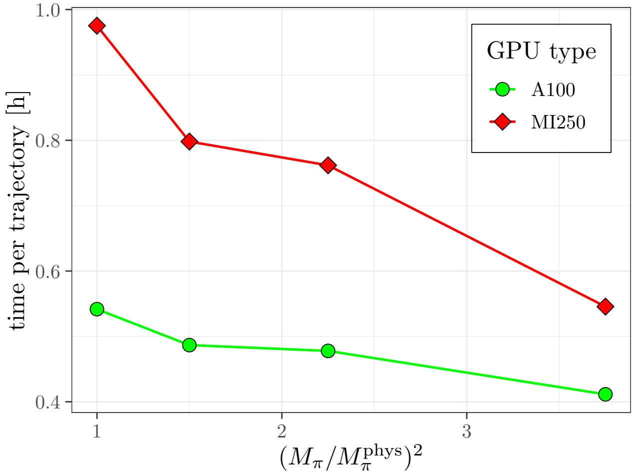
What about performance-portability?

MI250 PRELIMINARY

Single-node comparison on a $32^3 \times 64$ lattice, running on

- Juwels Booster ($4\times$ A100)
- Jureca DC-MI200 ($4\times$ AMD MI-250, `ROCm 5.2.0`, still being fine-tuned!).



(full HMC run, thermalised configuration, comparable acceptance rate)

$(M_\pi/M_\pi^{\mathrm{phys}})^2$	time A100 [h]	time MI250 [h]	ratio
3.75	0.411	0.546	1.33
2.25	0.478	0.762	1.59
1.50	0.487	0.798	1.64
1.00	0.542	0.975	1.80

- Time investment (for us)[a]:
  - 2-3 hours to adjust tmLQCD build system & compile code
  - few hours with JSC admins and AMD experts to resolve a few ROCm issues
  - ! get an HMC which runs on MI-250 and is *at most* a factor of 2 slower even at the physical point (at least on a single node) $\rightarrow$ excellent!

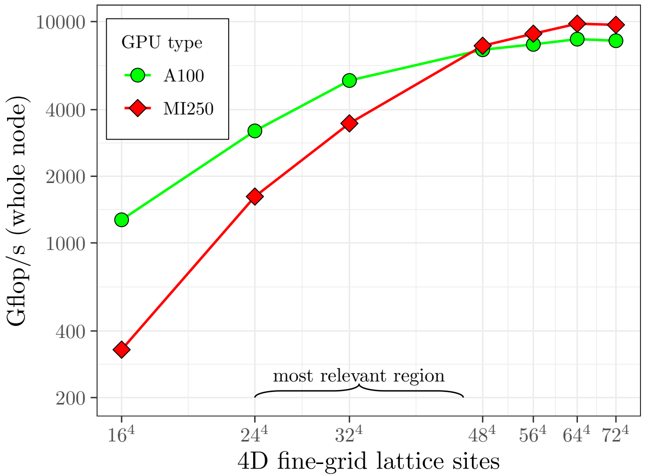
[a] major thanks to Bálint Joó (ORNL) and QUDA devs for many many of hours of effort which make this possible!

Origin of the performance difference?

Fine-grid operator benchmark (single precision)

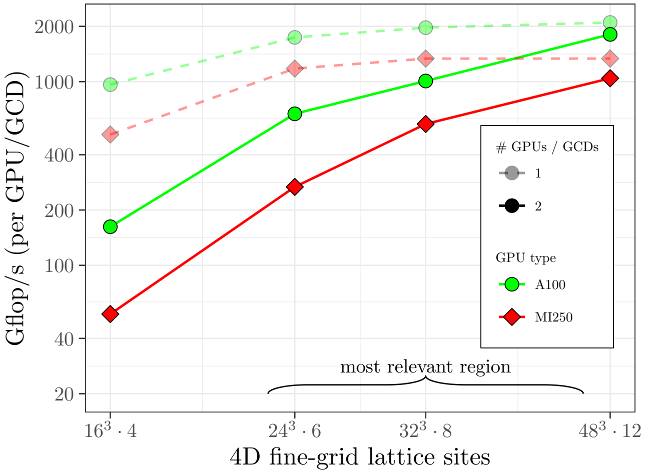
MI250 PRELIMINARY

full node (4 A100 GPUs / 8 MI250 GCDs)



- single node fine-grid operator performance up to factor 3 lower in region of highest relevance
- large local lattice: slightly faster than A100

single GPU/GCD vs. 2 GPUs/GCDs (strong scaling)



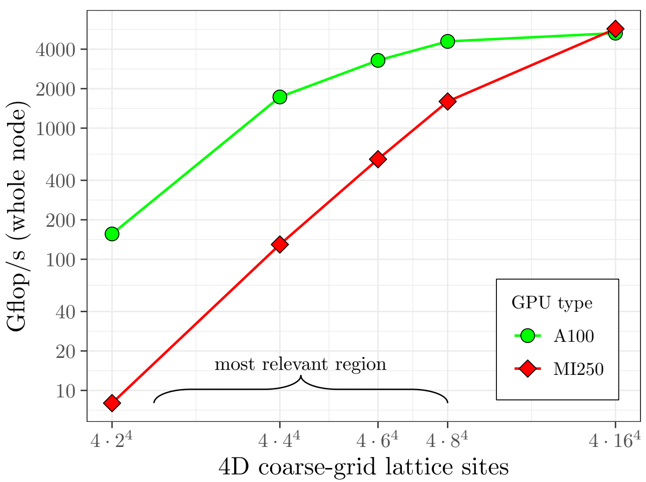
- single GPU / single GCD performance (dashed, semi-transparent) vs. 2 GPUs / 2 GCDs
  - exchange overhead apparently higher than for A100 even on same MCM (`HIP_VISIBLE_DEVICES=0,1`)

Origin of the performance difference?

Coarse-grid operator benchmark (single precision, 24 colours)

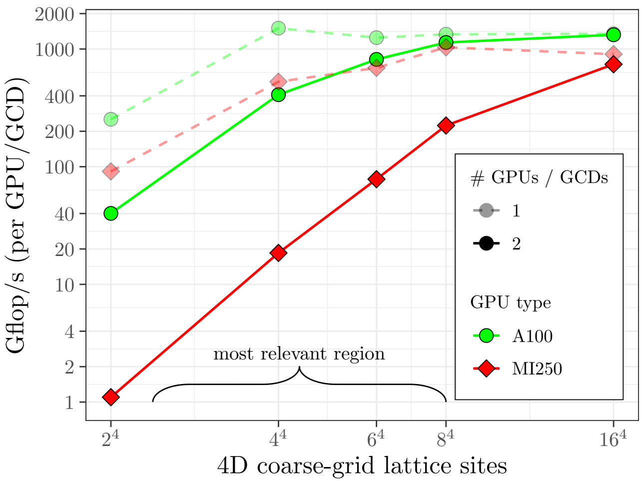
MI250 PRELIMINARY

full node (4 A100 GPUs / 8 MI250 GCDs)



- single node coarse-grid operator performance up to factor 10 lower in region of highest relevance

single GPU/GCD vs. 2 GPUs/GCDs (strong scaling)



- single GPU / single GCD performance (dashed, semi-transparent) vs. 2 GPUs / 2 GCDs
  - major exchange overhead even on same MCM (`HIP_VISIBLE_DEVICES=0,1`)