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The impact of rotation and the nuclear equation of state on core-collapse supernova explosion dynamics

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Explosive massive stars are powerful emitters of gravitational waves. In the last 10 years, significant progress has been made in understanding the characteristics of their gravitational-wave emission. However, better coverage of the core-collapse supernova progenitor parameter space is still needed to fully understand the gravitational-wave detection prospects, the explosion dynamics, and the birth properties of neutron stars and black holes. Here we show results from 150 supernova simulations with progenitor star masses between 9 and 36 solar masses, 3 nuclear equations of state, and a variety of different rotation rates. We describe the impact of the rotation and equation of state on the explosion dynamics and remnant birth properties. We describe the differences in the gravitational-wave emission, and discuss the detection prospects for next generation ground and space observatories.

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