Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

On the dephasing of genetic oscillators DAVIT POTOYAN, PETER WOLYNES, Rice University — The digital nature of genes combined with the associated low copy numbers of proteins regulating them is a significant source of stochasticity, which affects the phase of biochemical oscillations. We show that unlike ordinary chemical oscillators the dichotmoic molecular noise of gene state switching in gene oscillators affects the stochastic dephasing in a way that may not always be captured by phenomenological limit cycle based models.Through simulations of a realistic model of the $NFB\kappa B/I\kappa B$ network we also illustrate the dephasing phenomena which are important for reconciling single cell and population based experiments on gene oscillators.

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Date submitted: 15 Nov 2013 Electronic form version 1.4