LadHyX Seminar – January 31, 10:45

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How avalanches of micro-grains can help understand the way plants sense gravity

Plants are able to sense gravity, so that shoots grow up and roots grow down. The sensor of gravity in plants consists of tiny starch-rich grains called "statoliths" that sediment and form miniature granular piles at the bottom of the gravisensing cells. How such a sensor could be a reliable clinometer is unclear, as granular materials are known to display jamming and finite avalanche angles. We address this issue by comparing statolith avalanches in plant cells to microfluidic avalanches of Brownian particles in biomimetic cells. We reveal that statoliths behave like a liquid, not a granular material, due to the cell activity that strongly agitates the content of the cell. Our study elucidates the physical grounds of the high sensitivity of plants to gravity and bridges the active microrheology of statoliths to the macroscopic response of the plant