Qallse: Annealing Time Studies

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Setup

- Dataset : 30%(density) of tracks (Barrel)
  - create_dataset -o mydir -p ds30 -n 0.3
- Other parameters I specified
  - num_repeats = 10
  - num_reads = 10 (or 20, 30)
  - timeout = 300 (sec)
  - verbosity = 4
  - annealing_time (microsec) = 5, 10, 20, 100, 500, 1000, 1500, 2000
- Use QallseD0
- D-wave
  - DW_2000Q_2_1
  - dw_sampler: dimod.Sampler = dws.EmbeddingComposite(dws.DWaveSampler(config_file=‘mydwave.conf', permissive_ssl=True))

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How to measure “time”

I used methods of Qallse’s examples.

```
from hepqpr.qallse.other.dw_timing_recorder import solver_with_timing, TimingRecord
from hepqpr.qallse.cli.func import *

with capture_stdout(logfile):
    with time_this() as qtime_info:
        with solver_with_timing(dw_sampler, **solver_args) as (dwave_sampler, records):
            response = sampler.sample_qubo(Q, solver=dwave_sampler, **sampler_args)


print('CPU and Wall time:',qtime_info)

timing_records = [TimingRecord(r) for r in records]
print(f'total time: {sum(t.total_time for t in timing_records)}')
print(f'service time: {sum(t.service_time for t in timing_records)}')
print(f'qpu time: {sum(t.qpu_time for t in timing_records)}')
```

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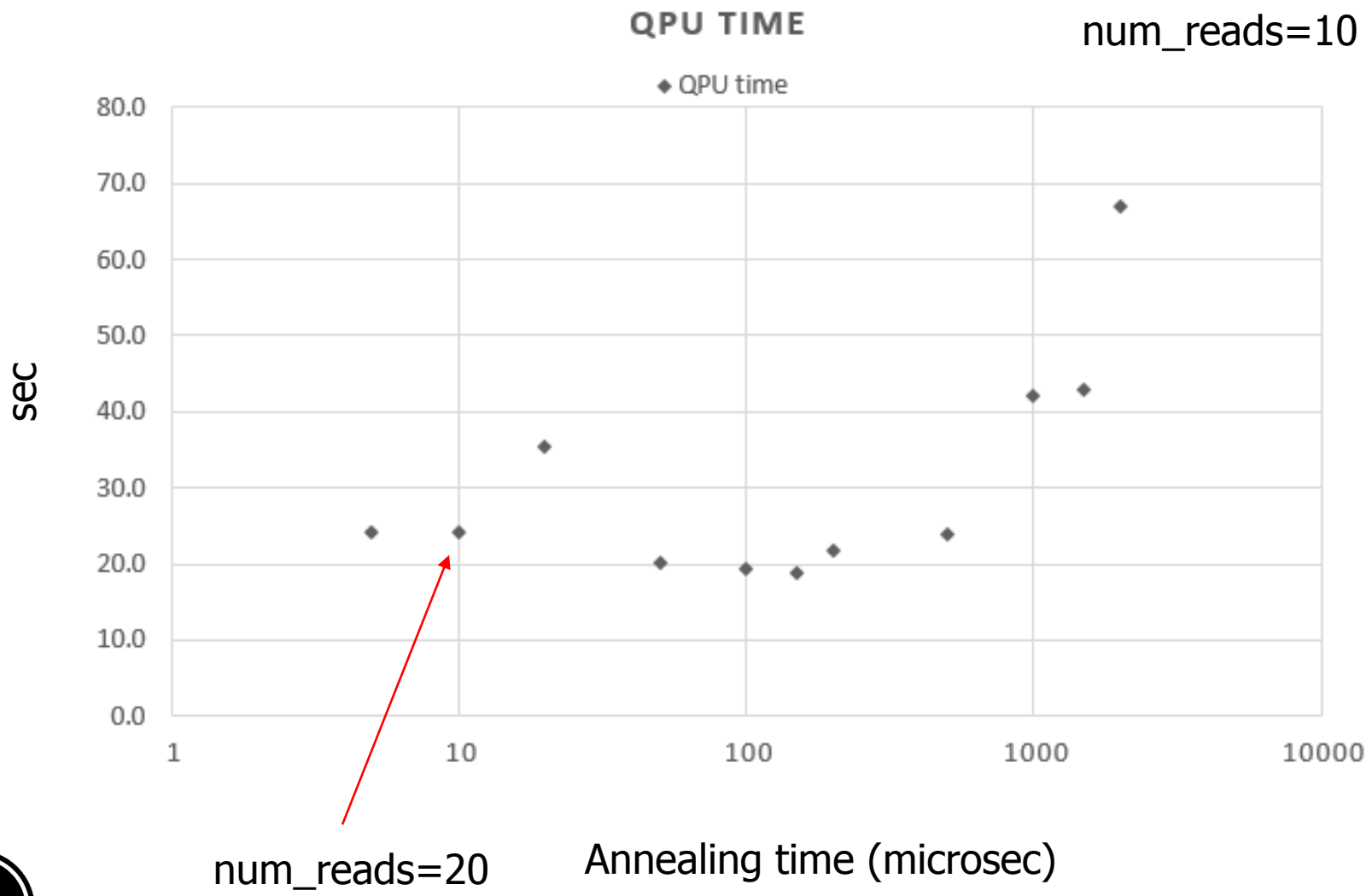
num_reads=10



