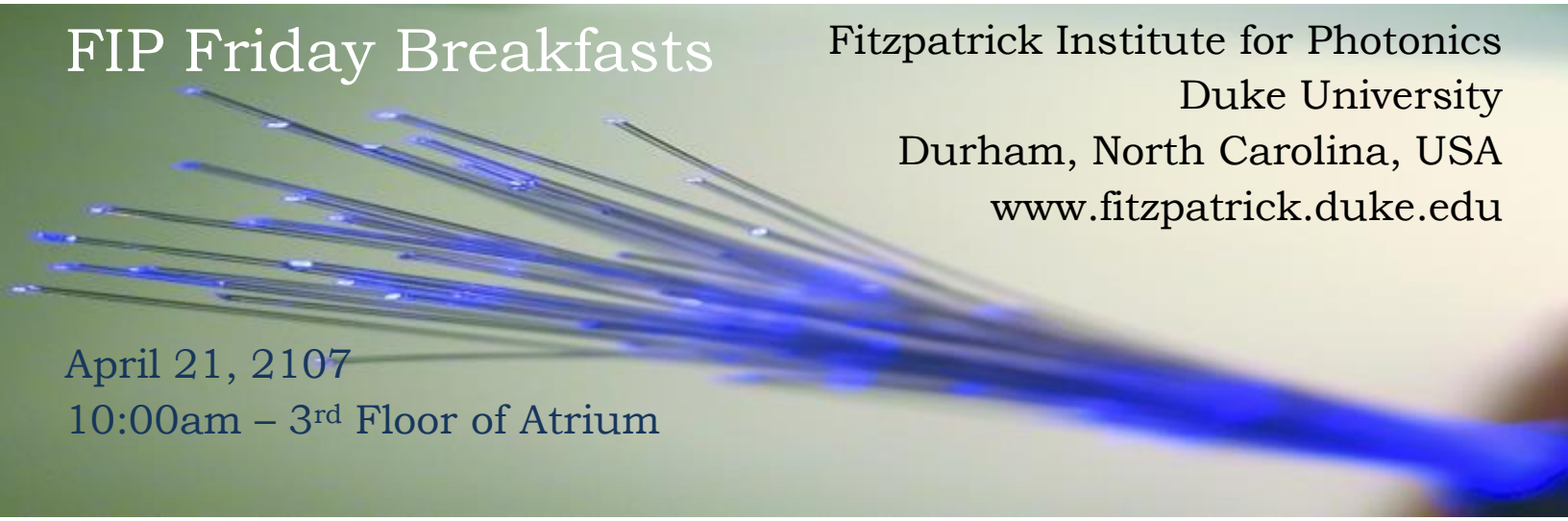

FIP Friday Breakfasts

Fitzpatrick Institute for Photonics
Duke University
Durham, North Carolina, USA
www.fitzpatrick.duke.edu

April 21, 2107
10:00am – 3rd Floor of Atrium

FIRST PLACE WINNER
OF POSTER SESSION AT 2017 FIP SYMPOSIUM

The atomic AC Stark shifts in an optical dipole trap

Margaret E. Shea, James A. Joseph, Paul M. Baker, Jungsang Kim, and Daniel J. Gauthier

Currently, there is great interest in utilizing the optical dipole force (ODF) to trap single neutral atoms for quantum information processes. One issue that arises when using the ODF is that the atomic energy levels experience quantum number dependent energy shifts. Precise knowledge of these so called AC-Stark shifts is necessary for spectroscopic interrogation of the trapped atoms and use of the atoms as quantum bits. Here we present a theoretical calculation of these shifts as they pertain to our experimental setup. We describe our formalism and discuss how these shifts affect the fluorescence rate of the trapped atom(s) and accurate atomic state detection. We also report on our experimental progress towards measuring these shifts in our setup.