

CUDAPm1 V0.20 on GTX480, run time versus exponent

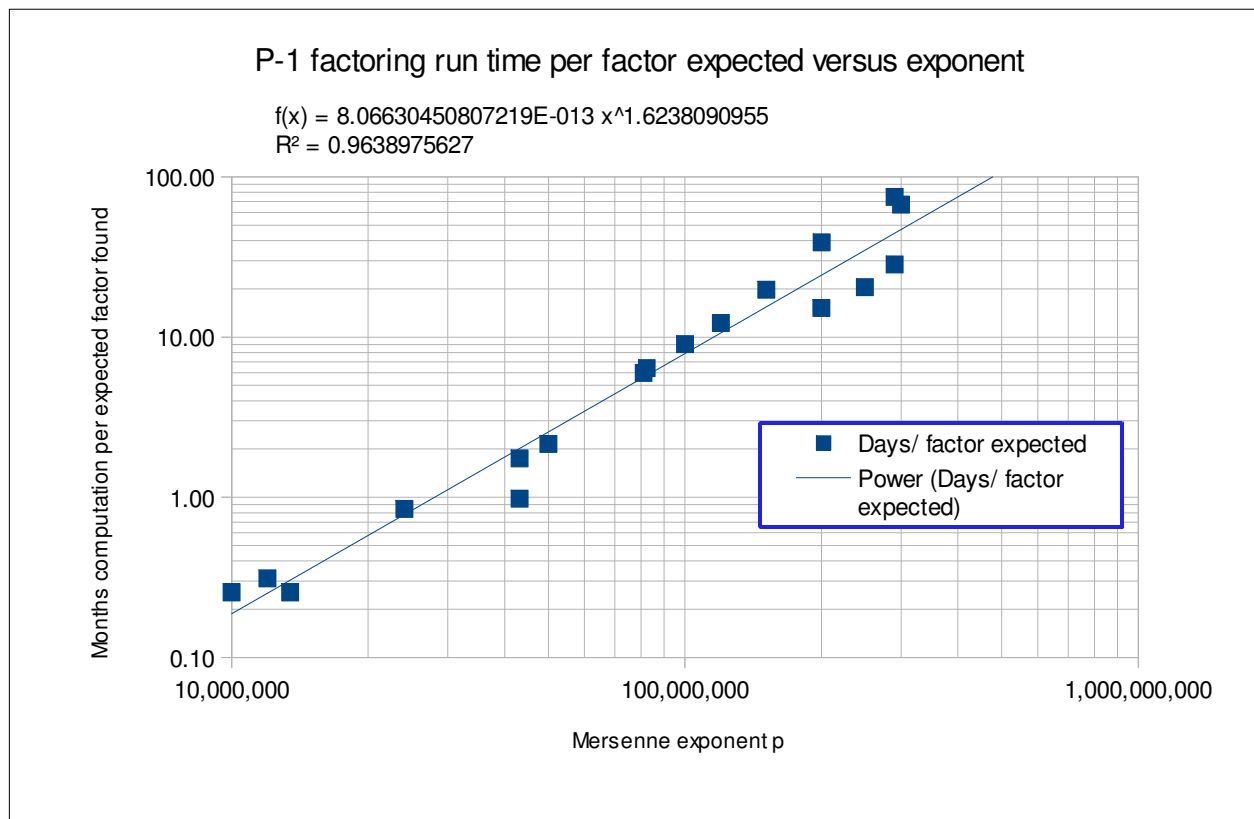
(other grayed cells are formula results)

