Universally Optimal Point Sets

Nicolas Nagel (TU Chemnitz)

The notion of energy appears on multiple occations in mathematics. For example two seemingly unrelated problems, namely the optimal configuration of electrons in some space and choosing optimal evaluation points for quasi-Monte Carlo integration algorithms, turn out to be two different instances of the same underlying problem. Both scenarios can be interpreted as minimizing a quantity, then called the energy, of a finite set of points. In the case of electrons this is given via the Coulomb potential and for the quasi-Monte Carlo integration via a kernel of an associated RKHS. Universal optimality is the phenomenon where a point set is simultaneously optimal for a wide class of energies. This talk aims to give an introduction to general energies, an overview of known results on the sphere and attempts to adapt these results for (tensor product) energies on the torus.