ATOMISTIC BASIS FOR THE ON-OFF SIGNALING MECHANISM IN RIBOSWITCHES. Donald Hamelberg, Department of Chemistry, Georgia State University, P. O. Box 4098, Atlanta, Georgia 30302-4098

Many bacterial genes are controlled by metabolite sensing motifs known as riboswitches, normally located in the 5' un-translated region of their mRNAs. Small molecular metabolites bind to the aptamer domain of riboswitches with amazing specificity, modulating gene regulation in a feedback loop as a result of induced mRNA degradation or conformational changes in the expression platform. We will discuss the results of molecular dynamics simulation studies of the SAM-II and *glmS* riboswitches, two riboswitches with very different mechanisms of action. The *glmS* riboswitch is believed to exploit a general acid-base catalytic mechanism in the presence of glucosamine-6-phosphate (GlcN6P) to accelerate self-cleavage by ~6 orders of magnitude, while S-adenosylmethionine (SAM) binding to the SAM-II riboswitch alters the curvature and base-pairing of the expression platform. The role and specificity of GlcN6P and SAM in the *glmS* and SAM-II riboswitches, respectively, will also be discussed.