Abstract Submitted
for the NWS19 Meeting of
The American Physical Society

Live or dead? Eliciting the stochastic nature of antibiotic survival
SHAHLA NEMATI, ANDREAS. E VASDEKIS, University of Idaho — Isogenic bacterial populations show significant phenotypic heterogeneity between individual cells. Phenotypic diversity, such as differences in growth rates and division lifetimes that vary widely between cells under identical conditions, can be responsible for genetically independent mechanisms of antibiotic survival. In our work, we focus on single cell observations of Escherichia coli bacteria during both pre and post exposure to Ampicillin, a cell-wall synthesis inhibitor. To accomplish this and characterize the single cell growth and survival under antibiotic treatment, we used time-lapse microscopy in microfluidics. We undertook two distinct methods of microfluidic integration. First, we used gel membranes to enable cellular growth into a 2D monolayer. In the second method, we employed gel membranes to constrain cells to grow along 1D microchannels. We will compare these two methods and present our results within the context of experimental throughput and image processing, as well as single-cell antibiotic survival.

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Date submitted: 09 May 2019 Electronic form version 1.4