



ERIC BETZIG, PH.D.

IMAGING LIFE AT HIGH SPATIOTEMPORAL RESOLUTION

APRIL 28, 2016

4:00 P.M.

208 LIGHT HALL



Upcoming Discovery Lecture:

CRAIG B. THOMPSON, M.D.

President and CEO, Memorial Sloan Kettering Cancer Center

May 5, 2016

208 Light Hall / 4:00 P.M.

SPONSORED BY:

SPONSORED BY CELL AND DEVELOPMENTAL BIOLOGY
(CDB DISTINGUISHED SPEAKER)
AND VANDERBILT BIOPHOTONICS CENTER

VANDERBILT  UNIVERSITY
MEDICAL CENTER

ERIC BETZIG, PH.D.

**GROUP LEADER, JANELIA RESEARCH CAMPUS
HOWARD HUGHES MEDICAL INSTITUTE
INVESTIGATOR, HHMI
MEMBER, NATIONAL ACADEMY OF SCIENCES
NOBEL PRIZE IN CHEMISTRY, 2014**



IMAGING LIFE AT HIGH SPATIOTEMPORAL RESOLUTION

As our understanding of biological systems has increased, so has the complexity of our questions and the need for more advanced optical tools to answer them. For example, there is a hundred-fold gap between the resolution of conventional optical microscopy and the scale at which molecules self-assemble to form sub-cellular structures. Furthermore, as we attempt to peer more closely at the dynamic complexity of living systems, the actinic glare of our microscopes can adversely influence the specimens we hope to study. Finally, the heterogeneity of living tissue can seriously impede our ability to image at high resolution, due to the resulting warping and scattering of light rays. I will describe three areas focused on addressing these challenges: super-resolution microscopy for imaging specific proteins within cells down to near-molecular resolution; plane illumination microscopy using non-diffracting beams for noninvasive imaging of three-dimensional dynamics within live cells and embryos; and adaptive optics to recover optimal images from within optically heterogeneous specimens.

Eric Betzig obtained a BS in Physics from Caltech and a Ph.D. in Applied Physics at Cornell. In 1988, he became a PI at AT&T Bell Labs where he extended his thesis work on near-field optical microscopy, the first method to break the diffraction barrier. By 1993, he held a world record for data storage density, and recorded the first super-resolution fluorescence images of cells as well as the first single molecule images at ambient temperature. Frustrated with technical limitations and declining standards as more jumped into the field, he quit science and by 1996 was working for his father's machine tool company. Commercial failure of the technologies he developed there left him unemployed in 2003 and looking for new directions. This search eventually culminated in his co-invention of the super-resolution technique PALM with his best friend, Bell Labs colleague Harald Hess. For this work, he is co-recipient of the 2014 Nobel Prize in Chemistry. Since 2005, he has been a Group Leader at the Janelia Research Campus, developing new optical imaging technologies for biology.
