Report on the research visit of Prof. Oleksandr Kutoviy to the Arctic University of Norway, UiT, campus Narvik in the Autumn of 2019

O. Kutoviy visited The Arctic University of Norway in September 2019.

During the visit a new research project on stochastic dynamics of the *birth-and-death* processes of infinite interacting particle system in random environment has been started. In the framework of this new project we discussed the contact model in random environment and made an essential progress in studying the limit evolution of this model.

Heuristically one may think of the heterogeneous landscape with areas, in which the survival rate for the offspring and the reproduction rate for the parent point are small compared to other places; at the same time the mortality rate is larger in these areas. Thus the heuristic pre-generator of the contact process in such a random environment has the following form:

$$LF(\gamma) = \sum_{x\in\gamma} d(x,\omega)[F(\gamma\backslash\{x\}) - F(\gamma)] + \int_{\mathbb{R}^d} b(x,\gamma,\omega)[F(\gamma\cup\{x\}) - F(\gamma)]dx,$$

where γ is the configuration of the contact model, $d(x,\omega)$ and $b(x,\gamma,\omega)$ are stationary death and birth rates, respectively. In typical examples the birth and death rates are functions of a stationary point process, for instance, Poisson point process.

Using the techniques elaborated in [1] we derived the evolution equations for the first and the second correlation functions, and then checked how the methods developed for homogenization of non-local convolution type operators (see [2]) can be adapted to investigating the large time behaviour of solutions of these equations.

O. Kutoviy gave a short course entitled "Stochastic models in random media under Vlasov scaling".

References.

1. Yu. Kondratiev, O. Kutoviy, R. Minlos On non-equilibrium stochastic dynamics for interacting particle systems in continuum. *J. Func. Analysis*, **255**(1), p. 200–227, 2008.

2. A. Piatnitski, E. Zhizhina Stochastic homogenization of convolution type operators. *J. Math. Pures Appl.*, **134**, p. 36–71, 2020.