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Abstract for an Invited Paper
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(Extreme) Core-collapse Supernova Simulations

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In this talk I will present recent progress on modeling core-collapse supernovae with massively parallel simulations on the largest supercomputers available. I will discuss the unique challenges in both input physics and computational modeling that come with a problem involving all four fundamental forces and relativistic effects and will highlight recent breakthroughs overcoming these challenges in full 3D simulations. I will pay particular attention to how these simulations can be used to reveal the engines driving some of the most extreme explosions and conclude by discussing what remains to be done in simulation work to maximize what we can learn from current and future time-domain astronomy transient surveys.