Društvo biofizikov Slovenije
in
Laboratorij za Biofiziko

Vas vabita na

biofizikalni seminar:

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dr. Matej Krajnc

Jožef Stefan Institute, Department of Theoretical Physics

On how *Drosophila* embryo gets dense

Fertilization of the *Drosophila* egg is followed by two distinct phases of nuclear cleavages. During the first phase, nine divisions that occur in the interior of the embryo, give rise to approximately 500 nuclei that are then carried to the surface. There, the nuclei divide four more times (phase two), resulting in a blastoderm embryo with approx. 6000 identical nuclei, which become compartmentalized by cell membranes during cellularization. These early processes in the embryo are extremely important since they provide a static blank canvas ready for subsequent pattern formation and gastrulation. We use live imaging to study the dynamics of the second phase of nuclear cleavages and to characterize the emergent nuclear packing in the system. Relying on a simple machine-learning approach, which uses dynamic time warping to analyze the time series of nuclear cycles, we measured the lengths of nuclear-cycle phases both for the wild type embryo and a mutant embryo with an altered DNA replication mechanism. Next we explored positioning of the nuclei during the rapid multiplication and found that the characteristic length scale of the internuclear interaction scales with the density, which allows the embryo to sustain the level of structural order at progressively smaller length scales. We explain these results with a particle-based model that accounts for density-dependent nuclear interactions and synchronous divisions.

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Vljudno vabljeni!

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