Symposium Physics of Embryonic Development Across Scales: From DNA to Organisms (SYED)

jointly organised by
the Biological Physics Division (BP),
the Chemical and Polymer Physics Division (CPP),
the Dynamics and Statistical Physics Division (DY), and
the Physics of Socio-economic Systems Division (SOE)

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The development of a single fertilized cell into a fully functional embryo is a prime example of non-equilibrium self-organization. While biological research on development has focussed on molecular aspects, recent progress has brought into the spotlight the underlying physical phenomena across scales in space and time. This includes polymer physics of DNA organization, dynamical systems and information theory of gene regulation, signaling and pattern formation, and the active mechanics of cells and tissues. Development therefore presents tantalizing challenges at the interface between physics and biology, experiment and theory. Addressing these challenges requires an integrative approach that bridges scales and disciplines. This symposium will bring together researchers from diverse backgrounds and provide an overview of the exciting recent advances in experiment and theory and highlight future challenges.

Overview of Invited Talks and Sessions

(Lecture hall H1)

Invited Talks

SYED 1.1	Mon	9:30–10:00	H1	**Emergent crystalline order in a developing epithelium** — Kartik Chhajed, Natalie Dye, Marko Popović, •Frank Jülicher
SYED 1.2	Mon	10:00–10:30	H1	**A tissue rigidity phase transition shapes morphogen gradients** — Camilla Autorino, Diana Khoromskaia, Bernat Corominas-Murtra, Zena Hadjivasiliou, •Nicoletta Petridou
SYED 1.3	Mon	10:30–11:00	H1	**Building quantitative dynamical landscapes of developmental cell fate decisions** — •David Rand
SYED 1.4	Mon	11:15–11:45	H1	**Control of lumen geometry and topology by the interplay between pressure and cell proliferation rate** — •Anne Grapin-Botton, Byung Ho Lee, Masaki Sano, Daniel Riveline, Kana Fuji, Tetsuya Hiraiwa
SYED 1.5	Mon	11:45–12:15	H1	**Chromosomes as active communication and memory machines** — •Leonid A. Mirny

Sessions

SYED 1.1–1.5	Mon	9:30–12:15	H1	**Physics of Embryonic Development Across Scales: From DNA to Organisms**