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Explorations of the viability of ARM and Intel Xeon Phi for Physics Processing

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In the last decade power limitations led to the introduction of multicore CPU's. The cores on the processors were however not dramatically different from the processors just before the multicore-era. In some sense, this was merely a tactical choice to maximize compatibility and buy time. The same scaling problems that led to the power limit are likely to push processors in the direction of ever greater numbers of simpler, less performant lower-power cores. Without this architectural change, it is doubtful if the gains expected from a Moore's Law extrapolation will continue to be realized over the next five years.

Although it is very hard to predict where the market will wind up in the long run, we already see today a couple of concrete product examples which give indications as to the kinds of things that we will see going forward, namely Intel's Many Integrated Core (MIC) architecture and the ARM processor. The first MIC commercial products (Xeon Phi) are in the form of a coprocessor and aimed at the HPC market. 32bit ARM is ubiquitous today in mobile electronics and the 64bit version (ARMv8) is expected to make a debut in the server space this year.

In this presentation we report on our first investigations into the viability of the ARM processor and Intel Xeon Phi processors. We use benchmarks with real physics applications and performance profiles to explore the viability of these processors for production physics processing. We investigate what changes would be necessary for complete, large applications to perform efficiently and in a scalable way on these kind of processors.

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