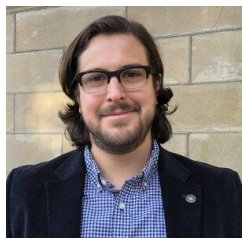


THE DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING SPEAKER SERIES

PRESENTS

Quantum tools for molecular microscopy



Mikael Backlund
Assistant Professor
Department of Chemistry, UIUC.

Monday, 04.05.2021, 9:55am

Zoom link: <https://uofh.zoom.us/j/99583104107>

LECTURE ABSTRACT

We are a new physical chemistry lab at UIUC broadly interested in developing quantum sensing methods for applications in the molecular sciences. In this talk I will primarily discuss two studies from my previous work that set the stage for my independent lab's ongoing and future research. First, I will discuss how framing single-molecule fluorescence microscopy as an exercise in quantum parameter estimation can yield surprising insights. Then I will describe how we leverage nitrogen-vacancy color centers in diamond to perform micro- and nanoscopic magnetometry.

References:

- M. P. Backlund, P. Kehayias, R. L. Walsworth, "Diamond-based magnetic imaging with Fourier optical processing," *Phys. Rev. Appl.* 8, 054003 (2017).
M. P. Backlund, Y. Shechtman, R. L. Walsworth, "Fundamental precision bounds for three-dimensional optical localization microscopy with Poisson statistics," *Phys. Rev. Lett.* 121, 023904 (2018).
D. B. Bucher, D. P. L. A. Craik, M. P. Backlund, M. J. Turner, O. Ben Dor, D. R. Glenn, R. L. Walsworth, "Quantum diamond spectrometer for nanoscale NMR and ESR spectroscopy," *Nature Protocols*, 14, 2707-2747 (2019).

SPEAKER BIOSKETCH

Professor Backlund received his B.S. in Chemistry with a minor in Math from the University of California, Berkeley in 2010. He then pursued his graduate studies at Stanford University as a Robert and Marvel Kirby Stanford Graduate Fellow, where he conducted research in the lab of W. E. Moerner. After earning his Ph.D. in Chemistry (with concentration in Chemical Physics) in 2016, he joined the lab of Ron Walsworth as a postdoctoral fellow in the Division of Atomic and Molecular Physics at the Harvard-Smithsonian Center for Astrophysics and the Department of Physics at Harvard University. Prof. Backlund joined the faculty at UIUC in 2020.

Please contact Dr. Xiaonan Shan (xshan@central.uh.edu) to request 1 on 1 online meeting.

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