



## Graduate School Event

# Molecular Mechanisms of Microtubule Reorganization in Elongating Root Epidermal Cells

**Syamala Inumella (Benkova Group)**

Benkova Group

Host: Mario de Bono

As root epidermal cells progress from a phase of elongation to differentiation, their cortical microtubule (MT) arrays exhibit a transversal-to-longitudinal reorientation. The hormone cytokinin, a key regulator of root development, facilitates these cytoskeletal changes. However, the molecular mechanisms underlying hormone-mediated MT reorientation during root development are still unknown. Here, we find that MT reorientation in root cells differs from the existing model in hypocotyl cells, as it does not rely on the rescue of the new MT plus-end formed by severing. We show that cytokinin facilitates MT array reorganization during cell differentiation by promoting katanin's (KTN1) severing activity, and by modulating KTN1's association with microtubules. Additionally, cytokinin regulates SPIRAL2 (SPR2) in a phosphorylation-dependent manner, directing its localization to, and stabilization of, the new MT minus-end created by katanin-mediated severing at crossovers. Notably, our findings suggest that dynamic and reversible phosphorylation at S579 of SPR2 is crucial for the proper functioning of the MT severing machinery. Finally, we identify MAP65-1 and CLASP as additional targets of cytokinin phosphoregulation. Cytokinin treatment decreases MT-MAP65-1 association in elongating cells, likely to expose MTs to KTN1-mediated severing, whereas it increases MT-CLASP association to stabilize the growing plus-end. In this way, cytokinin drives MT reorganization during cell development by simultaneously modulating several microtubule-associated proteins. These results reveal key molecular players in hormone-mediated cytoskeletal regulation, and highlight protein phosphorylation as a powerful tool during this process.

**Monday, May 5, 2025 01:00pm - 02:00pm**

Moonstone Bldg / Ground floor / Seminar Room F (I24.EG.030f ) and Zoom

---



This invitation is valid as a ticket for the ISTA Shuttle from and to Heiligenstadt Station.  
Please find a schedule of the ISTA Shuttle on our webpage:  
<https://ista.ac.at/en/campus/how-to-get-here/> The ISTA Shuttle bus is marked ISTA Shuttle  
(#142) and has the Institute Logo printed on the side.

[www.ista.ac.at](http://www.ista.ac.at) | Institute of Science and Technology Austria | Am Campus 1 | 3400 Klosterneuburg