



University of Stuttgart

Stuttgart Research Center Systems Biology (SRCBS)

Systems Biology Seminar Talk

„Small can lead to big:
complex phenotype
explained by small genotype
mutation.“

Dr. Christian Fleck

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**Thursday
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4 p.m. – 5 p.m.

ZBVT, Lecture Hall
(0.106)
Allmandring 31

Abstract:

For many developmental processes in animals and plants, gene regulatory networks are used to explain the observed behaviour. During the last years it became more and more clear that genetic models are infact no more than cartoons. They describe the overall logic, however, the processes cannot be adequately modelled without making numerous assumption on the mathematical parameters. To address this problem, we focus on a simple patterning system in plants that creates a two-dimensional trichome pattern on the leaves in *Arabidopsis thaliana*. When analysing weak alleles of one of the key genes, we discovered that point mutations lead to a drastic reduction of the interaction with a second key gene. We demonstrate that the change in this one parameter is sufficient to explain a complex range of patterning phenotypes. Our study elucidates how details matter in the genotype-phenotype mapping. To our knowledge, this is the first report documenting the mechanistic relevance of one parameter on complex patterning processes.

CV:

Christian Fleck obtained his PhD in theoretical softmatter physics from the University of Konstanz in 2005. After a postdoc period he became 2008 group leader at the Centre for biological systems analysis in Freiburg. Christian Fleck was rewarded a BMBF eBio start-up grant in 2012 with a volume of 1.5 million Euro and was appointed in the same year as an Associate-Professor at Wageningen University. Since 2018 he is Senior Researcher at the department of biotechnology at the ETH Zürich. His main research focus lies on the study of pattern formation and self-organization in biology, and he coordinates an EU research project on bio-medical tissue engineering..