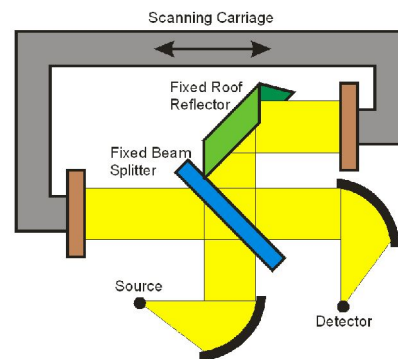


Identification and Significance of Innovation:

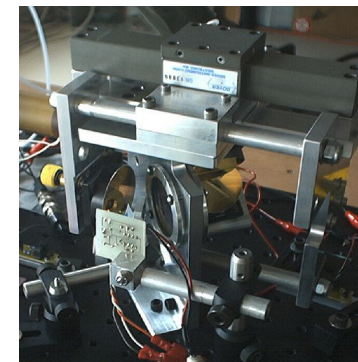
- (1) High-throughput interferometer design with passive optical alignment compensation. The design is particularly compact and simple.
- (2) An inexpensive replication method for molding precision optical surfaces on coarsely machined substrates.
- (3) Inexpensive, modular FTS electronics and software system.

**The significance is:**

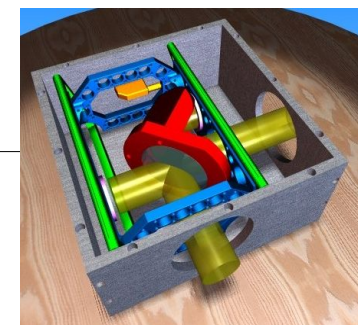
- (1) Improved interferometric stability relative to conventional Michelson interferometers; improved throughput relative to prior art tilt-compensated interferometers.
- (2) Commercial availability of lower-cost interferometer-quality mirrors.
- (3) Improved electronics subsystems for space- and earth-based FTS.
- (4) Improved cost/performance ratios for Fourier transform spectrometers.



Optical layout.



Phase I prototype.



Compact optical bench.

Technical Objectives and Work Plan:

• *System Mechanical Design*

- Evaluate compact layouts, translation and drive mechanisms. Design interferometer with compact footprint, adapt housing and mounting scheme, evaluate system for optimum performance.

• *Electronics and Software Design*

- PC104, bus communication, DSP/FPGA module, analog I/O modules, stabilized diode laser module, servo control module, signal processing.

• *Optics Manufacture*

- Replication process: vacuum chamber optimization, release agents, epoxy-fillers, metallization for mirror surfaces, quality testing of replicated surfaces.

NASA Applications:

- Remote sensing from aerospace platforms.
- Excellent resistance to cryocooler vibrations.
- Air quality monitoring for spacecraft.
- Crew health monitoring and laboratory research.

Non-NASA Applications:

- Widespread industrial, laboratory and medical measurements.
- Measurement of blood glucose and other physiological metabolites.
- Potential market impact for medical applications in billions of dollars.
- Conservative estimates of \$14 million per year market.
- Cost-effectiveness insures capture of a significant market share.

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