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.


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