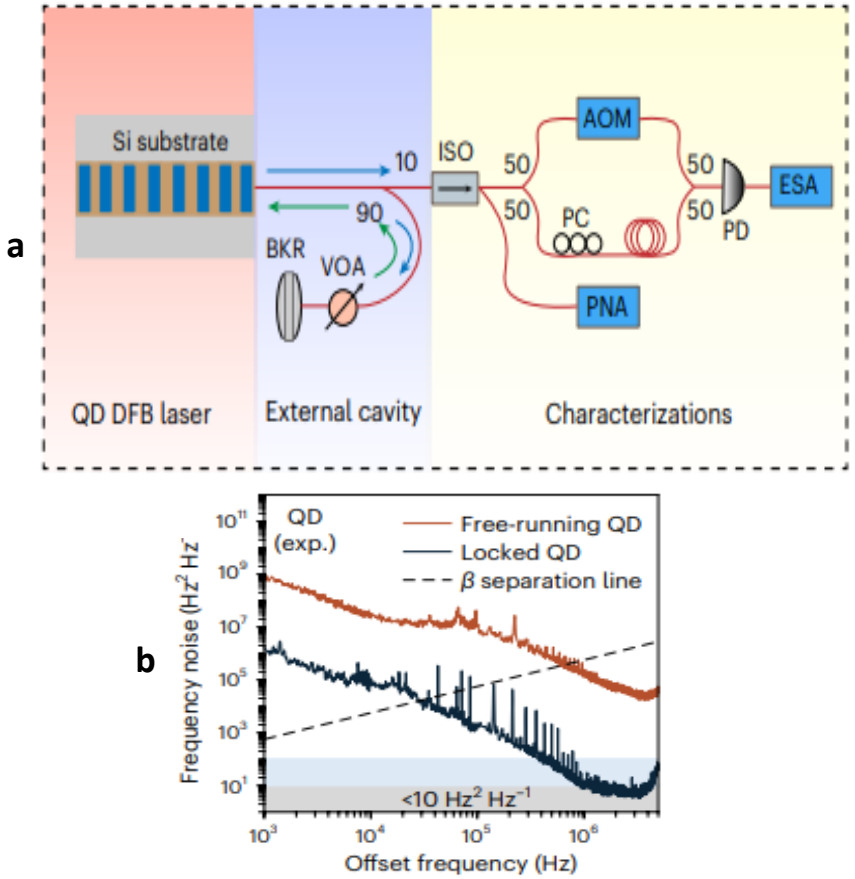
Turnkey Locking of Quantum-dot Lasers Directly Grown on Silicon



(a) Experimental setup for QD external-cavity locking (ECL). (b) Frequency-noise spectra of the QD laser in free-running (burgundy) and turnkey (black) operation.

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Scientific Achievement

Demonstrated turnkey approach to achieve high spectral stability in quantum-dot (QD) lasers directly grown on Silicon.

Significance and Impact

- Direct growth on Silicon enables integration with Silicon photonics in complex photonics integrated circuits (PICs).
- Cost-effective manufacturability from turnkey components.
- 16 Hz linewidth reduces noise in conventional and quantum coherent sensing and communication systems.
- Quintessent is commercializing this technology in an onshore foundry.

Research Details

- High-performance QD lasers provide scalable, low-cost, integration platforms to implement external-cavity locking.
- 1st-principle theory provides understanding of band structure, many-body and cavity quantum electrodynamics (cQED) physics.