

## **Ratchets: from driven and noisy to stationary and deterministic optical ratchets.**

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A ratchet effect occurs when an unbiased external medium (having here the restricted meaning of zero spatial and temporal averaging of external forces) is nonetheless able to induce motion in a preferred direction. Hence, the system can overcome a small bias against the preferred direction of motion: these systems are remarkable rectifiers, and the number of their applications is overwhelming. In 1D, most ratchets fall under the general (non-exclusive) categories of pulsating or tilting ratchets. On the other hand, in 2D there are forces which don't derive from a potential, and hence a stationary (non-driven) and purely deterministic ratchet is allowed. An example is shown which makes use of optical vortices.