Andrew J. Ochoa
Texas A&M University
Approximating continuous coupler distributions on devices with limited precision

Special purpose computers, such as the D-Wave 2X quantum annealer or the FPGA-based Janus Computer, are typically restricted by memory constraints, limited precision or analog noise. This means that the study of problems with interactions drawn from continuous distributions can be difficult. Here we extend the approach introduced by Leuzzi {¥em et al.}~[Phys.~Rev.~Lett.~103, 267201 (2009)] to approximate a continuous Gaussian distribution by using quadratures. Our approach allows us to approximate any continuous distribution using only a few discrete weights. From a classical point of view, this reduces the simulation's memory footprint of continuous problems drastically, as well as the simulation time, because multiple quantities and expensive operations, such as exponentials, can be precomputed and tabulated. For quantum annealing architectures this means that problems that require continuous distributions can be encoded within the restrictions of finite precision and analog noise on these devices. Advantages and disadvantages of this simulational approach are discussed.