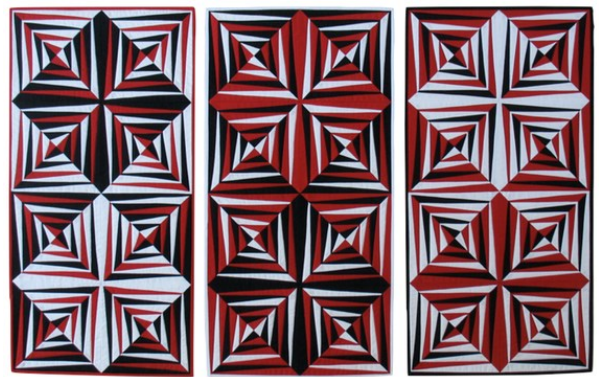


Pacific Institute for the
Mathematical Sciences

PIMS Distinguished Speakers Series

GERDA de VRIES

Associate Dean Undergraduate, Faculty of Science
Professor, Mathematical and Statistical Sciences
University of Alberta



Title: A Model of Microtubule Organization in the Presence of Motor Proteins

Abstract:

Microtubules and motor proteins interact *in vivo* and *in vitro* to form higher-order structures such as bundles, asters, and vortices. *In vivo*, the organization of microtubules is connected directly to cellular processes such as cell division, motility, and polarization. To address questions surrounding the mechanism underlying microtubule organization, we have developed a system of integro-partial differential equations that describes the interactions between microtubules and motor proteins. Our model takes into account motor protein speed, processivity, density, and directionality, as well as microtubule treadmilling and re-organization due to interactions with motors. Our model is able to provide a quantitative and qualitative description of microtubule patterning. Simulation results show that plus-end directed motor proteins form vortex patterns at low motor density, while minus-end directed motor proteins form aster patterns at similar densities. Also, a mixture of motor proteins with opposite directionality can organize microtubules into anti-parallel bundles such as are observed in spindle formation.

Bio:

Prof. de Vries is an applied mathematician, specializing in mathematical biology. She is interested in understanding and explaining physiological processes through the development and analysis of mathematical models. She has published over 70 research articles and 2 books of reference. She has received numerous awards, including an NSERC Discovery Accelerator Supplement (2009-2012). She was awarded Fellow of the Society for Mathematical Biology in 2017, and received the 2014 Excellence in Teaching Award of the Canadian Mathematical Society. She served as President of the Society for Mathematical Biology (2011-2013). She is also a self-taught quilt artist, creating quilts with abstract geometric designs, as well as an avid cyclist touring the world.

Friday—March 2, 2018

12:00 to 12:50 pm

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