The promise of quantum computing (and how we're going to get there!)

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Abstract:

Quantum computing promises to transform almost every aspect of our lives, society and economy. However, despite more than quarter of a century of effort, useful systems are yet to be realized. The challenge is that useful quantum computing requires ~1,000,000 qubits (to meet the demands of error correction). This challenge will only be met in the near term by harnessing the advanced manufacturing capabilities of the conventional silicon computer chip industry—one that has benefited from sustained investment of ~ $1tn over the past 50 years. I will survey the proposed approaches for achieving this goal and show that silicon photonics stands out in making general purpose quantum computing achievable with conventional silicon processes.