Table 1: Additional swap gates and circuit depth,  $n\,=\,5$ 

layout         benchmark         g         d         s basic         s sabre         s look         swap (%)         d basic         d swap           full_10_2         ghz         7         7         0         0         0         nan         7         7           full_10_2         dj         36         11         0         0         0         nan         11         11           full_10_2         graphstate         50         22         0         3         0         -100         22         22           full_10_2         qft         71         38         0         0         0         nan         38         38           full_10_2         wstate         73         45         0         0         0         nan         45         45           full_10_2         qftentangled         78         42         0         0         0         nan         42         42	7 11 22 38 45 42	0 0 0 0
full_10_2       dj       36       11       0       0       nan       11       11         full_10_2       graphstate       50       22       0       3       0       -100       22       22         full_10_2       qft       71       38       0       0       0       nan       38       38         full_10_2       wstate       73       45       0       0       0       nan       45       45         full_10_2       qftentangled       78       42       0       0       0       nan       42       42	11 22 38 45	0 0 0
full_10_2     graphstate     50     22     0     3     0     -100     22     22       full_10_2     qft     71     38     0     0     0     nan     38     38       full_10_2     wstate     73     45     0     0     0     nan     45     45       full_10_2     qftentangled     78     42     0     0     0     nan     42     42	22 38 45	0 0
full_10_2     qft     71     38     0     0     0     nan     38     38       full_10_2     wstate     73     45     0     0     0     nan     45     45       full_10_2     qftentangled     78     42     0     0     0     nan     42     42	45	
full_10_2     wstate     73     45     0     0     nan     45     45       full_10_2     qftentangled     78     42     0     0     nan     42     42		
	42	0
f II 10 0		0
$full_{-10}_{-2}$ vqe 83 21 0 0 0 nan 21 21	21	0
full_10_2 qaoa 95 31 0 3 0 -100 31 42	31	-26.19
full_ $10_{-2}$ realamprandom $130$ $37$ $0$ $0$ nan $37$ $37$	37	0
full_10_2 two localrandom 130 37 0 0 nan 37 37	37	0
full_10_2 su2random 150 41 0 15 0 -100 41 64	41	-35.94
full_10_2 qnn 154 58 0 39 0 -100 58 133	58	-56.39
$full_{-}10_{-}2 \qquad portfolioqaoa \qquad 195 \qquad 72 \qquad 0 \qquad \qquad 0 \qquad nan \qquad 72 \qquad \qquad 72$	72	0
full_10_2 random 223 97 0 12 0 -100 97 126	97	-23.02
$full_{-}10_{-}2 \qquad portfoliovqe \qquad 310  107  0 \qquad \qquad 0 \qquad \qquad 0  nan \qquad \qquad 107 \qquad 107$	107	0
full_7_3 ghz 7 7 0 0 nan 7 7	7	0
full_7_3 dj 36 11 0 3 0 -100 11 14	11	-21.43
full_7 $_{-3}$ graphstate 50 22 0 0 nan 22 22	22	0
full_7_3 qft 71 38 0 0 nan 38 38	38	0
full_7_3 wstate 73 45 0 0 0 nan 45 45	45	0
full_7_3 qftentangled 78 42 0 15 0 -100 42 74	42	-43.24
full_7_3 vqe 83 21 0 0 nan 21 21	21	0
full_7_3 qaoa 95 31 0 0 0 nan 31 31	31	0
full_7_3 realamprandom 130 37 0 42 0 -100 37 108	37	-65.74
full_7_3 twolocalrandom 130 37 0 15 0 -100 37 71	37	-47.89
full_7_3 su2random 150 41 0 0 0 nan 41 41	41	0
full_7_3 qnn 154 58 0 12 0 -100 58 90	58	-35.56
full_7_3 portfolioqaoa 195 72 0 0 0 nan 72 72	72	0
full_7_3 random 223 97 0 6 0 -100 97 140	97	-30.71
full_7_3     portfoliovqe     310     107     0     48     0     -100     107     172       grid_4_5     ghz     7     7     3     0     9     nan     10     7	107 8	-37.79 $14.29$
grid_4_5 ghz 7 7 3 0 9 nan 10 7 grid_4_5 dj 36 11 21 3 3 0 37 14	12	-14.29
grid_4_5 graphstate 50 22 18 3 9 200 41 25	20	-14.29 -20
grid_4_5 qft 71 38 36 15 27 80 82 54	52	-3.7
$grid_{-4.5}$ wstate 73 45 12 0 9 nan 51 45	40	-11.11
grid_4_5 qftentangled 78 42 36 18 15 -16.67 78 57	45	-21.05
grid_4_5 vqe 83 21 18 0 15 nan 39 21	29	38.1
grid_4_5 qaoa 95 31 18 6 27 350 59 50	45	-10
grid_4_5 realamprandom 130 37 81 42 48 14.29 160 97	59	-39.18
grid_4_5 twolocalrandom 130 37 81 42 48 14.29 160 101	59	-41.58
grid_4_5 su2random 150 41 81 42 48 14.29 174 106	63	-40.57
grid_4_5 qnn 154 58 54 30 54 80 151 103	80	-22.33
grid_4_5 portfolioqaoa 195 72 81 42 69 64.29 220 138	104	-24.64
grid_4_5 random 223 97 39 12 27 125 169 106	111	4.72
grid_4_5 portfoliovqe 310 107 81 39 48 23.08 239 175	115	-34.29
grid_9_3 ghz 7 7 6 3 6 100 13 10	8	-20
grid_9_3 dj 36 11 9 3 0 -100 21 17	11	-35.29
grid_9_3 graphstate 50 22 15 3 6 100 37 32	20	-37.5
grid_9_3 qft 71 38 39 12 21 75 74 53	41	-22.64
grid_9_3 wstate $73$ 45 18 0 12 nan 54 45	41	-8.89
grid_9_3 qftentangled 78 42 45 21 27 28.57 87 76	45	-40.79
grid $_{-9}$ 3 vqe 83 21 15 0 12 nan 35 21	27	28.57
grid $_{-9}$ 3 qaoa 95 31 9 9 21 133.33 37 48	48	0
grid_9_3 realamprandom 130 37 96 24 42 75 145 89	64	-28.09
grid_9_3 twolocalrandom 130 37 96 36 42 16.67 145 93	64	-31.18
grid_9_3 su2random 150 41 96 24 42 75 155 96	68	-29.17
grid_9_3 qnn 154 58 63 30 48 60 132 97	78	-19.59
grid_9_3 portfolioqaoa 195 72 96 39 69 76.92 199 141	121	-14.18
grid_9_3 random 223 97 30 12 27 125 114 106	111	4.72
grid_9_3 portfoliovqe 310 107 96 42 57 35.71 209 181	111	-38.67
line_5_4 ghz 7 7 0 9 18 100 7 13	9	-30.77

