

# SCIENCE AT THE EDGE

2016 SEMINAR SERIES

Quantitative Biology Graduate Program | Gene Expression in Development and Disease

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**R. GAURTH HANSEN LECTURE**

## **“Making Mathematical Sense of Development: Modeling Oscillatory Gene Expression in Somitogenesis”**

Somitogenesis, the process by which somites (segmented tissue blocks that differentiate into skeletal muscle and vertebrae) develop, is a biological process that is controlled by *hes/her* family genes that show oscillatory gene expression levels. These genes form the so-called somite segmentation clock, which controls the somitogenesis process. The zebrafish segmentation clock oscillates with a species-specific period in the posterior pre-somitic mesoderm (the precursor tissue from which somites are derived). The period of oscillations becomes longer as cells are displaced along the posterior to anterior axis, which results in traveling waves of clock gene expression sweeping through the unsegmented tissue. Although various hypotheses have been proposed, the mechanism underlying traveling waves has remained elusive. In this talk I will describe an interdisciplinary approach that combines molecular-level mathematical modeling and quantitative experimentation to solve this puzzle.

### **References**

Alim MA\*, [Ay A](#)\*, Hasan MM, Thai M, Kahveci T. Multiple Reference Networks Improve Accuracy of Signaling Network Construction. (Accepted to the IEEE/ACM Transactions on Computational Biology and Bioinformatics, \* Equal Contribution)

Ferrante A, Gellerman D, [Ay A](#), Woods K, Filipowicz A, Jain K, Bearden N, Ingram K (2015) Diurnal preference predicts phase differences in expression of human peripheral circadian clock genes. *J Circadian Rhythms* 13: Art-4

**FRIDAY, APRIL 15, 2016**  
**11:30AM, ROOM 1400 BPS**

*Refreshments at 11:15*