

# Single diode, dual-frequency, agile compact laser source for atom cooling and interferometry

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Laser sources are a fundamental component of cold-atom-based inertial sensors and atomic clocks. Over the past few decades, significant R&D has been devoted to reduce the size, complexity and price of single-frequency, narrow-linewidth laser sources.



Figure 1: I&Q modulator made by iXBlue

Using recent developments in telecom fiber-based technology, we present a new 780 nm laser architecture based on second-harmonic generation and an I&Q modulator operating at 1560 nm.



Figure 2: View of the CS-DSSB laser source developed by iXBlue

This key component suppresses the carrier by 25 dB at 1560 nm and generates two RF sidebands by carrier-

suppressed dual single sideband modulation (CS-DSSB) that can be independently controlled in frequency and power. At 780 nm, we measure 10 dB of rejection of the main parasitic Rabi frequency relative to the one generated with phase modulation.

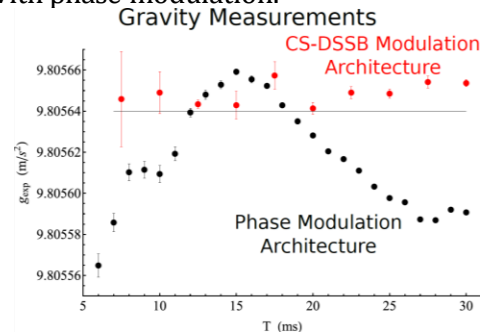


Figure 3: Preliminary comparison results of performances on gravity measurements

We demonstrate this new source on an atomic accelerometer and show that systematic effects are drastically reduced compared to other architectures based on electro-optic phase modulation.

**Keywords:** LASER, COLD ATOMS, ATOM INTERFEROMETRY

## References

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