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30% sample				%	%			%	(sec)	(sec)	(sec)	(sec)	(sec)	
(microsec)		energy	ideal	precisio	recall	missing doublets	tracks found	trackml score	CPU time	Wall time	total time	service time	QPU time	13 Feb maintanace
annealing time	num_reads													
5	10	-1125.36	-1125.00	97.47	97.22	43	337	96.44	128.069	1769.170	1668.172	528.651	24.2	after
5	20	-742.59	-1125.00	86.13	80.62	300	332	88.50	24.755	262.427	242.760	88.247	5.1	after
10	10	-806.00	-1125.00	87.41	84.30	243	338	90.13	124.054	1644.045	1547.374	631.528	23.6	after
10	10	-710.90	-1125.00	84.48	79.13	323	334	88.20	117.006	1226.364	1134.570	459.970	22.3	after
10	20	-1126.42	-1125.00	97.35	97.22	43	336	95.97	108.582	1381.143	1295.887	426.382	24.2	after
10	30	-1127.17	-1125.00	97.28	96.90	48	338	95.66	124.521	1380.748	1283.771	513.639	31.5	after
20	10	-1129.52	-1125.00	97.40	96.83	49	337	95.90	181.176	1973.938	1831.704	713.657	35.3	before
50	10	-1123.93	-1125.00	97.35	97.22	43	337	95.97	99.557	1123.700	1046.015	394.173	20.1	after
100	10	-1129.46	-1125.00	97.48	97.48	39	337	96.31	93.201	1193.119	1119.949	358.268	19.4	before
100	10	-1120.27	-1125.00	97.15	96.96	47	338	96.62	94.486	1374.279	1300.072	429.257	19.6	after
150	10	-1122.97	-1125.00	96.60	97.16	44	339	95.94	87.808	1101.827	1032.853	336.132	18.8	after
200	10	-1130.62	-1125.00	97.41	97.16	44	338	96.21	95.639	1216.115	1140.957	370.254	21.8	after
500	10	-1125.12	-1125.00	96.77	96.64	52	338	95.84	83.013	1012.513	947.382	335.381	24.0	before
1000	10	-1130.77	-1125.00	96.97	97.29	42	340	96.74	105.655	1208.240	1125.985	457.018	42.2	before
1500	10	-1114.24	-1125.00	96.97	97.03	46	337	96.06	84.355	1082.779	1016.499	386.097	42.8	before
2000	10	-1125.13	-1125.00	97.34	96.96	47	336	95.55	110.188	1300.180	1214.070	481.928	67.1	after

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