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Making extreme computations possible with virtual machines

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State-of-the-art algorithms generate scattering amplitudes for high-energy physics
at leading order for high-multiplicity processes as compiled code (in Fortran, C or C++). For complicated processes the size of these libraries can become tremendous (many GiB). We show that amplitudes can be translated to byte-code instructions, which
even reduce the size by one order of magnitude. The byte-code is interpreted
by a Virtual Machine with runtimes comparable to compiled code and a better scaling with additional legs. We study the properties of this algorithm, as an extension of the
Optimizing Matrix Element Generator (O'Mega). The bytecode matrix elements are available
as alternative input for the event generator WHIZARD. The bytecode interpreter can be
implemented very compactly, which will help with a future implementation on
massively parallel GPUs.

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