

Natalia Chepiga – TU Delft

Theory of quantum phase transitions

In this series of lectures I will provide an overview of the modern theory of quantum phase transitions. I will give a practical introduction to conformal field theory (CFT) and explain how it can be used to unveil the nature of quantum phase transitions on a lattice. I will discuss the minimal models – the family of critical theories describing the simplest set of quantum phase transitions, including the celebrated Ising model. Next, I will discuss the Wess-Zumino-Witten types of phase transitions in quantum magnets. I will stop in details on extended critical phases including Luttinger liquid, and the nature of the transitions out of them. Finally, I will discuss the state of the art of the theory of quantum phase transitions in the presence of chiral perturbations. Experimental realizations in the context of quantum magnets and Rydberg atoms will be briefly discussed.