Data from runs made with all cpu cores saturated with prime95, other GPU busy					Chance %	Probable	Days/ factor
p	t seconds	T days	Notes		factored per CUDAPm1	factors/hr	expected
10,000,223	85	0.00098	B1=30000, B2=300000		0.385	0.16306	0.256
12,004,033	151	0.00175	B1=45000, B2=517500		0.56	0.13351	0.312
13,466,917	477	0.00552	B1=110000, B2=1952500		2.16	0.16302	0.256
24,036,583	1048	0.0121	B1=150000, B2=2400000		1.43	0.04912	0.848
43,158,547	2238	0.0259	B1=190000, B2=3705000, 1LL		2.64	0.04247	0.981
43,158,547	4848	0.0561	B1=390000, B2=8482500, 2LL		3.21	0.02384	1.748
			factor found in stage 2 with				
50,001,781	7553	0.0874	B1=430000, B2=12125000		4.06	0.01935	2.153
81,061,241	18,371	0.213	B1=725000, B2=16131250		3.55	0.00696	5.990
82,388,489	19,789	0.229	B1=740000, B2=16465000		3.58	0.00651	6.398
100,000,081	27,232	0.315	B1=865000, B2=18597500		3.48	0.00460	9.057
120,002,191	45,995	0.532	B1 = 1135000, B2 = 25537500		4.34	0.00340	12.266
151,294,541	82,287	0.952	B1=1475000, B2=32081250		4.81	0.00210	19.800
			Found factor in stage 1 with				
200,001,187	66,583	0.771	B1=1900000, B2=29450000		5.07	0.00274	15.200
200,364,299	91,629	1.061	B1=1405000, B2=17211250		2.72	0.00107	38.990
			found factor in stage 1 with				
249,500,501	89,531	1.036	B1=2145000, B2=13942500		5.05	0.00203	20.520
289,999,981	153,518	1.777	B1=1760000, B2=9680000		2.37	0.00056	74.972
			Found factor in stage 1 with				
290,001,377	121,640	1.408	B1=2555000, B2=17246250		4.96	0.00147	28.384
299,500,177	292,817	3.389	B1=2660000, B2=17955000		5.04	0.00062	67.244

note, these are sums of stage 1 and stage 2 estimated total times provided by application, & may omit gcd times

P-1 run time Extrapolation (widely, wildly)					LL test time	
t=c0 p^c1						
c0	1.85E-013	2.1390E-018	from trend line		6.91E-016	
c1	2.132929676	2.132929676	from trend line		2.03070987	
p	t, seconds	days	T, years	notes	days/lltest	T(P-1)<T(LL) (P-1)/LL time
500,000	0.264	0.00000306	8.38E-009	milliseconds	0.0002583	YES 0.01184
1,000,000	1.160	1.3421E-005	3.68E-008		0.0010556	YES 0.01271
2,000,000	5.086	5.8866E-005	1.61E-007	seconds	0.0043131	YES 0.01365
3,000,000	12.077	0.000139784	3.83E-007		0.0098261	YES 0.01423
4,000,000	22.308	0.000258	7.07E-007		0.01762	YES 0.01465
5,000,000	35.905	0.000416	1.14E-006		0.02773	YES 0.01499
10,000,000	157.484	0.001823	4.99E-006	minutes	0.11329	YES 0.01609
20,000,000	690.734	0.007995	2.19E-005		0.46292	YES 0.01727
50,000,000	4.88E+003	0.056438	1.55E-004	hours	2.9758	YES 0.01897
100,000,000	2.14E+004	0.247543	6.78E-004		12.159	YES 0.02036
151,294,541	5.17E+004	0.598689	1.64E-003		28.189	YES 0.02124
200,000,000	9.38E+004	1.085743	2.97E-003	days	49.683	YES 0.02185
290,001,377	2.07E+005	2.398380	6.57E-003	Near GTX480 (1.5GB) nrp=1 limit (stage 2)	105.659	YES 0.02270
500,000,000	6.62E+005	7.66	0.021	weeks	319.383	YES 0.02400
580,087,237	9.09E+005	10.52	0.029	max p/32760K fft length (GTX480 max stage 1)	431.857	YES 0.02437
1.00E+009	2.90E+006	33.62	0.092	months; near limit CUDAPm1 supports; stage 2 req ~4GB	1305.0	YES 0.02576
2.00E+009	1.27E+007	147.45	0.404	quarter	5332.4	YES 0.02765
3.32E+009	3.76E+007	435.18	1.192	billion decimal digits; years; stage 2 ~13GB	14942.0	YES 0.02912
4.29E+009	6.50E+007	752.73	2.062	max 32-bit prime p	25175.3	YES 0.02990

Note also, finding some factors does not confirm an installation is working correctly; it may be unreliable.  
 Note finally, finding fewer factors than “expected” does not reliably indicate a problem, but might be a result of one.  
 The days/factor expected, and days/lltest, apparently are not quite the same function of exponent.  
 It makes some sense to value a LL test higher, since if correctly performed it provides conclusive primality results, in a predictable amount of time, while a P-1 effort may yield no factor and no primality information at higher run time.  
 On the other hand, a factor obtained is more information than merely “composite” or “prime”.

