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*The apple of my **i***

What do ultra-secure communications, a longstanding open problem in operator algebra and boson sampling have in common? These are all problems that are solved using quantum techniques.

In this public lecture, we discuss how quantum information is more like apples than oranges, and how this translates to a method for unforgeable money and ultra-secure communications. We then link this to quantum interactive proofs, the study of which have recently led to the unravelling of a 50-year old mathematical puzzle called the Connes embedding problem. Finally, we present boson sampling as the first ever demonstration of a computational advantage of quantum computers over conventional ones.

This public lecture is dedicated to first-year undergraduate students who often ask: “what good is linear algebra?”. My goal is to make this talk accessible to you, and to provide you with some answers to this very good question!