

## **A HOLOGRAPHIC OPTICAL ELEMENT-BASED SPECTROMETER FOR SPACE APPLICATIONS**

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Fabry-Perot/diffraction grating systems achieve high spectral resolution and a broad free spectral range with a much higher throughput than echelle spectrometers can. However, they require bulky pressure systems or complicated Piezo-electric systems to scan in wavelength through the free spectral range of the Fabry-Perot, both of which are difficult to implement in space applications.

A novel concept that can overcome these limitations is presented. At the heart of this innovation is a holographic optical element known as a Holographic Circle-to-Point Converter (HCPC) developed by NASA Goddard Space Flight Center. By using this HCPC as an interface between an air-gap Fabry-Perot and a diffraction grating, the entire free spectral range of the Fabry-Perot etalon can be sampled simultaneously, foregoing the need for wavelength scanning. Such a design does not require any moving parts or cumbersome pressure system, resulting in an overall reduction in size of the system, robust mechanical insensitivity to vibration, and simplicity of operation which makes it attractive to space applications.