Table 1: Additional swap gates and circuit depth,  $n\,=\,5$ 

layout	benchmark	g	d	s basic	s sabre	s look	swap (%)	d basic	d swap	d look	d (%)
line_5_4	dj	36	11	36	6	6	0	40	17	14	-17.65
$line_5_4$	graphstate	50	22	12	9	12	33.33	32	25	21	-16
$line_5_4$	qft	71	38	72	24	24	0	92	57	42	-26.32
$line_5_4$	wstate	73	45	0	0	15	nan	45	45	33	-26.67
$line_{-}5_{-}4$	qftentangled	78	42	72	24	36	50	96	73	50	-31.51
$line_5_4$	vqe	83	21	0	0	15	nan	21	21	24	14.29
$line_5_4$	qaoa	95	31	48	12	18	50	106	42	39	-7.14
$line_5_4$	${\rm real amprandom}$	130	37	180	72	93	29.17	206	128	59	-53.91
$line_5_4$	two local random	130	37	180	72	93	29.17	206	113	59	-47.79
$line_5_4$	su2random	150	41	180	69	93	34.78	219	123	63	-48.78
$line_5_4$	qnn	154	58	120	48	84	75	172	127	80	-37.01
$line_5_4$	portfolioqaoa	195	72	180	66	93	40.91	255	166	90	-45.78
$line_5_4$	$\operatorname{random}$	223	97	63	12	30	150	160	106	99	-6.6
$line_5_4$	portfoliovqe	310	107	180	69	90	30.43	242	187	126	-32.62
$ring_{-}10_{-}2$	ghz	7	7	0	3	9	200	7	10	8	-20
$ring_10_2$	dj	36	11	36	3	3	0	40	17	12	-29.41
$ring_10_2$	graphstate	50	22	12	6	9	50	32	25	20	-20
ring_10_2	qft	71	38	72	15	24	60	92	60	42	-30
ring_10_2	wstate	73	45	0	0	9	nan	45	45	40	-11.11
ring_10_2	qftentangled	78	42	72	21	30	42.86	96	75	49	-34.67
ring_10_2	vqe	83	21	0	0	15	nan	21	21	29	38.1
ring_10_2	qaoa	95	31	48	12	27	125	106	47	45	-4.26
ring_10_2	realamprandom	130	37	180	51	60	17.65	206	109	66	-39.45
ring_10_2	twolocalrandom	130	37	180	51	60 60	17.65 $25$	206	109	66	-39.45 -36.36
ring_10_2	su2random	$\frac{150}{154}$	41 58	180 120	48 39	66	69.23	219 172	110 122	70 84	-30.30 -31.15
ring_10_2 ring_10_2	qnn portfolioqaoa	$194 \\ 195$	58 72	180	59 66	87	31.82	$\frac{172}{255}$	166	110	-31.13
ring_10_2 ring_10_2	random	$\frac{195}{223}$	97	63	$\frac{66}{12}$	66	31.62 450	$\frac{255}{160}$	106	110 $121$	-33.73 14.15
ring_10_2 ring_10_2	portfoliovqe	310	107	180	51	93	82.35	$\frac{100}{242}$	204	$\frac{121}{125}$	-38.73
ring_5_4	ghz	310 7	7	nan	nan	93	nan			10	-36.75 nan
ring_5_4	dj	36	11	nan	nan	3	nan	nan nan	nan nan	12	nan
ring_5_4	graphstate	50	22	nan	nan	9	nan	nan	nan	22	nan
ring_5_4	qft	71	38	nan	nan	18	nan	nan	nan	43	nan
$ring_{-5}_{-4}$	wstate	73	45	nan	nan	9	nan	nan	nan	39	nan
ring_5_4	qftentangled	78	42	nan	nan	30	nan	nan	nan	49	nan
$ring_5_4$	vqe	83	21	nan	nan	6	nan	nan	nan	24	nan
$ring_5_4$	qaoa	95	31	nan	nan	24	nan	nan	nan	45	nan
$ring_5_4$	qnn	154	58	nan	nan	66	nan	nan	nan	84	nan
ring_7_3	ghz	7	7	0	0	9	nan	7	7	8	14.29
ring_7_3	$\stackrel{\circ}{\mathrm{d}\mathrm{j}}$	36	11	24	3	3	0	30	18	12	-33.33
ring73	graphstate	50	22	6	6	9	50	24	22	20	-9.09
ring_7_3	qft	71	38	51	18	24	33.33	77	57	42	-26.32
$ring_{-}7_{-}3$	wstate	73	45	0	0	9	nan	45	45	40	-11.11
$ring_{-}7_{-}3$	qftentangled	78	42	51	21	30	42.86	81	76	49	-35.53
$ring_7_3$	vqe	83	21	0	0	15	nan	21	21	29	38.1
$ring_7_3$	qaoa	95	31	24	9	27	200	54	48	45	-6.25
$ring_7_3$	real amprandom	130	37	120	48	60	25	129	102	66	-35.29
$ring_7_3$	two local random	130	37	120	48	60	25	129	107	66	-38.32
$ring_{-}7_{-}3$	su2random	150	41	120	51	60	17.65	138	117	70	-40.17
$ring_{-}7_{-}3$	qnn	154	58	93	48	66	37.5	122	127	84	-33.86
$ring_{-}7_{-}3$	portfolioqaoa	195	72	120	51	87	70.59	157	177	110	-37.85
$ring_{-}7_{-}3$	$\operatorname{random}$	223	97	60	12	66	450	157	106	121	14.15
$ring_{-}7_{-}3$	portfoliovqe	310	107	120	48	93	93.75	179	193	125	-35.23
$t_{horizontal_5_4}$	ghz	7	7	9	3	6	100	16	10	9	-10
$t_{horizontal_5_4}$	dj	36	11	24	3	3	0	37	16	12	-25
$t_{horizontal_5_4}$	graphstate	50	22	12	6	9	50	35	25	20	-20
t_horizontal_5_4	qft	71	38	48	15	24	60	82	60	42	-30
t_horizontal_5_4	wstate	73	45	18	0	6	nan	58	45	39	-13.33
$t_{borizontal_5_4}$	qftentangled	78	42	60	24	33	37.5	90	73	48	-34.25
	-	-									
t_horizontal_5_4 t_horizontal_5_4	vqe qaoa	83 95	21 31	12 33	0 9	12 24	nan 166.67	33 100	21 48	25 45	19.05 -6.25

Table 1: Additional swap gates and circuit depth,  $n\,=\,5$ 

layout	benchmark	g	d	s basic	s sabre	s look	swap (%)	d basic	d swap	d look	d (%)
t_horizontal_5_4	realamprandom	130	37	117	51	60	17.65	185	106	66	-37.74
$t_{borizontal_5_4}$	two local random	130	37	117	72	60	-16.67	185	126	66	-47.62
$t_{borizontal_5_4}$	su2random	150	41	117	48	60	25	198	115	70	-39.13
$t_{-}horizontal_{-}5_{-}4$	qnn	154	58	81	48	66	37.5	172	127	84	-33.86
$t_{-}horizontal_{-}5_{-}4$	portfolioqaoa	195	72	117	60	87	45	252	179	110	-38.55
$t_{\text{horizontal}}_{5_{\text{-}}4}$	random	223	97	36	12	66	450	151	106	121	14.15
$t_{horizontal_5_4}$	portfoliovqe	310	107	117	48	93	93.75	239	193	125	-35.23
$t_{vertical_5_4}$	ghz	7	7	9	0	6	nan	16	7	9	28.57
$t_{vertical_5_4}$	dj	36	11	24	3	3	0	37	17	12	-29.41
$t_{\text{vertical}}_{5_{\text{-}}4}$	graphstate	50	22	12	6	9	50	35	22	20	-9.09
$t_{\text{vertical}}_{5_{\text{-}}4}$	qft	71	38	48	15	24	60	82	60	42	-30
$t_{\text{vertical}}_{5_{\text{-}}4}$	wstate	73	45	18	0	6	nan	58	45	39	-13.33
$t_{\text{vertical}}_{-5}_{-4}$	qftentangled	78	42	60	21	33	57.14	90	75	48	-36
$t_{\text{-}}vertical_{\text{-}}5_{\text{-}}4$	vqe	83	21	12	0	12	nan	33	21	25	19.05
$t_{\text{-}}vertical_{\text{-}}5_{\text{-}}4$	qaoa	95	31	33	9	24	166.67	100	48	45	-6.25
$t_{\text{vertical}}_{5_{\text{-}}4}$	real amprandom	130	37	117	51	60	17.65	185	106	66	-37.74
$t_{\text{vertical}}_{5_{\text{-}}4}$	two local random	130	37	117	48	60	25	185	107	66	-38.32
$t_{\text{vertical}}_{5_{\text{-}}4}$	su2random	150	41	117	48	60	25	198	110	70	-36.36
$t_{\text{vertical}}_{5_{\text{-}}4}$	qnn	154	58	81	45	66	46.67	172	133	84	-36.84
$t_{vertical_5_4}$	portfolioqaoa	195	72	117	66	87	31.82	252	166	110	-33.73
$t_{\text{vertical}}_{5_{\text{-}}4}$	random	223	97	36	12	66	450	151	106	121	14.15
$t_{vertical_5_4}$	portfoliovqe	310	107	117	57	93	63.16	239	205	125	-39.02