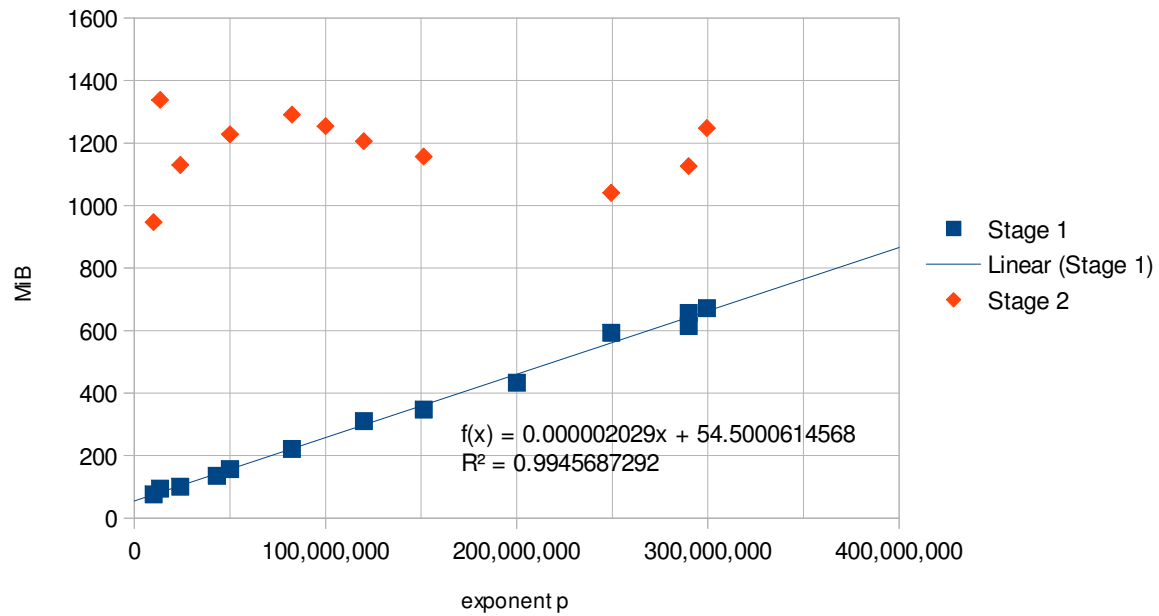


GPU memory needed per relative prime in stage 2 limits at how high an exponent stage 2 can be run

		memory usage MB binary (MiB) on 1536MB GTX480			Nrp
p	fft length K	Stage 1	Stage 2	Notes	
10,000,223	560	76	947		192
12,004,033	640				144
13,466,917	800	94	1338		192
24,036,583	1,280	100	1130		120
43,158,547	2,304	135			60
50,001,781	2,688	157	1228		48
82,388,489	4,608	221	1291		27
100,000,081	5,600		1254		20
120,002,191	7,168	310	1206		13
151,294,541	8,640	347	1157		9
200,001,187	11,200	433		no stage 2, factor found stage 1	5
249,500,501	14,336	593	1041		1
289,999,981	16,384	614	1126		1
290,001,377	16,384	656		no stage 2, 3 factors found in stage 1	
299,500,177	18,432	672	1248	warning stage 2 may use up to 1584 on gpu with 1536; stage 2 appears to fail with repeating stage-1-final residues	

(Allow for about 50MB variation)

