

Abstract Submitted
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A New Paradigm for Nanoparticle Biosensing: Magnetically Driven Critical Phase Slipping BRANDON H MCNAUGHTON, RAOUL KOPELMAN, University of Michigan, Applied Physics Program; University of Michigan, Chemistry — Could a single opto-magnetic micro or nanoparticle be used as a noninvasive nanobiosensor? In this work, we imitated micro-organism or bacteria sensing by binding a micron sized sphere to a larger rotating magnetic particle. The magnetic particle exhibits a nonlinear rotational behavior that marks a crossover from phase-locking to phase slipping with a remote rotating magnetic field. This critical transition is very sensitive to volume and shape changes, allowing for the detection of an attaching particle or biomolecule. Further miniaturization, combined with the remote sensing ability of this probe, could allow for measurements of viruses or biomolecules like DNA or proteins in a variety of environments, including closed biological systems.

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