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# Multi-threaded Geant4 on Intel Many Integrated Core architectures

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Starting from Geant4 Version 10.x : focus on parallelism

- Multi-threading: **memory reduction** (factor 10 w.r.t. multi-process) achieved
- Lock free event loop: **almost perfect scalability** (>90% linearity) with large number of threads
- Hybrid MPI/MT jobs: **achieved on very large number of workers** (256k total threads)
  - Test jobs on hybrid host/KNC shows good results

KNC supported since few years, preliminary tests on KNL confirm scaling and memory reduction

- **Factor 3 speedup w.r.t. KNC achieved**
- Simplified workflow and access to large DDR3 memory: more complex jobs possible

**Started testing on SuperComputers** with massive parallelism (MIRA@ANL):

- With more than ~100k workers I/O is limiting scaling (not specific to G4): plans to mitigate effect are in place
- Next generation of SuperComputers based on KNL: Theta@ANL, CoriII@NERSC
  - Getting ready to run complex simulations!