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Dynamic Detection of a Single Bacterium: Nonlinear Rotation Rate Shifts of Driven Magnetic Microspheres BRANDON H. MCNAUGHTON, RODNEY R. AGAYAN, RAOUL KOPELMAN, University of Michigan — We report on a new technique which was used to detect single Escherichia coli that is based on the changes in the nonlinear rotation of a magnetic microsphere driven by a magnetic field. The presence of one Escherichia Coli bacterium on the surface of a 2.0 micron magnetic microsphere (with an aluminum "nanocap" that indicates the microsphere's orientation) caused an easily measurable change in the drag of the system and, therefore, in the nonlinear rotation rate. The straight-forward measurement uses standard microscopy techniques and the observed average shift in the nonlinear rotation frequency changed by a factor of $\sim$3.8 (Arxiv preprint cond-mat/0610144). Further miniaturization will allow for dynamic detection of viruses and potentially even biomolecules in fluidic environments.

[X] Prefer Oral Session
[ ] Prefer Poster Session

Brandon H. McNaughton
bmcnaugh@umich.edu
University of Michigan

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