Silicon-based microresonators with a phase modulated continuous wave laser generates a stable, broad frequency comb

Technology #cu13244

Development of optical frequency combs able to emit ultrafast lasers at discrete, equally spaced intervals have broad industrial applications for use in advanced optics that require high precision. This technology combines phase modulation of a continuous wave laser source with normal dispersion silicon nitride microresonators to generate a frequency comb that is compact, optically stable, and has a broad frequency range. It is envisioned that this technology can be manufactured using standard semiconductor industrial processes and applied to a wide range of optical applications.

Silicon nitride microring resonators can be fabricated with standard industrial processes and used for compact, optically stable, broad-range frequency comb generation

Silicon nitride microring resonators can be manufactured using standard semiconductor industrial processes and combined with phase modulation of a continuous wave laser source to generate frequency combs that are compact and optically stable. This technology permits widely spaced frequencies while maintaining a broad frequency range.

The technology has been characterized using direct temporal measurement and a proposal mechanism for generation of these optical combs is described.

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Applications:

- High-precision atomic clocks
- Cellular level medical imaging
- Astrophysical spectrography
- High-precision distance measurements
• GPS systems
• Secure communications
• Explosive and chemical agent detection
• Medical procedures (e.g. eye surgery)
• Optical gears with rotations that are marked by frequency
• Telecommunication channel generators

**Advantages:**

• Achieves a broad-range of frequencies
• Exhibits high stability
• Compact
• Easy to manufacture using standard semiconductor industrial processes

**Patent information:**

Patent Pending

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