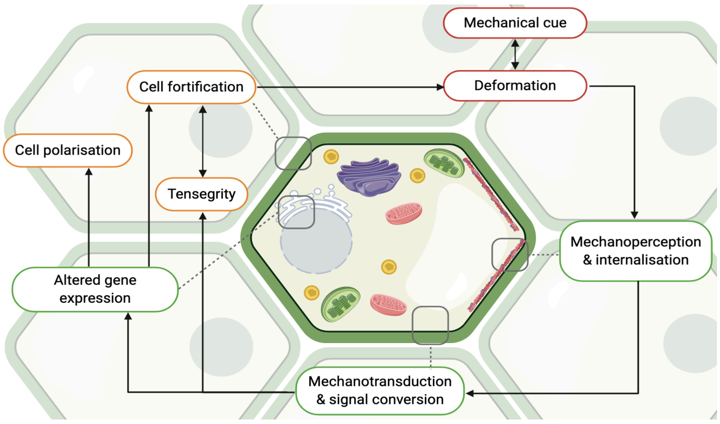
<u>Postdoc position in plant biophysics and mechanobiology:</u>

Deciphering the Plant Mechanostat; mechanical regulation of plant embryogenesis
Host laboratory: Prof. Joris Sprakel, Physical Chemistry and Soft Matter, Wageningen University
Close collaboration with: Prof. Dolf Weijers, Lab. Of Biochemistry, Wageningen University

The physical mechanisms by which plant cells and tissues sense, process and respond to mechanical forces remain poorly understood. Unraveling this is challenging as the mechanical signalling cascade involves a wide array of cellular structures and biomolecular effectors. Cells interact with their mechanical environment through their boundaries, the cell wall and plasma membrane. Forces are internalised through local structures, such as the cytoskeleton of protein filaments and transduced to the molecular scale, where force-induced conformational changes in mechanosensitive proteins convert mechanical cues into chemical signals and couple to the genetic machinery of the cell. Ultimately, mechanically-gated alterations of transcription patterns result in tensegrity adjustment, cell fortification and (re-)polarization.



In this fully-funded project, we will break through these limitations by using the early Arabidopsis embryo as a comprehensive miniature model for plants to explore how mechanical stimuli lead to cellular and genetic reprogramming. This project harnesses recent developments in the teams of Sprakel and Weijers to establish a toolkit of transgenic Arabidopsis lines marking crucial elements of the mechanostat (actin, tubulin, plasma membrane, tonoplast, SOSEKI polarity proteins), unique chemical mechanosensors and bespoke microfluidic devices for mechanical stimulation coupled to transcription sequencing. In this project, this unique toolbox will be combined and put to work to explore mechanical feedback, quantitatively and in full three-dimensions, with unprecedented detail for the first time.

We seek an ambitious postdoc (contract term: initially 1y with possibility for extension up to 3y in total) with a background in biophysics and/or (plant) mechanobiology for the physics part of this project. The work will be conducted in direct and close collaboration with a postdoc, hired in tandem, that focusses on the biological aspects of this problem. The work consists of establishing quantitative imaging assays with molecular mechanoprobes and transgenic lines, the design, calibration and application of bespoke microfluidic devices for mechanical stimulation, image analysis and mechanical modelling. We offer a position in an ambitious interdisciplinary research team at the interface of plant biology, mechanics and physics, in a collaborative atmosphere; independent working conditions and freedom to explore and realise your own ambitions; a maximum total contract duration of 3y.

References:
[1] Harnvanichvech et al. 'The *Arabidopsis* embryo as a quantifiable model for studying pattern formation', <u>Quantitative Plant Biology</u> 2, **2021.**
[2] Michels et al. 'Complete microviscosity maps of living plant cells and tissues with a toolbox of targeting mechanoprobes', <u>PNAS</u> *117,* **2020**.
[4] van Dop et al. 'DIX domain polymerization drives assembly of plant cell polarity complexes', <u>Cell</u> 180, 2020.
[3] Yoshida et al. 'A SOSEKI-based coordinate system interprets global polarity cues in *Arabidopsis'*, <u>Nature Plants</u> 5, **2019**.
[4] Liao & Weijers, 'A toolkit for studying cellular reorganisation during early embryogenesis in *Arabidopsis thalania*', <u>the Plant Journal</u> 93, **2018**.

Applications and/or questions can be directed at:
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<u>Application closes: June 1st, 2021</u>