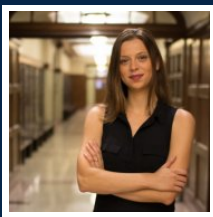


# Can We Make Better Antibiotics With Information From Nonlinear Laser Microscopes?



Tessa Calhoun  
Assistant Professor of Chemistry

## CURRENT RESEARCH

### Laser Microscopes Seeing the Unseen

The Calhoun Lab uses short laser pulses to take pictures of the unseen, so they can show how molecules behave, and how we can optimize their performance. Most research microscopes make use of fluorescence to create images; some molecules will glow and others will not. Nonlinear microscopy uses femtosecond (a millionth of a billionth of a second) laser pulses to map molecules and phenomena that can't be seen using fluorescence.

"When you work with light like that, all sorts of things you don't encounter in the normal world can happen," said Dr. Tessa Calhoun of the University of Tennessee, Knoxville.

While a lot of time in the Calhoun Lab is spent developing custom instruments used to perform the experiments, the group is an interdisciplinary team that applies these capabilities to the study of biological systems. The Calhoun Lab is analyzing the behavior of antibiotics by incubating the small molecule drugs with bacterial and fungal cells and taking images of the resulting interactions. One antibiotic under investigation has been clinically used for over 50 years with limited clinical resistance. To be able to see the path of delivery for the drug, and other ways it interacts with the cell membrane, with nonlinear microscopy would allow other, more effective antibiotics to be developed.

The images can show researchers information about the interplay between the drug molecules and the living cells that defy previous theories about the way individual antibiotics work. Not only will the lab be able to see how the drugs are delivered, they will be able to create guidelines on how to manipulate future antibiotics in ways that weren't conceivable before. For example, understanding the...

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## AFFILIATION

The University of Tennessee, Knoxville

## EDUCATION

- Ph.D. University of California, Berkley
- Lewis-Sigler Fellow (postdoc), Princeton University
- BS, Chemistry from Iowa State University

## RESEARCH AREAS

Technology, Chemistry

## FUNDING REQUEST

The Calhoun Lab would like to support one graduate student on each of the projects listed above. Support for each student is approximately \$50k/year. In addition, \$100k/year would support the purchase of new equipment and supplies to grow the lab and explore new projects.