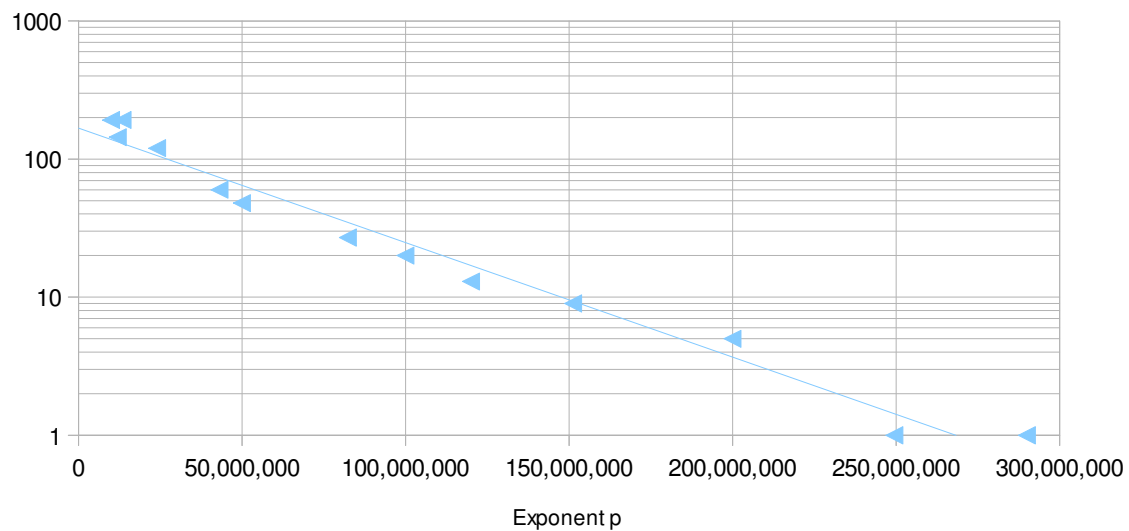
GPU memory used for CUDAPm1 vs. exponent and stage



