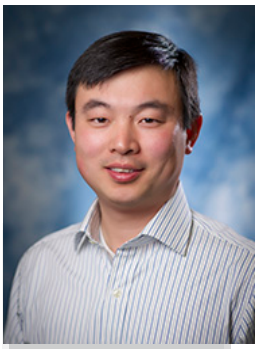
UNIVERSITY OF LOUISVILLE

COLLEGE OF ARTS & SCIENCES

Department of Chemistry

Brown and Williamson Series

Friday, September 20, 2019
@12:30 pm
Chemistry Building, LL-16



Qi Zhang, PhD

University of North Carolina at Chapel Hill

Unveiling the "Invisible" Regulatory States in RNA

ABSTRACT: RNA folds and balances between distinct conformational states for function. Riboswitches, a class of non-coding regulatory RNAs composed of a ligand-sensing domain and an expression platform, are known to control gene expression by folding into alternative conformations upon specific recognition of cellular cues. However, a molecular understanding of the dynamic interplay between the sensing domain and the expression platform that underlies riboswitch regulation remains elusive. Here, by developing and applying nucleic-acid-optimized chemical exchange saturation transfer (CEST) NMR spectroscopy, together with mutagenesis and functional measurements, we show that conformational kinetics of the riboswitch serves as a new layer of regulation, where ligand-dependent accessibility of a low-populated and short-lived RNA state guides distinct co-transcriptional folding pathways to direct gene expression outcome. Our results provide an integrated molecular mechanism for transcriptional riboswitches and exemplify a new mode of ligand-dependent RNA regulation.

BIO: Dr. Qi Zhang is an Associate Professor of Biochemistry and Biophysics, and co-director of the Biomolecular NMR Core Laboratory at University of North Carolina at Chapel Hill. Dr. Zhang obtained his B.S. degree from Fudan University in 2001 and his Ph.D. degree from University of Michigan – Ann Arbor, USA in 2007. From 2007 to 2011, Dr. Zhang was a Baltimore Family Postdoctoral Fellow of the Life Sciences Research Foundation at University of California, Los Angeles. In 2012, Dr. Zhang started his independent research at University of North Carolina at Chapel Hill, focusing on developing and applying NMR, together with computational and biochemical methods to understand non-coding RNA functions.