0.390928	0.390928	0.068699	0.367227	0.368428
5	1.110029	0.000000	0.277682	0.277682	0.069380	0.290984	0.295637
6	0.495673	0.000000	0.060176	0.060176	0.050713	0.098339	0.102362
7	0.705113	0.000000	0.119231	0.119231	0.056445	0.147602	0.148817
8	1.452114	0.000000	0.440798	0.440798	0.045277	0.433336	0.437837
9	1.253146	0.000000	0.343833	0.343833	0.081026	0.344865	0.348277
10	1.005310	0.000000	0.232087	0.232087	0.055534	0.237553	0.249512

Supplementary Table 8: **Parameters and results from rotated entangling gate.** Includes the parameters and ordered occupation numbers which correspond with Supplemental Figure 2. Includes the ideal and experimental results. Parameters are given in radians for the single R_y gate.