



复旦大学数学科学学院 数学综合报告会

报告题目: **Mathematical modelling of organelle distribution in Ustilago hyphal cells**

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报告地点: 光华东主楼 1403

摘要: Intracellular transport in fungi has a number of important roles in e.g. filamentous fungal growth and cellular metabolism. Two basic mechanisms for intracellular transport are motor-driven trafficking which usually occurs along microtubules (MTs) and diffusion which is inefficient to move over long distances. Recently, mathematical modelling approaches have been actively developed to understand such intracellular transport. We use live-cell imaging data in *Ustilago* hyphal cells and develop mathematical models to study mechanism underlying spatial organization of molecular motors and organelles. In particular, we found that stochastic motility of dynein motors along MTs contribute to half of its accumulation at hyphal tip to support early endosome recycling. The bidirectional transport of early endosome not only facilitates the directed motion of peroxisomes along MTs but also enhances their diffusive motion which is so-called active diffusion. Our modelling approach also suggests that directed transport and, to a lesser degree, active diffusion contribute to overcome the actin-based polar drift forces, to ensure even distribution of peroxisomes and support their mobility over short and long distances, respectively.

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