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## Quantum Computing for Optimization Problems in Synchrotron Radiation Facilities

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The advancement of quantum technologies is expected to pave the way for practical Quantum Computing (QC). Practical QC should provide solutions to certain problems, superior to those offered by the classical computational paradigm. The QC field is [in development][1] but has not taken its final form yet. In an attempt to define requirements for its practical use, this research reviews the current state of QC services as provided by IBM, Microsoft, Rigetti and D-Wave, and proposes potential applications in the synchrotron radiation facility Elettra Sincrotrone Trieste. This research has concentrated its focus on potential applications that may benefit from using QC for Optimization problems [1] even if it acknowledges other uses in fields like those of simulation modelling and information theory. In specific, this work starts by hinting on the optimisation needs for accelerator control till beamline end-station uses in scientific applications like X-ray Fluorescence data fitting [Fig.1] and Ptychography reconstructions. The connection of QC to specific practical optimisation problems in a synchrotron may serve as a partial guideline for the future development of the field.

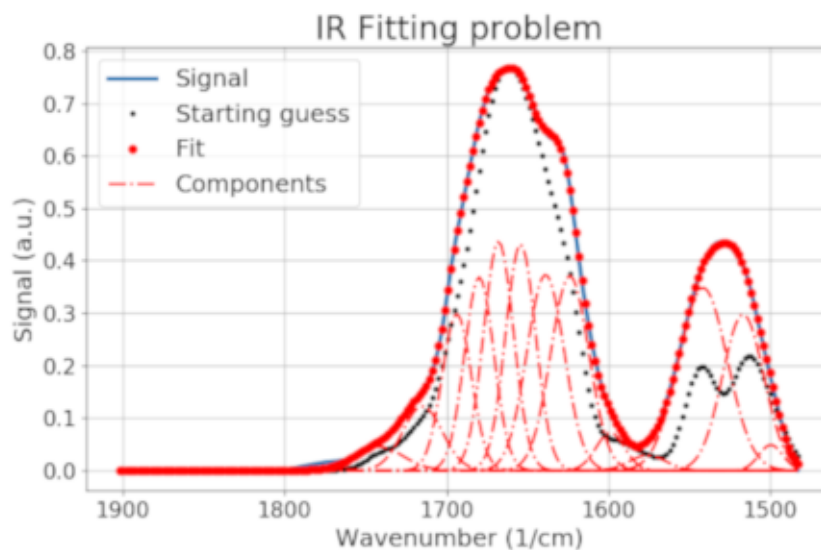


Figure: Data Fitting from a synchrotron IR experiment. Research suggests that QC should improve the existing workflow.

Figure 1: Image

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