THE ANTIFERROMAGNETIC XY-MODEL ON THE TRIANGULAR LATTICE: GEOMETRIC FRUSTRATION, CHIRALITY TRANSITIONS & TOPOLOGICAL SINGULARITIES

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Abstract: Antiferromagnetic spin systems are magnetic lattice models in which the exchange interaction between two spins favors anti-alignment. A system is said to be geometrically frustrated if, due to the lattice geometry, no spin configuration can simultaneously minimize all pairwise interactions. This frustration can lead to ground states with nontrivial patterns and unconventional magnetic order. A classical example is the antiferromagnetic XY model on the triangular lattice. In this talk, we study the discrete-to-continuum variational analysis of this model for low-energy states. We show that, depending on the energy scaling, the continuum limit may exhibit both chirality transitions (a parameter describing the local sense of orientation) and topological singularities. This is joint work with Annika Bach (TU Eindhoven), Marco Cicalese (TU Munich), and Gianluca Orlando (Politecnico di Bari).