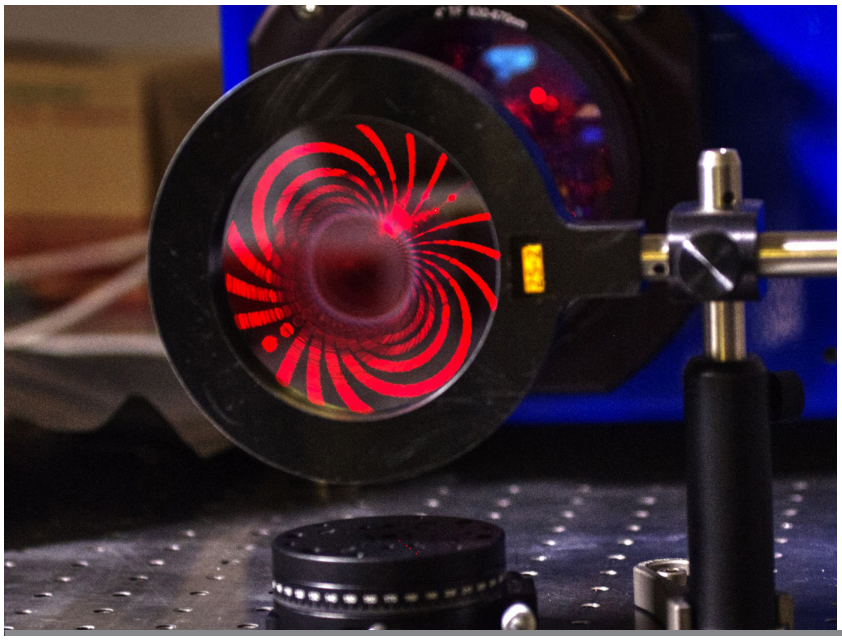

National Aeronautics and Space Administration

TECHNOLOGY SOLUTION

Electrical and Electronics

Serial Arrayed Waveguide Grating

An arrayed waveguide grating (AWG) that splits up an optical signal into wavelength channels to enable higher spectral resolution

Dispersive optical elements are important for many applications. In bulk, free-space optics, prisms, and gratings are often used. In optical waveguides, particularly in integrated photonics, arrayed waveguide gratings are most commonly used. AWGs split an optical signal into different wavelength channels. An AWG splits the optical signal into several parallel waveguides, which each have different optical path lengths. Each successive path increases in path length. The bigger the difference in path length, the better the optical resolution. However, there is a practical limitation to the resolution that can be achieved due to the ability to fit the long path lengths onto a photonics chip. The Serial Arrayed Waveguide Grating enables high resolution spectroscopy.

BENEFITS

- Enables higher spectral resolution
- Able to fit on a photonics chip

THE TECHNOLOGY

Serial Arrayed Waveguide Grating enables higher resolution wavelength separation. Traditional AWGs split the optical signal into multiple parallel paths each with a different path length. This new approach creates the different path lengths by splitting the signal into essentially one long path in which the different channels are periodically split off the main path in the desired fraction. This has the net result of requiring much less space on-chip for comparable optical path differences.

In traditional AWG, there are multiple parallel optical paths, each with a different engineered path-length. For high resolution, you want many different parallel paths and large differences in path length between the paths. To design this on a photonics chip requires significant area. The serial AWG creates a single path, equivalent to the longest path in the parallel AWG and split off fractions of the optical signal at various points along the way to create the equivalent path lengths. Serial Arrayed Waveguide Grating re-uses the same path instead of needing independent parallel paths.

APPLICATIONS

The technology has several potential applications:

- Optical communications
- Remote sensing/LIDAR
- Beam steering

PUBLICATIONS

Patent Pending

technology.nasa.gov

NASA's Technology Transfer Program pursues the widest possible applications of agency technology to benefit US citizens. Through partnerships and licensing agreements with industry, the program ensures that NASA's investments in pioneering research find secondary uses that benefit the economy, create jobs, and improve quality of life.

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More Information

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