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Towards an all-orders calculation of the electroweak bubble wall velocity

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In this talk, I discuss work where we calculate the velocity of the Higgs condensate bubble wall during a first-order electroweak phase transition in the early Universe. The interaction of particles with the bubble wall can be accompanied by the emission of multiple soft gauge bosons. When computed at fixed order in perturbation theory, this process exhibits large logarithmic enhancements which must be resummed to all orders when the wall velocity is large. In this work, we perform this resummation both analytically and numerically at leading logarithmic accuracy. The numerical simulation is achieved by means of a particle shower in the broken phase of the electroweak theory. The two approaches agree to the 10% level. For fast-moving walls, we find the scaling of the thermal pressure exerted against the wall to be P˜γˆ2Tˆ4. This is impactful for baryogenesis, gravitational wave radiation and the generation of other cosmic relics.

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