Nrp autoselected vs exponent on GTX480

$$f(x) = 167.8288027809 \exp(-1.90936276029383E-008 x)$$

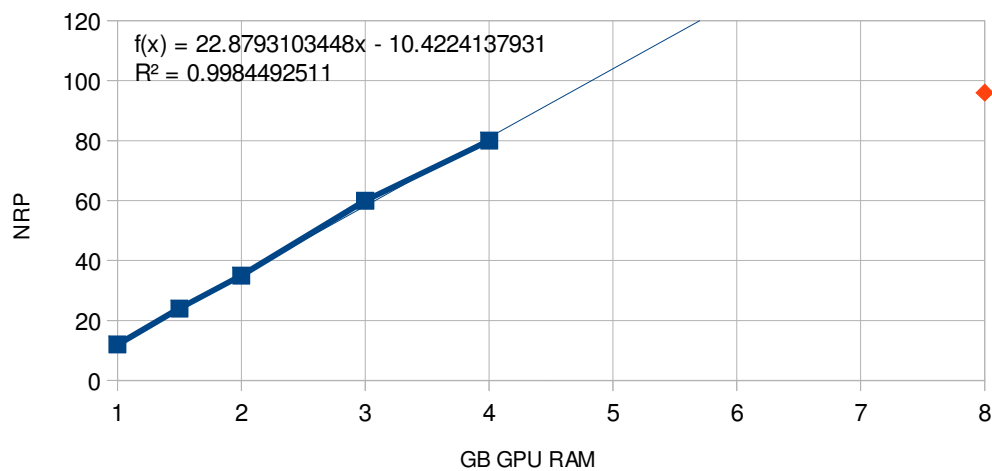
$$R^2 = 0.9751611152$$

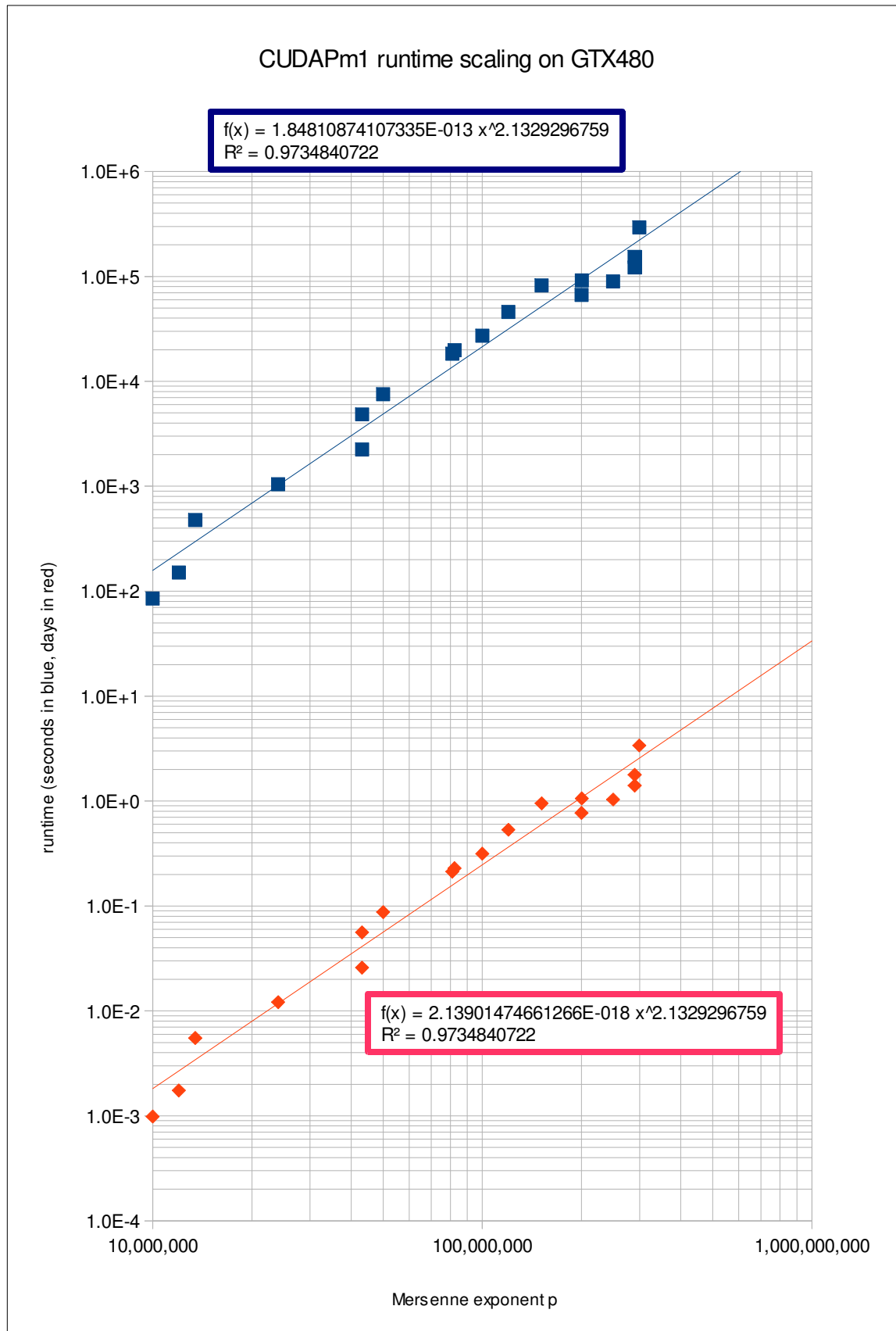


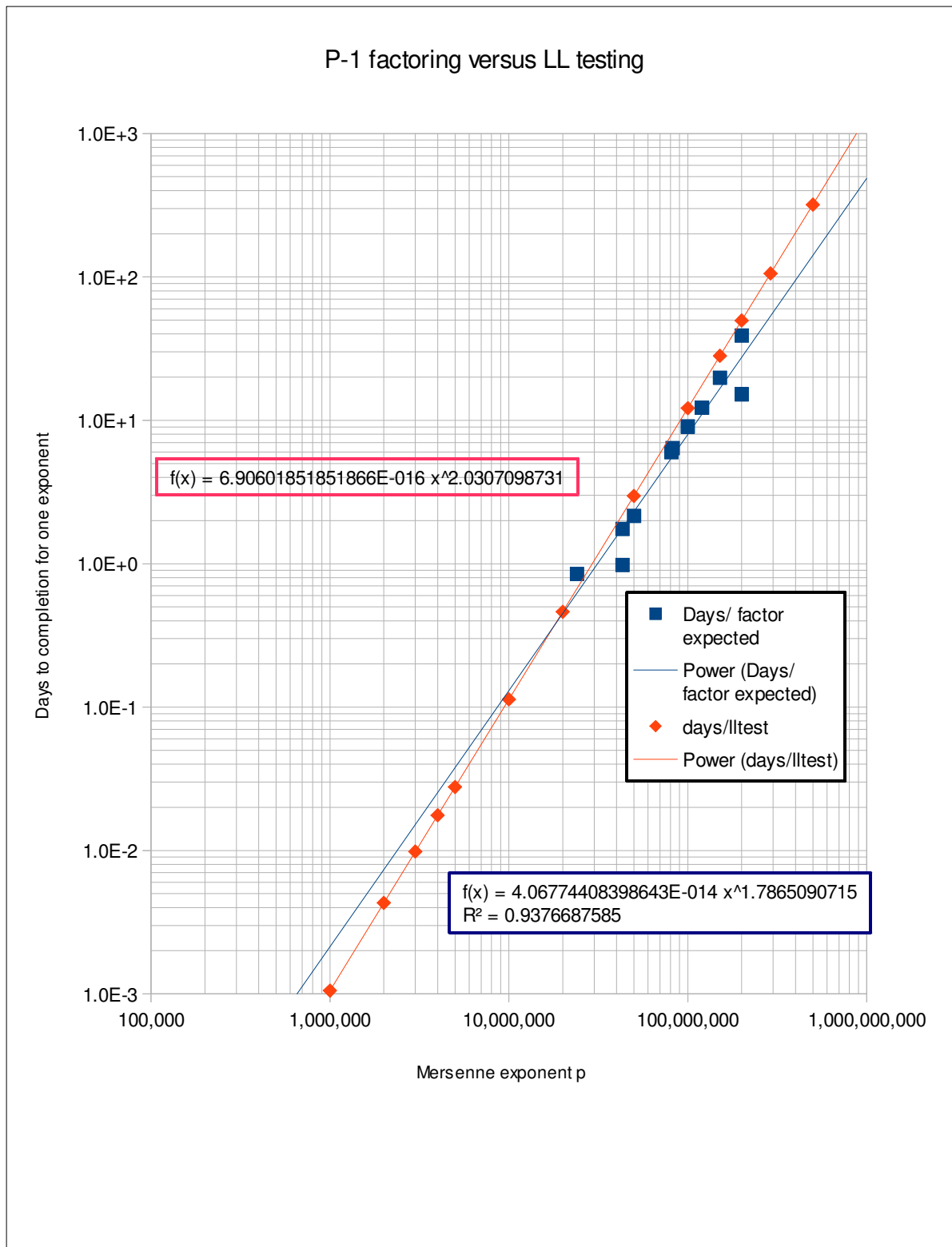
Relationship between GPU RAM and number of relative primes per pass in stage 2, p~84.8M

GPU Model	GPU RAM GB	NRP auto	Notes	480 "small" relative primes
Quadro 2000	1	12	System A RAM 12 GB, 2 other GPUs present	
GTX 480	1.5	24	System C RAM 24 GB, 1 other GPU present	
Quadro 4000	2	35	System A RAM 12 GB, 2 other GPUs present	
Quadro 5000	2.5 tbd			
GTX 1060	3	60	System A RAM 12 GB, 2 other GPUs present	
GTX 1050Ti	4	80	System B RAM 12 GB, 2 other GPUs present	
GTX 1070	8	96	System B RAM 12 GB, 2 other GPUs present	

P-1 stage 2, p~84.8M, NRP program selected vs. GPU ram size







exponent p	stage	file size B	size/exp	Size-p/8
86243	1	10884	0.126201547	103.625
110503	1	13916	0.125933233	103.125
216091	1	27112	0.12546566	100.625
1257787	1	157324	0.125080002	100.625
6972593	1	871676	0.125014611	101.875
8000023	1	1000104	0.125012641	101.125
43158547	1	5394920	0.125002355	101.625
45500071	1	5687612	0.125002266	103.125
50001781	1	6250324	0.125002027	101.375
50500003	1	6312604	0.125002052	103.625
60500029	1	7562604	0.125001659	100.375
70500007	1	8812604	0.125001463	103.125
80500001	1	10062604	0.12500129	103.875
81258773	1	10157448	0.125001248	101.375
81328081	2	10166112	0.125001253	101.875
82388489	1	10298664	0.125001249	102.875
85500001	1	10687604	0.125001215	103.875
150106423	1	18763404	0.125000674	101.125
151294541	1	18911920	0.125000677	102.375
200364299	1	25045640	0.125000512	102.625
249500221	1	31187628	0.125000402	100.375
249500501	1	31187664	0.125000406	101.375
249500501	2	31187664	0.125000406	101.375
299500177	1	37437624	0.12500034	101.875
299500177	2	37437624	0.12500034	101.875

