INTERNATIONAL SOLVAY INSTITUTES BRUSSELS

SOLVAY COLLOQUIUM

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Self-organized patterns of microtubules and molecular motors

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The internal organization of cells is largely determined by the architecture and orientation of the microtubule network. Microtubules serve as polar tracks for the selective transport of specific molecular motors toward either their plus or minus ends.

We present experiments on reconstituted systems and theory to study the interaction of microtubules with both plus-and minus-end directed motors bound to a fluid membrane. Depending on motor concentrations, the system leads either to the constant transport of microtubules or to their alignment, stacking, and immobilization in regular bands that separate motors into domains of opposite polarities.

In bands, microtubules all share the same polarity and segregate the two opposing motors accordingly. These regular patterns result from the balance of forces produced by the two motors as they walk in opposite directions along microtubules.

The patterns result from active microphase separation where the micotubules can be considered as active surfactants pumping the motors on each side depending on their polarity. We present a model for the steady state patterns in one and two dimensions and an active Cahn Hilliard theory, wich describes the kinetics of the phase separation.

Tuesday 18 March 2025 at 4:00 P.M.

COFFEE AND TEA WILL BE SERVED AT 3:45 P.M IN FRONT OF THE SOLVAY ROOM

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