

ABSTRACT NO.: 582**TITLE:** Theory and Applications of Entangled Photons**AUTHORS:** Amaal M. Ali (807002355)

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Quantum entanglement is a non-classical phenomenon which can be harnessed to improve on classical processes and has been used to develop new technologies, such as Quantum Optical Coherence Tomography and a Quantum Computer to calculate the energy levels in hydrogen. One scheme by which entangled photons are generated is the process of spontaneous parametric down-conversion (SPDC) using a non-linear crystal illuminated by a pump beam, usually a laser emitting in the ultraviolet range. In addition to the inherent position momentum and spectral entanglement, these photons can also be entangled in other degrees of freedom, including polarization. In this project, we have investigated the theory of entangled photons produced by the SPDC process and five applications of such photons - Dense Coding, Cryptography and Quantum Computing, as applied to the field of Quantum Information Science, Quantum Metrology and Quantum Imaging.