Hydrodynamic Spin States ANAND OZA, RODOLFO ROSALES, JOHN BUSH, Massachusetts Institute of Technology — We present the results of a theoretical investigation of droplets walking on a vibrating fluid bath. The droplet's trajectory is described in terms of an integro-differential equation that incorporates the influence of the propulsive force generated by its monochromatic guiding wave. A stability analysis of orbital solutions shows that walkers may execute stable circular orbits in the absence of an external force. When subjected to rotation, these hydrodynamic spin states exhibit a macroscopic analogue of Zeeman splitting. We conclude by presenting the stability analysis for a pair of orbiting walkers, and compare our results to recent laboratory experiments.

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