Contribution submission to the conference Dresden 2014

Constructing a Stochastic Model of Bumblebee Flights from Experimental Data — Friedrich Lenz[1], Aleksei V. Chechkin[2], and •Rainer Klages[1] — [1]Queen Mary U. of London, School of Math. Sci., UK — [2]Inst. f. Theor. Physics, NSC KIPT, Kharkov, Ukraine

The movement of organisms is subject to a multitude of influences of widely varying character: from the bio-mechanics of the individual, over the interaction with the complex environment many animals live in, to evolutionary pressure and energy constraints. As the number of factors is large, it is very hard to build comprehensive movement models. Even when movement patterns in simple environments are analysed, the organisms can display very complex behaviours. While for largely undirected motion or long observation times the dynamics can sometimes be described by isotropic random walks, usually the directional persistence due to a preference to move forward has to be accounted for, e.g., by a correlated random walk. We generalise these descriptions to a model in terms of stochastic differential equations of Langevin type, which we use to analyse experimental search flight data of foraging bumblebees [1]. Using parameter estimates we discuss the differences and similarities to correlated random walks. From simulations we generate artificial bumblebee trajectories which we use as a validation by comparing the generated ones to the experimental data [2]

[1] T.C.Ings, L.Chittka, Curr. Biol. **18**, 1520 (2008)
[2] F.Lenz, A.V.Chechkin, R.Klages, PLoS ONE **8**, e59036 (2013)

Part:	**DY**
Type:	**Vortrag;Talk**
Topic:	**Statistische Physik in biologischen Systemen (mit BP); Statistical Physics in Biological Systems (with BP) Session according to Symposium**
Email:	**r.klages@qmul.ac.uk**