Table 2: Additional swap gates and circuit depth, n=10

	1 1 1			1 .	1	1 1	(04)	11.	1	11 1	1 (04)
layout	benchmark	g	d	s basic	s sabre	s look	swap (%)	d basic	d swap	d look	d (%)
full_10_2	ghz	12	12	0	6	0	-100	12	15	12	-20
full_10_2 full_10_2	dj	79	17 26	$0 \\ 0$	$\frac{3}{6}$	$0 \\ 0$	-100 -100	17 23	20 30	17 23	-15 -23.33
full_10_2	$rac{ ext{graphstate}}{ ext{wstate}}$	$\frac{100}{163}$	90	0	0	0	nan	23 90	90	23 90	-23.33 0
full_10_2	vqe	168	26	0	0	0	nan	26	26	26	0
full_10_2	gaoa	190	$\frac{20}{34}$	0	6	0	-100	34	47	34	-27.66
full_10_2	qft	270	78	0	18	0	-100	78	133	78	-41.35
full_10_2	qftentangled	282	82	0	18	0	-100	82	156	82	-47.44
$full_10_2$	realamprandom	335	57	0	105	0	-100	57	213	57	-73.24
$full_10_2$	twolocalrandom	335	57	0	81	0	-100	57	196	57	-70.92
$full_10_2$	su2random	375	61	0	99	0	-100	61	236	61	-74.15
$full_10_2$	qnn	459	108	0	90	0	-100	108	310	108	-65.16
full_10_2	portfolioqaoa	615	132	0	111	0	-100	132	426	132	-69.01
full_10_2	random	646	155	0	93	0	-100	155	320	155	-51.56
full_10_2	portfoliovqe	1145	217	0	15	0	-100	217	288	217	-24.65
full_7_3	ghz	12	12	0	9	0	-100	12	21	12	-42.86
full_7_3 full_7_3	dj	79 100	17 26	48 18	9	9 12	0 300	70 53	26 24	22 23	-15.38
full_7_3	$rac{ ext{graphstate}}{ ext{wstate}}$	163	90	0	3 6	0	-100	90	$\frac{24}{93}$	23 90	-4.17 -3.23
full_7_3	vqe	168	26	0	3	0	-100	90 26	93 38	26	-3.23 -31.58
full_7_3	qaoa	190	$\frac{20}{34}$	48	6	15	150	138	50 50	42	-31.56 -16
full_7_3	qft	270	78	168	45	150	233.33	236	159	140	-11.95
full_7_3	qftentangled	282	82	168	57	150	163.16	240	181	144	-20.44
full_7_3	realamprandom	335	57	471	99	141	42.42	632	224	130	-41.96
full_7_3	twolocalrandom	335	57	471	195	141	-27.69	632	264	130	-50.76
$full_7_3$	su2random	375	61	471	126	141	11.9	657	220	135	-38.64
$full_7_3$	qnn	459	108	294	180	249	38.33	531	338	214	-36.69
$full_7_3$	portfolioqaoa	615	132	471	156	231	48.08	845	478	239	-50
$full_7_3$	$\operatorname{random}$	646	155	159	114	132	15.79	419	320	179	-44.06
$full_7_3$	portfoliovqe	1145	217	471	105	255	142.86	878	450	308	-31.56
$grid_4_5$	$\operatorname{ghz}$	12	12	6	6	24	300	18	18	16	-11.11
$grid_4_5$	dj	79	17	144	21	18	-14.29	88	44	24	-45.45
$grid_4_5$	graphstate	100	26	51	15	36	140	70	35	24	-31.43
grid_4_5	wstate	163	90	24	15	42	180	96	99	65	-34.34
$grid_4_5$ $grid_4_5$	vqe	168	$\frac{26}{34}$	$\frac{36}{105}$	$\begin{array}{c} 3 \\ 21 \end{array}$	$\begin{array}{c} 45 \\ 33 \end{array}$	$1400 \\ 57.14$	61 $174$	$\frac{35}{59}$	33 38	-5.71
grid_4_5 grid_4_5	qaoa qft	$\frac{190}{270}$	78	507	108	33 195	80.56	335	176	130	-35.59 -26.14
grid_4_5 grid_4_5	qftentangled	282	82	414	108	180	66.67	285	213	122	-20.14 $-42.72$
grid_4_5	realamprandom	335	57	1323	258	375	45.35	786	246	138	-43.9
grid_4_5	twolocalrandom	335	57	1323	258	375	45.35	786	254	138	-45.67
grid_4_5	su2random	375	61	1323	261	375	43.68	815	267	142	-46.82
$grid_4_5$	qnn	459	108	876	186	390	109.68	636	291	220	-24.4
$grid_4_5$	portfolioqaoa	615	132	1323	261	450	72.41	956	356	262	-26.4
$grid_4_5$	random	646	155	477	186	375	101.61	643	325	222	-31.69
$grid_4_5$	portfoliovqe	1145	217	1323	261	342	31.03	994	465	265	-43.01
$grid_9_3$	ghz	12	12	12	9	24	166.67	24	21	16	-23.81
$grid_9_3$	dj	79	17	90	21	12	-42.86	82	46	22	-52.17
grid_9_3	graphstate	100	26	42	15	48	220	57	33	26	-21.21
grid_9_3	wstate	163	90	21	0	27	nan	102	90	46	-48.89
grid_9_3	vqe	168	26	9	6	$\frac{54}{79}$	800	31	35 56	43	22.86
grid_9_3	qaoa	190 270	34	63 270	12 06	78 180	550 87.5	145	56 211	49 120	-12.5
grid_9_3 grid_9_3	$_{ m qft}$	$\frac{270}{282}$	78 82	$279 \\ 282$	96 99	180 198	87.5 100	288 288	$211 \\ 177$	$\frac{120}{135}$	-43.13 -23.73
grid_9_3 grid_9_3	qitentangled realamprandom	$\frac{282}{335}$	82 57	282 690	99 231	$\frac{198}{321}$	38.96	288 591	248	155 151	-23.73 -39.11
grid_9_3 grid_9_3	twolocalrandom	335	57 57	690	$\frac{231}{273}$	$\frac{321}{321}$	17.58	591 591	248	$151 \\ 151$	-39.11 -49.5
grid_9_3 grid_9_3	su2random	375	61	690	273	$\frac{321}{321}$	17.58	619	310	157	-49.35
grid_9_3	qnn	459	108	456	180	$\frac{321}{240}$	33.33	537	275	174	-36.73
grid_9_3	portfolioqaoa	615	132	690	249	384	54.22	803	384	248	-35.42
grid_9_3	random	646	155	285	171	225	31.58	455	312	185	-40.71
$grid_9_3$	portfoliovqe	1145	217	690	222	387	74.32	951	479	284	-40.71
$line_5_4$	$\operatorname{ghz}$	12	12	0	9	27	200	12	21	15	-28.57

Table 2: Additional swap gates and circuit depth, n=10

layout	benchmark	g	d	s basic	s sabre	s look	swap (%)	d basic	d swap	d look	d (%)
line_5_4	dj	79	17	216	21	21	0	94	54	30	-44.44
$line_5_4$	$\operatorname{graphstate}$	100	26	72	24	57	137.5	68	36	32	-11.11
$line_5_4$	wstate	163	90	0	0	27	nan	90	90	76	-15.56
line_5_4	vqe	168	26	0	0	27	nan	26	26	33	26.92
line_5_4	qaoa	190	34	168	30	75	150	228	53	44	-16.98
line_5_4	qft	270	78	780	168	195	16.07	342	181	106	-41.44
line_5_4	qftentangled	282	82 57	780 2160	195	195	$0 \\ 7.32$	346	217 $278$	110 112	-49.31
line_5_4 line_5_4	realamprandom twolocalrandom	$\frac{335}{335}$	57	2160 $2160$	$\frac{369}{360}$	$\frac{396}{396}$	1.32 10	876 876	278 268	112	-59.71 -58.21
line_5_4	su2random	375	61	2160	360 360	396	10	904	208 291	112	-58.21 -60.14
line_5_4	qnn	459	108	1440	249	$\frac{390}{327}$	31.33	657	$\frac{291}{258}$	155	-39.92
line_5_4	portfoliogaoa	615	132	2160	360	408	13.33	985	380	176	-53.68
line_5_4	random	646	155	582	312	435	39.42	708	342	225	-34.21
line_5_4	portfoliovge	1145	217	2160	360	408	13.33	1007	402	255	-36.57
$ring_10_2$	ghz	12	12	0	9	36	300	12	21	17	-19.05
ring_10_2	$\ddot{\mathrm{d}}\mathrm{j}$	79	17	78	21	24	14.29	64	43	21	-51.16
ring_10_2	graphstate	100	26	30	12	39	225	45	28	29	3.57
ring_10_2	wstate	163	90	0	12	48	300	90	96	62	-35.42
ring_10_2	vqe	168	26	0	9	66	633.33	26	40	40	0
$ring_10_2$	qaoa	190	34	120	24	60	150	154	42	48	14.29
$ring_10_2$	qft	270	78	330	141	165	17.02	233	205	103	-49.76
$ring_10_2$	qftentangled	282	82	330	147	165	12.24	237	239	107	-55.23
$ring_10_2$	realamprandom	335	57	885	399	516	29.32	522	351	215	-38.75
ring_10_2	twolocalrandom	335	57	885	405	516	27.41	522	402	215	-46.52
ring_10_2	su2random	375	61	885	402	537	33.58	543	381	224	-41.21
ring_10_2	qnn	459	108	663	288	432	50	440	360	232	-35.56
ring_10_2	portfolioqaoa	615	132	885	387	594	53.49	606	496	292	-41.13
ring_10_2	random	646	$\frac{155}{217}$	402	237	381	60.76 $54.74$	493	375	244 298	-34.93 -49.32
ring_10_2 ring_5_4	portfoliovqe ghz	$\frac{1145}{12}$	$\frac{217}{12}$	885 nan	411	$636 \\ 45$	54.74 nan	636	588	298 21	-49.32 nan
ring_5_4	dj	79	17	nan	nan nan	12	nan	nan nan	nan nan	$\frac{21}{23}$	nan
ring_5_4	graphstate	100	26	nan	nan	39	nan	nan	nan	30	nan
ring_5_4	wstate	163	90	0	12	45	275	90	93	55	-40.86
ring_5_4	vqe	168	26	0	12	57	375	26	43	35	-18.6
ring_5_4	gaoa	190	34	nan	nan	78	nan	nan	nan	55	nan
ring_5_4	qftentangled	282	82	nan	nan	195	nan	nan	nan	137	nan
ring_7_3	ghz	12	12	0	15	51	240	12	24	25	4.17
ring_7_3	$\stackrel{\circ}{\mathrm{d}}\mathrm{j}$	79	17	126	15	24	60	79	35	19	-45.71
$ring_7_3$	graphstate	100	26	48	18	39	116.67	63	33	29	-12.12
$ring_7_3$	wstate	163	90	0	6	66	1000	90	96	62	-35.42
$ring_{-}7_{-}3$	vqe	168	26	0	9	66	633.33	26	40	43	7.5
$ring_{-}7_{-}3$	qaoa	190	34	81	21	75	257.14	158	64	56	-12.5
$ring_{-7}_{-3}$	qft	270	78	540	135	159	17.78	319	188	116	-38.3
t_horizontal_5_4	ghz	12	12	18	0	21	nan	30	12	17	41.67
t_horizontal_5_4	dj	79	17	150	21	15	-28.57	88	51	26	-49.02
t_horizontal_5_4	graphstate	100	26	60	21	36	71.43	66	38	23	-39.47
t_horizontal_5_4	wstate	163	90	45	0	27	nan	116	90	72	-20
t_horizontal_5_4	vqe	168	26	51	0	33	nan	71	26	37	42.31
t_horizontal_5_4	qaoa	190	34	129	21	78	271.43	206	50	50	0
t_horizontal_5_4 t_horizontal_5_4	qft	$\frac{270}{282}$	78 82	486 510	$\frac{162}{156}$	$\frac{195}{195}$	20.37 $25$	331 313	$\frac{198}{225}$	106 110	-46.46 -51.11
t_horizontal_5_4	qftentangled realamprandom	$\frac{202}{335}$	57	1614	363	$\frac{193}{414}$	14.05	840	263	143	-45.63
t_horizontal_5_4	twolocalrandom	335	57	1614 $1614$	366	$\frac{414}{414}$	14.05 $13.11$	840	$\frac{205}{265}$	$\frac{143}{143}$	-45.05 -46.04
t_horizontal_5_4	su2random	375	61	1614 $1614$	372	414	11.29	868	203	143 $147$	-49.66
t_horizontal_5_4	qnn	459	108	1056	249	402	61.45	662	$\frac{252}{258}$	194	-24.81
t_horizontal_5_4	portfolioqaoa	615	132	1614	366	489	33.61	979	$\frac{260}{367}$	238	-35.15
t_horizontal_5_4	random	646	155	522	273	402	47.25	660	419	231	-44.87
t_horizontal_5_4	portfoliovqe	1145	217	1614	366	441	20.49	1001	444	276	-37.84
t_vertical_5_4	ghz	12	12	27	9	30	233.33	39	18	19	5.56
t_vertical_5_4	dj	79	17	135	30	15	-50	85	49	25	-48.98
t_vertical_5_4	graphstate	100	26	63	21	39	85.71	76	34	24	-29.41

