



## CSIAC Success Story

### FA8075-12-D-0001-0024, CAT 16-1264 Quantum Algorithm Analysis (QAA)

<b>Customer:</b>	Air Force Research Laboratory (AFRL/RI)
<b>Challenge:</b>	The mission of AFRL/RI is to explore, prototype and demonstrate high-impact game-changing information technologies that enable the Air Force and Nation to maintain its superior technical advantage. The overall objective of QAA is to leverage AFRL's theoretical quantum interference research to experimentally pursue an entangled photon approach to quantum gates, including cluster states and Linear Optical Quantum Computing.
<b>Approach:</b>	<p>This Core Analysis Task supports Quantum Information Processing which focuses on computational methods and architectures. Specific algorithms have been utilized to demonstrate this concept of high potential interest such as database searches, pattern recognition, and unconstrained optimization. Specific activities included:</p> <ul style="list-style-type: none"> <li>- Theory/experiment research and demonstration of Continuous Variable Cluster State (CV/CS) quantum computation</li> <li>- Pearson Correlation Function</li> <li>- Mixed modes/correlation and loss</li> </ul> <p>Throughout this process, CSIAC identified areas of risk or opportunities for risk reduction in the entangled photon approach to quantum gates.</p>
<b>Value:</b>	CSIAC advanced Quantum Computing by analyzing how to compress, transmit, and manipulate this information more efficiently in the quantum realm. CSIAC utilized custom quantum simulation software to apply entanglement as a resource along with performance benchmarks to measure the benefits of utilizing this advanced technology in various scenarios such as communication systems and error correcting codes design.

**The Cyber Security and Information Systems Information Analysis Center (CSIAC) is operated by a team led by Quanterion Solutions Incorporated under Contract FA8075-12-D-0001.**

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