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Common Envelope Wind Tunnel: The Effects of Binary Mass Ratio and Implications for the Accretion-Driven Growth of LIGO Binary Black Holes SOUMI DE, Syracuse University, USA, MORGAN MACLEOD, Harvard-Smithsonian Center for Astrophysics, USA, ROSA EVERSON, University of California, Santa Cruz, USA, ANDREA ANTONI, University of California, Berkeley, USA, ILYA MANDEL, Monash University, Australia, ENRICO RAMIREZ-RUIZ, University of California, Santa Cruz, USA — With the impressive number of binary black hole and binary neutron stars mergers observed by the LIGO-Virgo detector network in the recent years, it is now important to understand the formation channels of these systems. This talk focuses on the common envelope phase, crucial to the formation of compact object binaries. During this phase, the two companions evolve inside a shared envelope, with the secondary object orbiting towards the core of the primary star. The secondary object interacts with the envelope's fluid material flowing past it, giving rise to drag forces that pull the two stellar cores into a tighter orbit. Additionally, the embedded object can be modified by accretion from the flow around it. We present results from three-dimensional hydrodynamical simulations modeling the common envelope inspiral phase using the the "wind tunnel" formalism, and highlight the effects of the full set of flow parameters on accretion and drag forces in these episodes. We point to the key role of the coupled effect of accretion and drag coefficients in modulating the transformation of binaries in common envelope phases, and discuss our understanding of the effect of this phase on the properties of stellar-mass black hole populations.

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