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Realization of a Brownian Motor through Real Time Feedback Control GOVIND PANERU, Center for Soft and Living Matter, Institute for Basic Science (IBS), Ulsan 44919, Republic of Korea, DONG YUN LEE, Department of Structure and Constituents of Matter, University of Barcelona, Barcelona 08028, Spain, HYUK KYU PAK, IBS Center for Soft and Living Matter and Department of Physics, Ulsan National Institute of Science and Technology, Ulsan 44919, Republic of Korea — Recent studies on the relation between information and thermodynamics showed that in the presence of a feedback control, an information quantity known as mutual information, should be included in describing non-equilibrium dynamics of fluctuating systems. Here, we have designed an information engine that consists of a colloidal particle in a single heat bath. The engine is capable of transporting the particle along one direction by utilizing the information about the microscopic state of the system. This one way transportation of the particle behaves as a Brownian motor. We measured the average extracted work for various cycle time τ and found that the average extracted work per engine cycle increases with increasing τ, and for large τ, our system is capable of achieving an upper bound of the extractable work. We have also investigated the relation between the average transport velocity and the extracted work. For a given τ, the average transport velocity is limited by the amount of extracted work or the net available information.

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