Table 2: Additional swap gates and circuit depth,  $n\,=\,10$ 

layout	benchmark	g	d	s basic	s sabre	s look	swap (%)	d basic	d swap	d look	d (%)
t_vertical_5_4	wstate	163	90	72	0	45	nan	137	90	66	-26.67
$t_{vertical_5_4}$	vqe	168	26	66	3	51	1600	73	35	38	8.57
$t_{vertical_5_4}$	qaoa	190	34	114	27	81	200	196	82	56	-31.71
$t_{\text{vertical}}_{-5}_{-4}$	qft	270	78	498	144	195	35.42	273	187	106	-43.32
$t_{\text{-}}vertical_{\text{-}}5_{\text{-}}4$	qftentangled	282	82	510	153	195	27.45	309	228	110	-51.75
$t_{vertical_5_4}$	realamprandom	335	57	1515	378	447	18.25	835	243	154	-36.63
$t_{vertical_5_4}$	two local random	335	57	1515	423	447	5.67	835	304	154	-49.34
$t_{vertical_5_4}$	su2random	375	61	1515	384	447	16.41	863	310	160	-48.39
$t_{vertical_5_4}$	qnn	459	108	1002	258	423	63.95	662	304	204	-32.89
$t_{vertical_5_4}$	portfolioqaoa	615	132	1515	396	504	27.27	976	462	255	-44.81
$t_{vertical_5_4}$	random	646	155	525	246	381	54.88	710	351	228	-35.04
$t\_vertical\_5\_4$	portfoliovqe	1145	217	1515	396	507	28.03	997	536	282	-47.39

