THE NEMATIC PHASE OF A SYSTEM OF LONG HARD RODS

Margherita Disertori, **Alessandro Giuliani**

Université de Rouen, Università di Roma Tre

We consider a two-dimensional lattice model for liquid crystals consisting of long rods interacting via purely hard core interactions, with two allowed orientations defined by the underlying lattice. We present a rigorous proof of the existence of a nematic phase: more precisely, we show that at intermediate densities the system exhibits orientational order, either horizontal or vertical, but no positional order. The proof is based on a two-scales cluster expansion: first the system is coarse-grained on a scale comparable with the rods' length; then the resulting effective theory is re-expressed as a contour's model, which can be treated by Pirogov-Sinai methods.

Keywords: Monomer-$k$mer system, lattice models for liquid crystals, long range orientational order, Onsager's excluded volume effect, cluster expansion, Pirogov-Sinai method.