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### **Quantum entanglement and quantum computing in the optical frequency comb**

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An ultrafast laser emits over a vastly multimode gain spectral bandwidth an optical frequency comb, or OFC but the emission happens but one photon at a time, albeit in a stimulated manner. When one changes the gain medium from linear (one-photon) to nonlinear (two-photon), the laser becomes a two-photon laser (if the pump excites the gain medium) or an optical parametric oscillator (if it doesn't) and two-photon emission leads to massive multipartite entanglement of the OFC modes, which has been demonstrated experimentally. I will explain how this entanglement can be harnessed and leveraged toward building a universal quantum computer.

Reference: M. Chen, N. C. Menicucci, and O. Pfister, "Experimental realization of multipartite entanglement of 60 modes of a quantum optical frequency comb," *Physical Review Letters* **112**, 120505 (2014).

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