中央大學物理學系

Department of Physics, National Central University



## Colloquium

# Bistability paves the way for cell

# death propagation as trigger waves

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### Date: 2024/10/22(Tue) Venue: S4-625 Time: 14:00-16:00

#### Abstract:

Large-scale cell death is widely observed during embryonic development and various human pathological conditions. However, a systems-level understanding for how large-scale cell death emerges had been lacking. Harnessing time-lapse imaging, chemical/genetic perturbations and mathematical modeling, we show how metabolic stress quantitatively modulate cellular state for the emergence of redox multistability, allowing reactive oxygen species (ROS) to regenerate and propagate across millions of cells. Intriguingly, these cell death trigger waves (i.e., its initiation, direction and speed) can be oriented by the emergent cellular patterns in a cell population. These cellular patterns dictate cell density and cell-cell alignment that prime cells with heterogeneous sensitivity to metabolic stress. Our findings show how cell death propagation as an emergent property of redox multistability and how self-organized cellular patterns can direct cell death propagation, featuring how collective cellular behavior in tissues and organs may influence cellular vulnerability to metabolic stress.