

WaFIRS - Enabling Ultra-Sensitive, Broad-Band Spectroscopy from Space

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Recent long-wavelength observations have revealed a large population of high-redshift galaxies. The Spitzer and Herschel missions will produce catalogs of thousands of objects that are very difficult to observe optically. Yet spectroscopic capabilities in the far-infrared/submillimeter/millimeter lag behind imagers primarily because of the large optical volume or complexity required for spectrographs. The WaFIRS concept combines a curved, optimized Rowland grating and parallel-plate wave-guide confinement to significantly reduce both size and complexity versus existing spectrometer designs. An individual WaFIRS module can instantaneously cover nearly 50% bandwidth while minimizing the background noise seen by each detector. Since each module is essentially two-dimensional, many modules can be stacked to give continuous coverage in the far-infrared and submillimeter. We will present results from a millimeter-wave prototype that we are preparing for astronomical observations in the fall.