

Departmental Seminar

Hyperacute Stereovision in Fruit Fly, *Drosophila Melanogaster*

9:00 a.m. – 10:00 a.m. | February 18, 2019 (Monday)

Rm 813, 8/F, The Jockey Club Tower | Centennial Campus | The University of Hong Kong



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Abstract

Ultrafast photomechanical photoreceptor contractions enable *Drosophila* to see the world in much finer detail than their compound eyes' optical resolution by translating spatial information into phasic time series responses (Juusola et al., 2016). But could this mechanism also allow insects to see in stereo? Here we show how synchronous mirror-symmetric photomechanical contractions in the frontal forward-facing left and right eye photoreceptors give *Drosophila* high-resolution 3D-vision. By combining in vivo 100-nm-resolution x-ray imaging with electrophysiology and fly genetics, in vivo high-speed optical imaging, mathematical modelling and behavioural paradigms, we reveal how these photoreceptor microsaccades - by verging and narrowing the eyes' overlapping receptive fields - can channel depth information to hyperacute stereovision. These results change our understanding of how insect compound eyes work, highlight the importance of fast mirror-symmetric photoreceptor motion for 3D perception, and suggest coding strategies to improve man-made sensors.

~All are Welcome~