Table 3: Additional swap gates and circuit depth, n=15

September   Sept								(0.4)				- (0.1)
Fall   10.2   dj	layout	benchmark	g	d	s basic	s sabre	s look	swap (%)	d basic	d swap	d look	d (%)
fall.ll 0.2         graphstate         15         29         30         6         24         300         51         40         31         -13. 24.39           fall.ll 0.2         waste         233         13         0         6         0         -100         135         141         135         -24.39           fall.ll 0.2         opon         255         34         63         6         6         9         100         135         141         135         -25.33           fall.ll 0.2         optendangled         608         12         18         788         48         321         56.77         49         22         210         -43.57         56.11         20         14         21         27.77         145         25.25         23         24         -25.25         23.24         24         -25.25         23         24         -25.25         23.24         24         -25.25         23         24         -25.25         24         -25.25         24         -25.25         24         -25.25         -25.24         24         -25.25         24         -25.25         -25.24         24         -25.25         -25.24         -25.25         -25.25         -25.24		_										
Fall   10.2		<u> </u>					_					
full.10.2   wstate		~ -										
fall   10							-					
full 10.2         qft.         qft.         591         11.8         378         48         321         568.75         485         30?         241         225         25.35         full 10.2         rehampenadom         615         77         11.46         17         315         77.97         1309         32         210         -43.55         full 10.2         twolocalrandom         615         77         11.46         188         315         62.85         1309         322         210         -35.75         full 10.2         qum         675         81         11.46         189         315         66.67         11.33         452         21.0         -35.2         15.2         14.6         11.1         399         310         1103         32.7         302         -22.0         -35.2         14.6         18.0         11.0         1							~					
full 10.2 brill 10.2		_										
full.10.2         realamprandom         615         77         1146         177         315         77.97         1399         372         210         -35.5 full.10.2         twolocalmone         675         81         1146         188         315         62.67         1439         322         210         -35.7 full.10.2         mach mach mach mach mach mach mach mach		•										
full 10.2         twolocalrandom         615         77         1146         138         315         128.26         1399         327         210         35.78           full 10.2         qun         914         158         720         90         369         310         1133         452         215         52.43           full 10.2         portfolloqaoa         1260         129         1146         189         318         18.72         196         77         302         -42.68           full 10.2         portfolloqao         2365         327         1146         189         534         182.54         1903         984         504         48.78           full 7.3         dj         118         22         96         9         27         200         67         35         30         16.67           full 7.3         dq         253         31         0         12         0         100         315         56         31         44.64           full 7.3         dq         253         31         0         12         0         -100         31         35         32         -8.15           full 7.3         qt         dt		_										
fall II 0.2         opun         914         158         720         90         360         310         1103         527         302         -14.26           full. 10.2         portfolioqos         1260         912         1446         189         134         1268         1200         957         529         -44.72           full. 10.2         portfolioqos         255         327         17         7         6         6         0         100         17         20         14         -18.78           full. 7.3         ghapitstato         150         29         66         9         157         60.67         156         30         30         -16.67           full. 7.3         cyqe         253         31         0         12         0         -100         315         64         31         -4.64           full. 7.3         cyqe         253         31         108         15         51         240         123         14         13         -4.64           full. 7.3         qft         59         31         80         15         51         240         123         14         13         34         28         23 <t< td=""><td><math>full_10_2</math></td><td></td><td></td><td>77</td><td>1146</td><td></td><td></td><td></td><td></td><td></td><td>210</td><td></td></t<>	$full_10_2$			77	1146						210	
full. 10.2         oportfoliogoa         1260         192         1146         141         393         178-72         1766         777         351         -54.83           full. 10.2         portfoliovge         2505         327         1146         189         534         182.54         1903         984         504         -48.78           full. 7.3         ghz         17         17         0         6         0         -100         17         20         16-667           full. 7.3         graphstate         150         29         36         9         27         200         67         35         32         -8.57           full. 7.3         wstate         253         33         0         12         0         -100         135         141         135         -4.26           full. 7.3         opa         253         135         0         12         0         -100         135         141         135         -4.26           full. 7.3         qft         591         118         501         117         030         156-14         20         23         24         25         151         6         6         14         141	$full_10_2$	su2random	675	81	1146	189	315	66.67	1433	452	215	-52.43
full.10.2         random         1992         412         534         246         597         142.68         1900         957         529         -44.72           full.7.3         gbz         17         17         70         6         0         -100         17         20         17         -15           full.7.3         gbz         118         22         96         9         15         66.67         116         36         30         -16.75           full.7.3         vqe         253         31         0         12         0         -100         35         14         44.64           full.7.3         watate         253         31         0         12         0         -100         35         14         135         -42.65           full.7.3         qne         255         34         108         15         51         240         232         50         53         6         51         11         13         15         51         240         232         50         53         6         72         74         11         13         32         25         14         6         11         8         10	$full_10_2$	qnn	914	158	720	90	369				302	-42.69
full In 0.2         portfoliovege         2505         327         1146         189         534         182.54         193         984         504         -48.75           full.7.3         ghz         17         17         0         6         0         -100         17         20         17         -155           full.7.3         graphstate         150         29         36         9         27         200         67         35         32         -8.75           full.7.3         wstate         253         135         0         12         0         -100         135         141         135         -4.66           full.7.3         qfte         591         18         501         117         300         166.41         588         295         213         -22.8           full.7.3         qfte         591         18         501         117         300         166.41         588         295         213         -22.8           full.7.3         qfte         591         18         501         150         300         160         592         399         217         -45.61           gid.4.5         ghz         417         <		portfolioqaoa										
full.7.3         ghz         17         17         0         6         0         -100         17         20         17         -15         6.6         16         36         30         -16.67         full.7.3         rgaplistate         150         29         36         9         27         200         67         35         32         -8.57           full.7.3         veg         253         31         0         12         0         -100         31         56         31         -4.46         101         31         56         31         -4.46         101         31         56         31         -4.56         101         73         40         10         135         51         10         100         31         56         31         -4.56         41         13         42.5         426         101         118         42.5         11         11         150         300         100         192         39         21         -4.56         41         41.3         33         27.5         48         21         27.5         48         23         22.5         21.88         33         33         35         11         30         20         14<												
full.7.3         q̄j         118         22         96         9         15         66.67         116         36         30         -16.67           full.7.3         graphstate         150         29         36         9         27         200         67         35         32         -8.57           full.7.3         vye         253         13         0         12         0         -100         135         141         135         -426           full.7.3         qaoa         285         34         108         15         12         0         -100         135         141         135         -426           full.7.3         qfe         591         118         501         117         300         156.41         588         295         213         -27.85           full.7.3         qfe         591         118         501         150         300         156.41         588         295         213         -27.18         60         17         45.11         14.62         14         44         111         362.5         94         31         38         22.58         34         21.7         21.88         33         32         35		• •										
full 7.3         graphstate         150         29         36         9         27         200         67         35         32         8.5 full 7.3           full 7.3         westate         253         31         0         12         0         -100         135         54         141         135         -4.26           full 7.3         qaoa         285         34         108         15         51         240         223         50         53         6           full 7.3         qftentangled         608         122         501         150         300         100         592         399         217         -45.61           full 7.3         qftentangled         608         122         501         150         300         100         592         399         217         -45.1           full 7.3         qftentangled         608         122         501         150         300         100         592         399         217         -45.4           grid 4.5         qix         15         223         313         48         12         27         40         128         30         225         28.27         740         13		_										
full.7.3         vege         253         31         0         12         0         -100         31         56         31         -4.46           full.7.3         qaoa         285         31         108         15         51         240         235         11         35         -4.26           full.7.3         qft         591         118         501         117         300         156.41         588         295         213         -27.8           full.7.3         qft         591         118         501         117         300         156.41         588         295         217         4-56.1           grid.4.5         gftentangled         608         122         301         18         33         8.333         8.33         29         32         25         -21.88           grid.4.5         dgr         graphstate         150         291         417         24         111         362.5         94         31         38         49.33           grid.4.5         graphstate         250         33         3         35         39         141         261.54         369         56         49         -18.33           g		<u> </u>										
full.7.3         wstate         253         135         0         12         0         -100         135         141         135         -4.26           full.7.3         qfo         285         34         108         15         51         240         223         50         53         6           full.7.3         qftentangled         608         122         501         117         300         156.41         588         295         213         -27.8           full.7.3         qftentangled         608         122         501         150         300         100         592         399         227         -45.61           grid.4.5         ggaphstate         170         71         17         12         18         33         38.33         29         32         25         22.5         22.5         24         113         36.2         59         31         38         24.93           grid.4.5         qg         253         31         48         12         78         550         75         60         49         -18.33         39         3         57         1800         147         138         102         22.60         99		~ -										
full.7.3         qaoa         285         34         108         15         51         240         223         50         53         6           full.7.3         qft         591         118         501         117         300         1564         588         295         213         -27.8           full.7.3         qft         591         118         501         150         300         100         592         399         217         -45.61           grid.4.5         gbz         dj         118         22         324         45         27         -40         128         75         38         -49.33           grid.4.5         graphstate         150         29         147         24         111         362.5         94         31         38         22.58           grid.4.5         wstate         253         135         39         3         57         1800         147         138         102         20.59           grid.4.5         qft         591         118         1698         312         555         68.7         637         315         223         -29.21           grid.4.5         qftentangled         608<							-					
full 7-3         qft         591         118         501         117         300         156.41         588         295         213         2-7.8           mull 7-3         qftentangled         608         122         501         150         300         100         592         399         217         -45.61           grid 4.5         ghz         17         17         12         18         33         83.33         29         32         25         21.88           grid 4.5         graphstate         150         29         147         24         111         362.5         94         31         38         23.58           grid 4.5         graphstate         253         31         48         12         78         550         75         60         49         -18.33           grid 4.5         qsta         253         31         48         12         78         550         75         60         49         -18.33           grid 4.5         qt         dt         591         118         168         12         75         30         561         87         73         34         324         214         -33.59							_					
full 7.3         qftentangled         608         122         501         150         300         100         592         399         217         4.56         grid.4.5         ghz         17         17         12         18         33         83.33         29         32         25         -21.88           grid.4.5         dj         118         22         324         45         27         -40         128         75         38         -49.33           grid.4.5         cyqe         253         31         48         12         78         550         75         60         49         -18.33           grid.4.5         wstate         255         34         357         39         141         261.54         369         58         70         20.69         99         318         36         68.7         73         30         261         82         73         34         34         124         143         142         143         44         144         143         34         24         144         143         34         24         144         143         34         34         34         24         24         144         143		_										
