PHYSICAL MATHEMATICS SEMINAR

SPATIAL INTERACTION NETWORKS IN MICROBIAL COMMUNITIES

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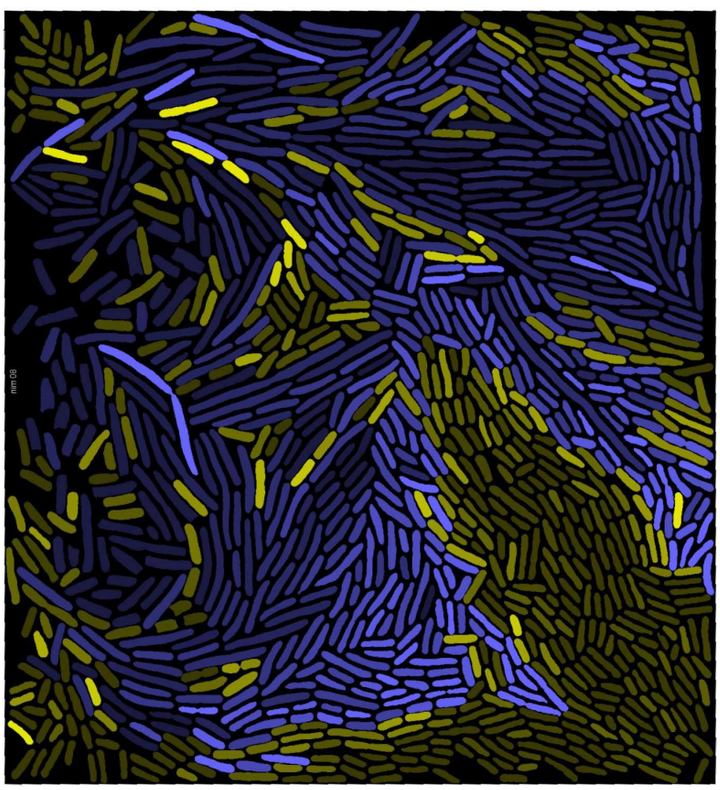
ABSTRACT:

Communities of interacting microbes perform fundamental processes on Earth, such as cycling the elements and shaping our health. These processes arise from a dense network of interactions between individual cells in the community. Most microbial communities are spatially structured aggregates of cells, where individual cells move little and interact mostly with cells close in space. Therefore, the spatial arrangement of different cell types determines the interactions that occur and therefore the processes that the whole community performs. I reconstruct the spatial network of interaction between cells by observing microbial communities at the single-cell level. Combining experiments with modeling, I address the question: what can we say of the properties of the community if we know how the single cells interact?

The image shows two mutualistic Escherichia coli strains in yellow and purple. We automatically segment and track single cells inside bacterial communities using time-lapse microscopy.

Cell tracking allows us to calculate growth rates of cells. Here, brighter colors indicate faster growth rates. Cells that are close to the interface between types have faster growth rates. Using these growth rates, we measured the spatial scale at which individual cells interact inside the community.



TUESDAY, SEPTEMBER 22, 2020
2:30 PM – 3:30 PM

http://math.mit.edu/seminars/pms/

https://mit.zoom.us/j/97273690529
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