



Auto-Aligned Fourier Transform UV Spectrometer – Phase II Project Summary

OPTRA, Inc. was contracted to design, develop, fabricate and test a spectrometer system for operation in the ultraviolet based on an auto-aligned scanning Michelson Interferometer (FTS System). The FTS system was designed, developed and fabricated at the contractor's facility in Topsfield, Massachusetts; the FTS system was constructed and tested for the NASA Jet Propulsions Laboratory (Pasadena, California).

The primary objective of the program was to provide a fieldable measurement system for a number of existing and contemplated NASA missions in support of the NASA aeronomy program. The system developed under this contract was based on using a diode laser based metrology system to bring the Michelson interferometer into initial alignment and to maintain that alignment with the requisite precision to be highly efficient in the UV region. The advantages of high throughput, a multiplex advantage that is still substantial, and the precise and stable instrument profile and wavelength scale of the Fourier Transform Spectrometer (FTS) can now be realized in this region using the rapid scan Michelson design. The advantage of this design includes compactness, a high scan efficiency, and a high optical efficiency made possible by the small number of optical elements.

UV Spectrometer Parameters

<u>Parameter</u>	<u>Units</u>	<u>Value</u>
Wavelength Optimization region	nm	250-800
Maximum Resolution (1/Retardation)	cm ⁻¹	0.1
Available Retardation	cm	10.88, 5.44, 2.72
		0.01 (See Note 1)
Scan Rate (Nominal)	scan/sec	0.2 @ 10 cm
Retardation Rate (Maximum)	cm/sec	2
Scan Waveform		Sawtooth
Duty Cycle		90% @ 10 cm
Sampling Interval	A	1000
Sampling Rate (Maximum)	kHz	200
Clear Aperture	cm	5
Natural Field of View ($u^2 = 1/Bv$)	mrad	7 full angle
Tilt Compensation		Auto-Align
Reverence Source		Sharp LT015MD
		Laser Diode @ 830 nm
Detectors		PMT
		UV enhanced silicon

Note 1: 2²⁰, 2¹⁹, 2¹⁸, and 2¹⁰, respectively.

<u>Data System Interface</u>	
Trigger	TTL Hight 3.5-5 V
	Triggering at 0 for 0.1-1 μsec
Clock	Square TTL 0-5 V (Position Derived)
Analog Signal	User selectable Gain of 1x, 10x, or 100x