grid.4.5         ghz         l.1         1.7         1.2         1.8         3.3         8.3.3         2.9         3.2         2.5         2.1.88           grid.4.5         graphstate         150         2.9         14.7         2.4         11.1         362.5         4         3.1         3.8         2.2.58           grid.4.5         wge         253         3.1         4.8         12         7.8         550         7.5         60         4.9         1.8.33           grid.4.5         wstate         253         3.1         4.8         12         7.8         550         7.5         60         4.9         1.8.33           grid.4.5         qaoa         285         34         357         39         141         261.54         369         58         70         20.69           grid.4.5         qftentangled         608         122         1575         300         561         87         687         315         223         29.21           grid.4.5         qft         157         5277         606         759         17.67         1840         442         198         -55.61           grid.4.5         qm         mortfolioqaa		_										
grid.4.5         dj         118         22         324         45         27         -40         128         75         38         -49.33           grid.4.5         ycq         253         31         48         12         78         500         75         60         49         -18.33           grid.4.5         vyc         253         31         48         12         78         500         75         60         49         -18.33           grid.4.5         qaca         285         34         357         39         141         261.54         369         58         70         20.69           grid.4.5         qft         49         591         118         1698         312         525         68.27         734         324         214         -33.95           grid.4.5         qftentangled         608         122         1575         300         561         87         687         315         223         -29.21           grid.4.5         twolocalrandom         615         77         5277         696         759         12.95         1881         422         202         -55.61           grid.4.5         qun <t< td=""><td></td><td>_</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>		_										
grid 4.5         graphstate         150         29         147         24         111         362.5         94         31         38         22.58           grid 4.5         wstate         253         31         48         12         78         550         75         60         49         -18.33           grid 4.5         wstate         253         135         39         3         57         1800         147         138         102         -26.09           grid 4.5         qaoa         285         34         357         39         141         261.54         399         58         70         20.69           grid 4.5         qftentangled         608         122         1575         300         561         87         687         315         223         -29.21           grid 4.5         qftentangled         608         122         1575         300         561         87         687         315         227         695         17.67         1840         442         198         51-61           grid 4.5         su2random         675         81         5277         672         759         12.95         1881         422         20	0	_										
grid.4.5         wstate         253         135         39         3         57         1800         147         138         102         26.09           grid.4.5         qaoa         285         34         357         39         141         261.54         369         58         70         20.69           grid.4.5         qftentangled         608         122         1575         300         561         87         687         315         223         -29.21           grid.4.5         realamprandom         615         77         5277         645         759         17.67         1840         412         198         -51.94           grid.4.5         twolocalrandom         615         77         5277         645         759         12.95         1840         412         198         -51.94           grid.4.5         su2random         675         81         5277         672         759         12.95         1881         422         202         -52.13           grid.4.5         portfolioqaoa         1260         192         5277         672         759         12.95         1881         422         202.13         31           grid.4.5	0	v		29	147		111	362.5	94	31	38	
grid.4.5         qaoa         285         34         357         39         141         261.54         369         58         70         20.69           grid.4.5         qft         591         118         1698         312         525         68.27         734         324         214         -33.95           grid.4.5         qftentangled         608         122         1575         300         561         87         687         315         223         -29.11           grid.4.5         realamprandom         615         77         5277         645         759         17.67         1840         412         198         -51.94           grid.4.5         su2random         615         77         5277         696         759         9.05         1840         446         198         -55.61         grid.4.5         gun         91         158         3384         447         858         91.95         1840         446         198         -55.61         grid.4.5         qun         91         42         366         141         365         412         285.61         grid.4.5         portfolioqaa         126         192         5277         663         1170	$grid_4_5$	vqe	253	31	48	12	78	550	75	60	49	-18.33
grid.4.5         qft         591         118         1698         312         525         68.27         734         324         214         -33.95         grid.4.5         qftentangled         608         122         1575         300         561         87         687         315         233         -29.21         grid.4.5         realamprandom         615         77         5277         645         759         17.67         1840         412         198         -51.91         grid.4.5         twolocalrandom         615         77         5277         696         759         9.05         1840         446         198         -55.61         grid.4.5         gurandom         675         81         5277         676         759         19.95         1881         422         202         -52.13         grid.4.5         gurandom         914         158         3384         447         858         91.95         1881         422         202         -52.13         grid.4.5         qum         914         158         3384         447         858         91.95         1881         422         202.13         35         71.12         447         858         91.95         188         148         228.53	$grid_4_5$	wstate	253				57	1800			102	-26.09
grid.4.5         qftentangled         608         122         1575         300         561         87         687         315         223         -29.21           grid.4.5         realamprandom         615         77         5277         645         759         17.67         1840         412         198         -51.94           grid.4.5         twolocalrandom         615         77         5277         696         759         9.05         1840         442         198         -51.94           grid.4.5         su2random         675         81         5277         672         759         12.95         1881         422         202         -52.13           grid.4.5         qnn         914         158         3384         447         858         91.95         1386         414         355         -14.25           grid.4.5         portfolioqao         1260         192         5277         663         1170         76         207         585         418         -28.55           grid.4.5         portfolioqao         2505         327         5277         648         768         18.52         2244         756         412         45.5 <td< td=""><td>0</td><td>_</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	0	_										
grid.4.5         realamprandom         615         77         5277         645         759         17.67         1840         412         198         -51.94           grid.4.5         twolocalrandom         615         77         5277         696         759         9.05         1840         446         198         -55.61           grid.4.5         su2random         675         81         5277         672         759         12.95         1881         422         202         -52.13           grid.4.5         qnn         914         158         3384         447         858         91.95         1386         414         355         -14.25           grid.4.5         portfolioqao         1260         192         5277         663         1170         76.47         2077         585         418         -28.55           grid.4.5         portfoliovqe         2505         327         5277         648         768         18.52         2244         756         412         -45.5           grid.9.3         ghz         17         17         18         9         42         366.67         35         20         25         25           grid.9.3	0	_										
grid.4.5         twolocalrandom         615         77         5277         696         759         9.05         1840         446         198         -55.61           grid.4.5         su2random         675         81         5277         672         759         12.95         1881         422         202         -52.13           grid.4.5         portfolioqao         1260         192         5277         663         1170         76.47         2077         585         418         -28.55           grid.4.5         portfolioqao         1260         192         5277         663         1170         76.47         2077         585         418         -28.55           grid.4.5         portfoliovqe         2505         327         5277         648         768         18.52         2244         756         412         -45.5           grid.9.3         ghz         17         17         18         9         42         366.67         35         20         25         25         25         31         48         9         66         633.33         60         45         47         444         446         198         36         43         33         -13.16<	0	<b>-</b>										
grid.4.5         su2random         675         81         5277         672         759         12.95         1881         422         202         -52.13           grid.4.5         qnn         914         158         3384         447         858         91.95         1386         414         355         -14.25           grid.4.5         portfolioqaoa         1260         192         5277         663         1170         76.47         2077         585         418         -28.55           grid.4.5         random         1992         412         2250         1041         1533         47.26         2103         1056         629         -40.44           grid.9.3         gbz         17         17         18         9         42         366.67         35         20         25         25           grid.9.3         gbz         118         22         234         48         24         -50         122         67         34         -49.25           grid.9.3         graphstate         150         29         108         30         87         190         86         38         33         -13.16           grid.9.3         qaoa	0	_										
grid.4.5         qnn         914         158         3384         447         858         91.95         1386         414         355         -14.25           grid.4.5         portfolioqaa         1260         192         5277         663         1170         76.47         2077         585         418         -28.55           grid.4.5         portfoliovqe         2505         327         5277         648         768         18.52         2244         756         412         -45.5           grid.9.3         gbz         17         17         18         9         42         366.67         35         20         25         25           grid.9.3         dj         118         22         234         48         24         -50         122         67         34         -49.25           grid.9.3         graphstate         150         29         108         30         87         190         86         38         33         -13.13           grid.9.3         wstate         253         31         48         9         66         633.33         60         45         47         444           grid.9.3         qft         591	0											
grid.4.5         portfolioqaoa         1260         192         5277         663         1170         76.47         2077         585         418         -28.55         grid.4.5         random         1992         412         2250         1041         1533         47.26         2103         1056         629         -40.44         grid.4.5         portfoliovqe         2505         327         5277         648         768         18.52         2244         756         412         -45.5         grid.9.3         ghz         17         17         18         9         42         366.67         35         20         25         25         grid.9.3         dj         118         22         234         48         24         -50         122         67         34         -49.25         grid.9.3         grad.9.3         graphstate         150         29         108         30         87         190         86         38         33         -13.16         grid.9.3         wstate         253         135         57         18         72         300         156         147         107         -27.21         grid.9.3         qft         591         118         1164         270         450 <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>												
grid.4.5         random         1992         412         2250         1041         1533         47.26         2103         1056         629         -40.44           grid.4.5         portfoliovqe         2505         327         5277         648         768         18.52         2244         756         412         -45.5           grid.9.3         ghz         17         17         18         9         42         366.67         35         20         25         25           grid.9.3         graphstate         150         29         108         30         87         190         86         38         33         -13.16           grid.9.3         vqe         253         135         57         18         72         300         156         147         107         -27.21           grid.9.3         qft         591         118         1164         270         450         66.67         680         292         203         30.48           grid.9.3         qft         591         118         1164         270         450         66.67         680         292         203         30.48           grid.9.3         qft         591 <td>0</td> <td>•</td> <td></td>	0	•										
grid.4.5         portfoliovqe         2505         327         5277         648         768         18.52         2244         756         412         -45.5           grid.9.3         ghz         17         17         18         9         42         366.67         35         20         25         25           grid.9.3         dj         118         22         234         48         24         -50         122         67         34         -49.25           grid.9.3         graphstate         150         29         108         30         87         190         86         38         33         -13.16           grid.9.3         vqe         253         31         48         9         66         633.33         60         45         47         4.44           grid.9.3         qaoa         285         34         198         36         243         575         247         51         71         39.22           grid.9.3         qft         591         118         1164         270         450         66.67         680         292         203         -30.48           grid.9.3         qftentangled         608         72<	~											
grid 9.3         ghz         17         17         18         9         42         366.67         35         20         25         25           grid 9.3         dj         118         22         234         48         24         -50         122         67         34         -49.25           grid 9.3         graphstate         150         29         108         30         87         190         86         38         33         -13.16           grid 9.3         vqe         253         313         57         18         72         300         156         147         107         -27.21           grid 9.3         qaoa         285         34         198         36         243         575         247         51         71         39.22           grid 9.3         qft         591         118         1164         270         450         66.67         680         292         203         -30.48           grid 9.3         qftentangled         608         122         1128         279         357         27.96         650         327         192         -41.28           grid 9.3         twolocalrandom         615 <t< td=""><td>~</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	~											
grid.9.3         dj         118         22         234         48         24         -50         122         67         34         -49.25           grid.9.3         graphstate         150         29         108         30         87         190         86         38         33         -13.16           grid.9.3         vqe         253         31         48         9         66         633.33         60         45         47         4.44           grid.9.3         wstate         253         135         57         18         72         300         156         147         107         -27.21           grid.9.3         qft         591         118         1164         270         450         66.67         680         292         203         -30.48           grid.9.3         qftentangled         608         122         1128         279         357         27.96         650         327         192         -41.28           grid.9.3         realamprandom         615         77         3018         666         834         25.23         1603         439         240         -45.33           grid.9.3         su2random         6	~	_										
