Neutron monitor generated data distributions in quantum variational Monte Carlo

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Abstract

We have assessed the potential applications of the neutron monitor hardware as random number generator for normal and uniform distributions. The data tables from the acquisition channels with no extreme changes in the signal level were chosen as the retrospective model. The stochastic component was extracted by fitting the raw data with splines and then subtracting the fit. Scaling the extracted data to zero mean and variance of one is sufficient to obtain a stable standard normal random variate. Distributions under consideration pass all available normality tests. Inverse transform sampling is suggested to use as a source of the uniform random numbers. Variational Monte Carlo method for quantum harmonic oscillator was used to test the quality of our random numbers. If the data delivery rate is of importance and the conventional one minute resolution neutron count is insufficient, we could always settle for an efficient seed generator to feed into the faster algorithmic random number generator or create a buffer.

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