## Advancing gravitational wave predictions from cosmological first-order phase transitions



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## **Bubble wall velocity from hydrodynamics**

Terminal velocity of bubble walls in cosmological first-order phase transitions is a key parameter affecting both the primordial gravitational wave signal and baryon asymmetry production in electroweak baryogenesis. In this talk, I present recent results showing that, under local thermal equilibrium, pure hydrodynamic backreaction can lead to steady-state expansion, as confirmed by numerical simulations. However, this is not generic. Runaways are more common, as bubble walls often reach supersonic velocities before the fluid shell forms. To capture this effect, we extend analytical methods beyond local equilibrium and provide a criterion to identify physical detonations, with important consequences for cosmological observables.

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