grid.9.3         graphstate         150         29         108         30         87         190         86         38         33         -13.16           grid.9.3         vqe         253         31         48         9         66         633.33         60         45         47         4.44           grid.9.3         wstate         253         135         57         18         72         300         156         147         107         -27.21           grid.9.3         qaoa         285         34         198         36         243         575         247         51         71         39.22           grid.9.3         qftentangled         608         122         1128         270         450         66.67         680         292         203         -30.48           grid.9.3         qftentangled         608         122         1128         279         357         27.96         650         327         192         -41.28           grid.9.3         realamprandom         615         77         3018         662         834         24.11         1603         439         240         -45.33           grid.9.3         su2random												
grid.9.3         wstate         253         135         57         18         72         300         156         147         107         -27.21           grid.9.3         qaoa         285         34         198         36         243         575         247         51         71         39.22           grid.9.3         qft         591         118         1164         270         450         66.67         680         292         203         -30.48           grid.9.3         qftentangled         608         122         1128         279         357         27.96         650         327         192         -41.28           grid.9.3         realamprandom         615         77         3018         666         834         25.23         1603         439         240         -45.33           grid.9.3         twolocalrandom         615         77         3018         672         834         24.11         1603         453         240         -47.02           grid.9.3         qun         914         158         2061         444         771         73.65         1277         456         343         -24.78           grid.9.3         po			150	29	108		87	190			33	
grid.9.3         qaoa         285         34         198         36         243         575         247         51         71         39.22           grid.9.3         qft         591         118         1164         270         450         66.67         680         292         203         -30.48           grid.9.3         qftentangled         608         122         1128         279         357         27.96         650         327         192         -41.28           grid.9.3         realamprandom         615         77         3018         666         834         25.23         1603         439         240         -45.33           grid.9.3         twolocalrandom         615         77         3018         662         834         24.11         1603         453         240         -47.02           grid.9.3         su2random         675         81         3018         672         831         23.66         1641         489         242         -50.51           grid.9.3         qnn         914         158         2061         444         771         73.65         1277         456         343         -24.78           grid.9.3	$grid_9_3$	vqe	253	31		9			60	45	47	4.44
grid.9.3         qft         591         118         1164         270         450         66.67         680         292         203         -30.48           grid.9.3         qftentangled         608         122         1128         279         357         27.96         650         327         192         -41.28           grid.9.3         realamprandom         615         77         3018         666         834         25.23         1603         439         240         -45.33           grid.9.3         twolocalrandom         615         77         3018         672         834         24.11         1603         453         240         -47.02           grid.9.3         su2random         675         81         3018         672         831         23.66         1641         489         242         -50.51           grid.9.3         qnn         914         158         2061         444         771         73.65         1277         456         343         -24.78           grid.9.3         portfolioqaoa         1260         192         3018         663         1074         61.99         1843         655         412         -37.1		wstate										
grid_9_3         qftentangled         608         122         1128         279         357         27.96         650         327         192         -41.28           grid_9_3         realamprandom         615         77         3018         666         834         25.23         1603         439         240         -45.33           grid_9_3         twolocalrandom         615         77         3018         672         834         24.11         1603         453         240         -47.02           grid_9_3         su2random         675         81         3018         672         831         23.66         1641         489         242         -50.51           grid_9_3         qnn         914         158         2061         444         771         73.65         1277         456         343         -24.78           grid_9_3         portfolioqaoa         1260         192         3018         663         1074         61.99         1843         655         412         -37.1           grid_9_3         portfolioyae         2505         327         3018         636         1107         74.06         2112         835         471         -43.59												
grid_9_3         realamprandom         615         77         3018         666         834         25.23         1603         439         240         -45.33           grid_9_3         twolocalrandom         615         77         3018         672         834         24.11         1603         453         240         -47.02           grid_9_3         su2random         675         81         3018         672         831         23.66         1641         489         242         -50.51           grid_9_3         qnn         914         158         2061         444         771         73.65         1277         456         343         -24.78           grid_9_3         portfolioqaoa         1260         192         3018         663         1074         61.99         1843         655         412         -37.1           grid_9_3         portfolioqaoa         1260         192         3018         663         1074         61.99         1843         655         412         -37.1           grid_9_3         portfolioqaoa         1260         192         3018         636         1107         74.06         2112         835         471         -43.59      <												
grid_9_3         twolocalrandom         615         77         3018         672         834         24.11         1603         453         240         -47.02           grid_9_3         su2random         675         81         3018         672         831         23.66         1641         489         242         -50.51           grid_9_3         qnn         914         158         2061         444         771         73.65         1277         456         343         -24.78           grid_9_3         portfolioqaoa         1260         192         3018         663         1074         61.99         1843         655         412         -37.1           grid_9_3         portfolioqaoa         1260         192         3018         663         1074         61.99         1843         655         412         -37.1           grid_9_3         portfolioqaoa         1260         192         3018         663         1140         45.59         1913         1177         576         -51.06           grid_9_3         portfoliovqe         2505         327         3018         636         1107         74.06         2112         835         471         -43.59		_										
grid.9.3         su2random         675         81         3018         672         831         23.66         1641         489         242         -50.51           grid.9.3         qnn         914         158         2061         444         771         73.65         1277         456         343         -24.78           grid.9.3         portfolioqaoa         1260         192         3018         663         1074         61.99         1843         655         412         -37.1           grid.9.3         random         1992         412         1647         783         1140         45.59         1913         1177         576         -51.06           grid.9.3         portfoliovqe         2505         327         3018         636         1107         74.06         2112         835         471         -43.59           line.5.4         ghz         17         17         0         12         42         250         17         23         20         -13.04           line.5.4         dj         118         22         546         66         36         -45.45         146         102         45         -55.88           line.5.4         vq		_										
grid.9.3         qnn         914         158         2061         444         771         73.65         1277         456         343         -24.78           grid.9.3         portfolioqaoa         1260         192         3018         663         1074         61.99         1843         655         412         -37.1           grid.9.3         random         1992         412         1647         783         1140         45.59         1913         1177         576         -51.06           grid.9.3         portfoliovqe         2505         327         3018         636         1107         74.06         2112         835         471         -43.59           line.5.4         ghz         17         17         0         12         42         250         17         23         20         -13.04           line.5.4         dj         118         22         546         66         36         -45.45         146         102         45         -55.88           line.5.4         graphstate         150         29         186         36         138         283.33         95         33         49         48.48           line.5.4         wstate<												
grid.9.3         portfolioqaoa         1260         192         3018         663         1074         61.99         1843         655         412         -37.1           grid.9.3         random         1992         412         1647         783         1140         45.59         1913         1177         576         -51.06           grid.9.3         portfoliovqe         2505         327         3018         636         1107         74.06         2112         835         471         -43.59           line.5.4         ghz         17         17         0         12         42         250         17         23         20         -13.04           line.5.4         dj         118         22         546         66         36         -45.45         146         102         45         -55.88           line.5.4         graphstate         150         29         186         36         138         283.33         95         33         49         48.48           line.5.4         vqe         253         135         0         0         42         -39.13         31         83         43         -48.19           line.5.4         qaoa												
grid_9_3         random         1992         412         1647         783         1140         45.59         1913         1177         576         -51.06           grid_9_3         portfoliovqe         2505         327         3018         636         1107         74.06         2112         835         471         -43.59           line_5_4         ghz         17         17         0         12         42         250         17         23         20         -13.04           line_5_4         dj         118         22         546         66         36         -45.45         146         102         45         -55.88           line_5_4         graphstate         150         29         186         36         138         283.33         95         33         49         48.48           line_5_4         vqe         253         31         0         69         42         -39.13         31         83         43         -48.19           line_5_4         wstate         253         135         0         0         42         nan         135         135         121         -10.37           line_5_4         qaoa         285												
grid_9_3         portfoliovqe         2505         327         3018         636         1107         74.06         2112         835         471         -43.59           line_5_4         ghz         17         17         0         12         42         250         17         23         20         -13.04           line_5_4         dj         118         22         546         66         36         -45.45         146         102         45         -55.88           line_5_4         graphstate         150         29         186         36         138         283.33         95         33         49         48.48           line_5_4         vqe         253         31         0         69         42         -39.13         31         83         43         -48.19           line_5_4         wstate         253         135         0         0         42         nan         135         135         121         -10.37           line_5_4         qaoa         285         34         438         75         210         180         391         56         71         26.79           line_5_4         qft         591         118 </td <td></td>												
line_5_4         ghz         17         17         0         12         42         250         17         23         20         -13.04           line_5_4         dj         118         22         546         66         36         -45.45         146         102         45         -55.88           line_5_4         graphstate         150         29         186         36         138         283.33         95         33         49         48.48           line_5_4         vqe         253         31         0         69         42         -39.13         31         83         43         -48.19           line_5_4         wstate         253         135         0         0         42         nan         135         135         121         -10.37           line_5_4         qaoa         285         34         438         75         210         180         391         56         71         26.79           line_5_4         qft         591         118         2877         426         519         21.83         742         316         170         -46.2	~											
line_5_4         dj         118         22         546         66         36         -45.45         146         102         45         -55.88           line_5_4         graphstate         150         29         186         36         138         283.33         95         33         49         48.48           line_5_4         vqe         253         31         0         69         42         -39.13         31         83         43         -48.19           line_5_4         wstate         253         135         0         0         42         nan         135         135         121         -10.37           line_5_4         qaoa         285         34         438         75         210         180         391         56         71         26.79           line_5_4         qft         591         118         2877         426         519         21.83         742         316         170         -46.2												
line_5_4         graphstate         150         29         186         36         138         283.33         95         33         49         48.48           line_5_4         vqe         253         31         0         69         42         -39.13         31         83         43         -48.19           line_5_4         wstate         253         135         0         0         42         nan         135         135         121         -10.37           line_5_4         qaoa         285         34         438         75         210         180         391         56         71         26.79           line_5_4         qft         591         118         2877         426         519         21.83         742         316         170         -46.2												
line_5_4         vqe         253         31         0         69         42         -39.13         31         83         43         -48.19           line_5_4         wstate         253         135         0         0         42         nan         135         135         121         -10.37           line_5_4         qaoa         285         34         438         75         210         180         391         56         71         26.79           line_5_4         qft         591         118         2877         426         519         21.83         742         316         170         -46.2												
line_5_4         wstate         253         135         0         0         42         nan         135         135         121         -10.37           line_5_4         qaoa         285         34         438         75         210         180         391         56         71         26.79           line_5_4         qft         591         118         2877         426         519         21.83         742         316         170         -46.2		~ -										
line_5_4 qft 591 118 2877 426 519 21.83 742 316 170 -46.2												
	$line_5_4$				438		210					
line_5_4 qftentangled 608 122 2877 414 543 31.16 746 311 177 -43.09		_										
	line_5_4	qftentangled	608	122	2877	414	543	31.16	746	311	177	-43.09

