

Abstract Submitted  
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**Cluster state engineering by phase modulation of a quantum optical frequency comb**<sup>1</sup> OLIVIER PFISTER, XUAN ZHU, CHUN-HUNG CHANG, CARLOS GONZALEZ-ARCINIEGAS, JACOB HIGGINS, Univ of Virginia, AVI PE'ER, Bar-Ilan University — We report the discovery of a conceptually simple technique to generate and tailor universal quantum computing resources known as cluster entangled states, here of light. Our method uses a single source of pairwise entangled optical fields, i.e., an optical parametric oscillator, and an electro-optic modulator, a common photonic device. We show that the combined action of the quantum source and of the phase modulator involves several tunable parameters that confer a high degree of quantum control over the generated quantum state, and can increase its topological dimension. This extremely simple architecture is highly compatible with on-chip integrated optics.

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