Dirac 2

1st Generation QUDIT Entropy Quantum Computer

Summary

Dirac-2 is a portable, low power, and room temperature qudit entropy quantum computer (EQC). Dirac-2 solves problems of Objective Function Minimization and Maximization for **integer optimization** by finding the ground state of a complex system with many inter-correlated variables.

These problems correspond to minimizing or maximizing the expected return of the objective function:

$$E = \sum_{i}^{N} \overset{\text{Loss}}{C_i V_i} + \sum_{i,j}^{N} \overset{\text{Strength of connection}}{J_{ij} \underset{\text{Spin configuration}}{V_i V_j}}$$

under the constraint of a fixed resource $R = \Sigma_{i=1}^{N} V_i$ where V_i is the value of each variable, C_i is the linear coefficient of each variable, which is a real number that can be positive, negative, or zero, J_{ij} is the coupling coefficient of two variables, which can be any real number.

Specifications

Type	Qudit of 64 dimensions
Maximum size of variables	N = 1,000 (up to 2,000 with decreased connectivity requirements)
Connectivity	All-to-all
Operating Temperature	25 ˚C / 77 ˚F (room temperature)
Power Consumption	<80 W
Physical size	Contained in a 3U rack-mountable unit
Order of correlation	Any types of second-order correlations, where interactions between qudits can be repulsive (positive correlation) or attractive (negative correlation)

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