QMC and nonnegative local discrepancy

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In our talk, we present a way of finding a non-asymptotic and computable upper bound for the integral of a function f over $[0,1]^d$. Indeed, let $f:[0,1]^d \to \mathbb{R}$ be a completely monotone integrand and let points $\boldsymbol{x}_0,\ldots,\boldsymbol{x}_{n-1} \in [0,1]^d$ have a non-negative local discrepancy (NNLD) everywhere in $[0,1]^d$. In such a situation, we can use the points $\boldsymbol{x}_0,\ldots,\boldsymbol{x}_{n-1}$ in a quasi-Monte Carlo (QMC) rule and obtain the desired bound for the integral of f. An analogous non-positive local discrepancy (NPLD) property provides a computable lower bound.

We will also discuss which point sets are candidates for having the NNLD or NPLD property.