Quantum mechanics predicts that for single quanta interference is limited to pairs of events. It can therefore be categorized as “second-order interference theory”. In this thesis, we wish to explore possibility of “higher-order interference”, exemplified by generalizations of Young’s double slit experiment to three and more paths. We show in the thesis that it is possible to create higher-order interference using non-linear processes within second quantization formalism and it is present in some extensions of quantum mechanics. We also discuss operational advantages of utilizing higher-order interference and propose precise experiment with atoms to bound its presence.