Table 3: Additional swap gates and circuit depth,  $n\,=\,15$ 

layout	benchmark	g	d	s basic	s sabre	s look	swap (%)	d basic	d swap	d look	d (%)
line_5_4	realamprandom	615	77	8190	888	936	5.41	1996	418	162	-61.24
$line_5_4$	two local random	615	77	8190	876	936	6.85	1996	416	162	-61.06
$line_5_4$	su2random	675	81	8190	897	936	4.35	2039	461	165	-64.21
$line_{-}5_{-}4$	qnn	914	158	5460	591	732	23.86	1442	431	234	-45.71
$line_{-}5_{-}4$	portfolioqaoa	1260	192	8190	888	948	6.76	2165	531	260	-51.04
$line_5_4$	random	1992	412	3348	1623	1926	18.67	2915	1128	656	-41.84
line_5_4	portfoliovqe	2505	327	8190	891	948	6.4	2297	695	378	-45.61
ring_10_2	ghz	17	17	0	21	111	428.57	17	26	40	53.85
ring_10_2	dj graphstate	118 150	22 29	336 111	$\frac{33}{27}$	60 108	81.82 300	122 84	$71 \\ 32$	28 31	-60.56 -3.12
ring_10_2 ring_10_2	yqe vqe	$\frac{150}{253}$	$\frac{29}{31}$	0	33	108	481.82	84 31	52 63	51 59	-5.1 <i>2</i> -6.35
ring_10_2	wstate	253	135	0	15	177	1080	135	138	78	-43.48
ring_10_2	qaoa	$\frac{285}{285}$	34	291	36	141	291.67	303	54	60	11.11
ring_10_2	qft	591	118	2034	384	504	31.25	707	389	186	-52.19
ring_10_2	qftentangled	608	122	2034	360	624	73.33	711	344	216	-37.21
ring_10_2	realamprandom	615	77	5427	1155	1332	15.32	1879	565	302	-46.55
ring_10_2	twolocalrandom	615	77	5427	1131	1332	17.77	1879	601	302	-49.75
$ring_10_2$	su2random	675	81	5427	1155	1338	15.84	1922	661	305	-53.86
$ring_10_2$	qnn	914	158	3576	708	1116	57.63	1356	558	349	-37.46
$ring_10_2$	portfolioqaoa	1260	192	5427	1065	1701	59.72	2060	793	534	-32.66
$ring_10_2$	$\operatorname{random}$	1992	412	2127	1050	1407	34	2042	1129	580	-48.63
$ring_10_2$	portfoliovqe	2505	327	5427	1098	1590	44.81	2195	1030	520	-49.51
$ring_5_4$	ghz	17	17	0	27	51	88.89	17	41	30	-26.83
$ring_5_4$	dj	118	22	153	36	27	-25	113	71	33	-53.52
ring_5_4	graphstate	150	29	78	18	102	466.67	72	38	32	-15.79
ring_5_4	vqe	253	31	0	39	63	61.54	31	76 150	44	-42.11
ring_5_4	wstate	253	$\frac{135}{34}$	$0\\171$	48	72 93	50 82.35	135	150	79	-47.33
ring_5_4 ring_7_3	qaoa	$\frac{285}{17}$	$\frac{34}{17}$	0	51 18	93 84	82.33 366.67	$\frac{250}{17}$	83 32	43 28	-48.19 -12.5
$ring_{-7}$ -3 $ring_{-7}$ -3	$_{ m dj}^{ m ghz}$	118	22	168	39	42	7.69	116	52 66	29	-12.5 -56.06
ring_7_3	graphstate	150	29	84	$\frac{33}{24}$	96	300	85	43	$\frac{25}{35}$	-18.6
ring_7_3	vqe	253	$\frac{23}{31}$	0	24	138	475	31	63	53	-15.87
ring_7_3	wstate	253	135	0	15	108	620	135	144	81	-43.75
ring_7_3	qaoa	285	34	228	51	177	247.06	267	76	71	-6.58
$ring_7_3$	realamprandom	615	77	2679	999	1224	22.52	1444	740	319	-56.89
$ring_7_3$	twolocalrandom	615	77	2679	882	1224	38.78	1444	595	319	-46.39
$t_{horizontal_5_4}$	ghz	17	17	27	39	39	0	44	53	28	-47.17
$t_{horizontal_5_4}$	$\mathrm{d}\mathrm{j}$	118	22	384	42	27	-35.71	137	65	40	-38.46
$t_{horizontal_5_4}$	graphstate	150	29	147	42	147	250	96	37	45	21.62
$t_{horizontal_5_4}$	vqe	253	31	63	6	54	800	79	34	47	38.24
$t_{-}horizontal_{-}5_{-}4$	wstate	253	135	63	21	45	114.29	166	141	111	-21.28
t_horizontal_5_4	qaoa	285	34	348	54	234	333.33	337	56	67	19.64
t_horizontal_5_4	qft	591	118	1842	381	519	36.22	729	309	170	-44.98
t_horizontal_5_4	qftentangled	608	122	1788	390	543	39.23	698	320	177	-44.69
t_horizontal_5_4 t_horizontal_5_4	realamprandom twolocalrandom	$615 \\ 615$	77 77	$5859 \\ 5859$	885 876	$1020 \\ 1020$	15.25 $16.44$	$1927 \\ 1927$	$446 \\ 424$	234 234	-47.53 -44.81
t_horizontal_5_4	su2random	675	81	5859	993	1020 $1020$	2.72	1927	538	$\frac{234}{237}$	-44.61 -55.95
t_horizontal_5_4	qnn	914	158	4041	606	1020 $1065$	75.74	1458	481	$\frac{257}{355}$	-26.2
t_horizontal_5_4	portfolioqaoa	1260	192	5859	822	1359	65.33	2156	636	420	-33.96
t_horizontal_5_4	random	1992	412	2613	1407	1815	29	2408	1130	644	-43.01
t_horizontal_5_4	portfoliovqe	2505	327	5859	975	1047	7.38	2288	893	431	-51.74
t_vertical_5_4	ghz	17	17	45	51	54	5.88	62	59	29	-50.85
$t_{\text{vertical}} = 5.4$	dj	118	22	318	48	27	-43.75	131	69	38	-44.93
$t_{vertical_5_4}$	graphstate	150	29	150	30	138	360	107	35	41	17.14
$t_{vertical_5_4}$	vqe	253	31	150	12	99	725	94	54	48	-11.11
$t_{vertical_5_4}$	wstate	253	135	126	45	84	86.67	200	153	97	-36.6
$t_{vertical_5_4}$	qaoa	285	34	336	63	234	271.43	351	62	89	43.55
$t_{vertical_5_4}$	qft	591	118	1680	396	615	55.3	642	352	222	-36.93
$t_{\text{vertical}\_5\_4}$	qftentangled	608	122	1764	411	621	51.09	653	393	234	-40.46
$t_{\text{vertical}}_{5_{\text{-}}4}$	realamprandom	615	77	5304	1047	1098	4.87	1919	564	261	-53.72
t_vertical_5_4	twolocalrandom	615	77	5304	1011	1098	8.61	1919	593	261	-55.99

Table 3: Additional swap gates and circuit depth,  $n\,=\,15$ 

layout	benchmark	g	d	s basic	s sabre	s look	swap (%)	d basic	d swap	d look	d (%)
$t_{vertical_5_4}$	su2random	675	81	5304	1086	1098	1.1	1962	658	265	-59.73
$t_{\text{vertical}}_{5_{\text{-}}4}$	qnn	914	158	3669	600	1077	79.5	1449	509	344	-32.42
$t_{\text{vertical}}_{-5}_{-4}$	portfolioqaoa	1260	192	5304	879	1440	63.82	2150	641	430	-32.92
$t_{\text{-}}vertical_{\text{-}}5_{\text{-}}4$	random	1992	412	2475	1203	1800	49.63	2366	1214	658	-45.8
$t_{\text{vertical}}_{-5}_{-4}$	portfoliovqe	2505	327	5304	942	1251	32.8	2280	834	456	-45.32