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Now that we are ready for Exascale, what can we do with it? PIconGPU for next generation accelerator research.

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PIconGPU, like many other codes, is ready for the next Exascale supercomputers. Heterogeneous programming as the main ingredient enables effective use of these machines. Important challenges still ahead are timely analysis of large scale simulation data and complex workflows for multi-physics simulations and machine learning.

As experimental capabilities progress and high-repetition rate sources have become widely available, the role of simulations is shifting. Predictive capabilities are put to the test more often than ever. While simulations for high intensities still push the boundaries of known physics, the task to predict experimental outcomes for sources existing now has become more and more pressing.

The question arises which steps will be necessary to achieve good comparison with experiments. We will present our approach to work closely with experiment, lessons learned from this approach, what can be done better and how Exascale computing might help.

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