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Numerical multi-loop integration on heterogeneous many-core processors

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We report on multi-loop integral computations executed on a PEZY/Exascale large-scale (immersion cooling) computing system. The programming model requires a host program written in C++ with an OpenCL kernel. However the kernel can be generated by the Goose compiler interface, which allows parallelizing loops according to compiler directives. As an advantage, the executable derived from a program instrumented with Goose pragmas can be run on multiple devices and multiple nodes without changes to the program. We use lattice rules and lattice copy (composite) rules on PEZY to approximate integrals for multi-loop self-energy diagrams with and without masses.

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