**Trait-based models in ecology: From Fokker-Planck equations to collective coordinates**

Prof. Marcel Oliver, School of Engineering and Science, Jacobs University, Bremen, Germany

This is a joint work with Agostino Merico[1], Gunnar Brandt[1] and S Lan Smith[2]
*[1]Systems Ecology, ZMT (Leibniz Center for Tropical Marine Ecology), Bremen, Germany*
*[2]Research Institute for Global Change, Jamstec (Japan Agency for Marine-Earth Science and Technology), Yokohama, Japan*

Trait-based models in ecology describe community composition via a distribution function in a continuum trait space. Starting out from a discrete trait space, we show that the assumption of random mutation to neighboring traits leads to a diffusion equation of Fokker-Planck type in the continuum limit. We further show how to approximate the trait space dynamics via a set of ordinary differential equations for the first few moments of the trait distribution function.

We compare this approach to the method of collective coordinates, and show an example from modeling phytoplankton communities in a resource limited behavior. Our approach offers, in particular, an endogenous mechanism for sustaining the adaptive capacity of the population.