

Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

How neotropical hummingbird versus bat species generate lift to hover¹ RIVERS INGERSOLL, DAVID LENTINK, Stanford University — Both hummingbirds and nectar bats evolved the ability to hover in front of flowers providing them access to energy rich nectar. Hummingbirds have been found to generate more than a quarter of their weight support during the upstroke by inverting their wings—much more than generalist birds during slow hovering flight. In contrast to hummingbirds, bats have membrane wings which they partially fold during the upstroke. It has been hypothesized that bats generate some vertical lift force during the upstroke although the complex wake structures make it hard to quantify upstroke function through flow measurement. To compare the kinematics and aerodynamic forces generated by both groups, we caught and trained over 100 individuals spanning 18 hummingbird and 3 bat species in Coto Brus, Costa Rica. We used 3D calibrated high-speed cameras to measure wingbeat kinematics and a novel aerodynamic force platform to measure the instantaneous vertical lift force *in vivo*. This data gives us new insight into how ecology shapes the evolution of hovering flight across taxa in the same ecosystem.

¹This research is supported by NSF CAREER Award 1552419 and the KACST Center of Excellence for Aeronautics and Astronautics at Stanford.

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Date submitted: 26 Jul 2017

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