

Frustration - practical

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Although it seems hopeless to unravel the many unusual notions related to frustration in such a short time, it still is possible to have a grasp of fundamental issues. Frustration is about contradictory constraints, frustration is about large numbers fighting in opposite directions, frustration is about emergence, and much more. I will aim at illustrating only these three aspects.

1 - While antiferromagnetic Neel like ordering is, and has been, the most usual example of behavior in antiferromagnetism, it was actually thought to be impossible to observe from the theoretical point of view. A century of studies has proved that it is indeed a stable state of matter. But how about destroying this state? Frustration is the answer, and we shall first focus on this aspect: destroying ordering while maintaining strong correlations.

2 - Once this is done, we can forget models and constraints, and simply look at numbers. Given an energy spectrum, classical or quantum, it does not matter, what can we infer from its structure? We shall see that very unexpected situations may appear, where, at very low temperatures, thermodynamics is not driven by the lowest energies.

3 - Eventually, we will try to show that frustrated models are a good way to produce unusual quasi-particles, ones that are not coded in the parent models. These quasi-particles are then called *emergent*, and this concept is too important in modern advances to be overlooked. So we will not.

And, of course, these practicals will be a place to exchange and maybe reorient its content if needed, according to your expertise, or my ignorance.