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Shedding new light on high energy density physics

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In this talk we will introduce recent developments in studying high energy density physics with Exascale simulations. Specifically, we will focus on new capabilities of the PIconGPU simulation code and its use to study the interaction of high power lasers with solid density matter. In all of these cases, the laser power irradiating the target exceeds values that drive relativistic electrons into the material, creating a situation where the material can even become relativistically transparent. We discuss several applications, from laser-driven compact particle accelerators to studying direct drive fusion to showcase where the use of high performance computing helps to shed new light on high energy density physics.

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