

MATHEMATICAL PHYSICS OF QUASICRYSTALS

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Tuesday, 7 September 2021, 11:00–12:45

Classical lattice-gas models of interacting particles without periodic configurations minimizing energy will be discussed. We will talk about the Hilbert's 18-th problem, non-periodic tilings, crystal problem of statistical physics, ergodic theory of symbolic dynamical systems, and substitution systems. Examples will consist of Robinson' tilings, Thue-Morse and Fibonacci sequences. We will see how systems of finite type or "relatively close" to finite type give rise to systems of interacting particles placed on regular graphs and with only non-periodic ground-state configurations minimizing energy functionals. We will investigate stability of such non-periodic ground states against perturbations of interactions and thermal motions of particles.

Many open problems will be discussed, in particular the existence of non-periodic Gibbs measures - microscopic models of quasicrystals.

References:

- A. van Enter, H. Koivusalo, and J. Miękisz, Sturmian ground states in classical lattice-gas models, *J. Stat. Phys.* 178: 832–844 (2020)
- <https://www.mimuw.edu.pl/~miekisz/sturmianjsp.pdf>
- and papers on my homepage <https://www.mimuw.edu.pl/~miekisz>