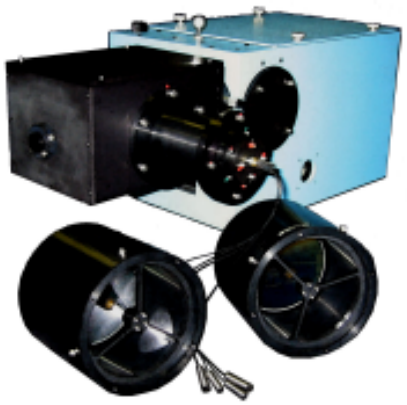
McPHERSON

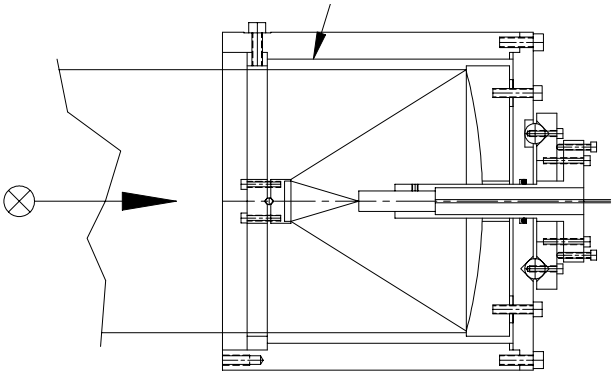
Multiple Fiber Imaging Spectrometer

MULTIPLE FIBER IMAGING



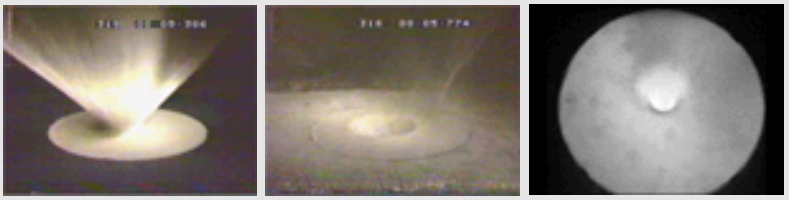
McPherson, Inc. has developed an Ultraviolet, Visible and Near Infrared Spectrometer System optimized for monitoring fiber coupled telescopes. The 350-mm focal length high resolution, research grade spectrometer delivers 0.1-mm scale images near axis and < 0.1-nm spectral resolution. The spectrometer includes a reflective fiber-coupling accessory to aperture match fast fibers to spectrometer optics most effectively. Combined with fast-gated detection system wide range spectra can be collected to monitor or plot over time the characteristic of transient phenomena.

For experiments involving remote events or hostile environments use of a telescope to spatially select and collect signal is advantageous. An imaging spectrometer can allow more data to be collected since multiple fibers can be introduced and dispersed simultaneously. For example, the impact zone of a high-energy projectile often produces a light emission by superheated plasma or other detonation. Due to the impact, the immediate area is debris filled and would damage sensitive optical elements. Use of telescopes allows collecting signal from specific areas in the impact zone and analyzing the wavelength emission features. Use of multiple telescopes allows mapping changing spectral characteristics of the impact area from ground zero to the periphery.



125-mm clear aperture optical receiver / telescope.

McPherson builds high quality reflective telescopes for this work. Use in the ultraviolet or over broad wavelength ranges is facilitated by these devices. They function free of chromatic aberration that would otherwise change focus and throughput with wavelength. Standard versions exist in 50-mm and 125-mm clear apertures. These are parabolic systems optimally condensing the collected field to small core diameter fibers for transfer to the spectrometer entrance slit. Use of these tools allows spectroscopy and imaging experiments with varying photon energies on multiple targets on the nanosecond time scale.



Still photos from a high-speed image sequence (one millisecond between each frame) of an impact by a copper sphere traveling at 4.5 km/sec into porous pumice. A bright "flash" is a high temperature plume resembling a Roman candle that shoots out of the hole created as the projectile penetrates into the target. The ejecta curtain resembles a funnel. These images courtesy of the NASA Deep Impact web site and Dr. P. Schultz, Professor of Geophysics with Brown University.

The spectrometer system with telescope input optics allows viewing the impact zone from a safe distance.

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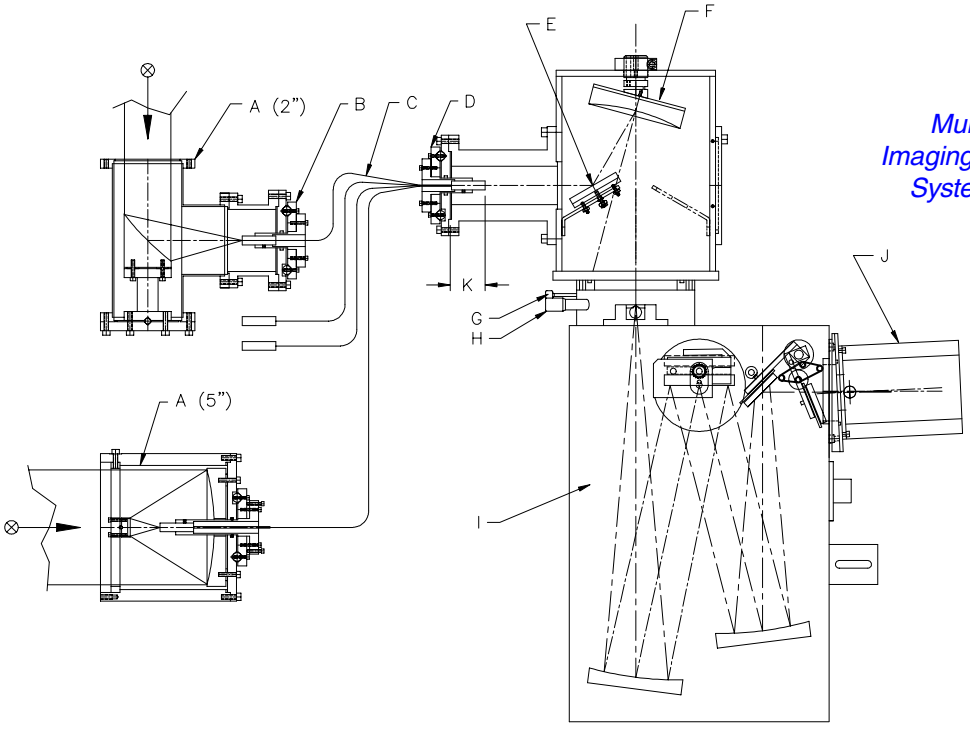

Multiple Fiber Imaging Spectrometer System Overview

A OPTICAL RECEIVER (TELESCOPE)
B FIBER MOUNT
C FIBER
D QUADFIBER TERMINATION
E CYLINDRICAL CONDENSER
F FOCUSING MIRROR
G SLIT OCCULTER (HEIGTH)
H SLIT MICROMETER
I MONOCHROMATOR
J CAMERA