



Michigan Aerospace | Optical Products | [Atmospheric Intelligence](#)

Michigan Aerospace provides the most advanced atmospheric measurement systems available.

Ground, airborne, and space operations are often severely constrained by a lack of atmospheric knowledge, especially at longer distances.

Michigan Aerospace combines extensive design and engineering, program management, and production experience with expertise in atmospheric physics to ensure that we meet our customers' requirements.

Our Direct Detection LIDAR, Raman, and multi-wavelength systems provide atmospheric intelligence:

- Ground-based LIDAR for launch and test ranges
- Airborne Optical Air Data Systems, with options for clear air turbulence, ice, and volcanic ash detection
- Airborne Precision Air Drop LIDAR for more accurate and consistent payload delivery
- Space-based atmospheric profiling for improving weather and climate models
- LIDAR for wind turbine and wind farm optimization and protection



proven accuracy, ruggedness,
and durability on the ground,
in the air, and in space



Earth

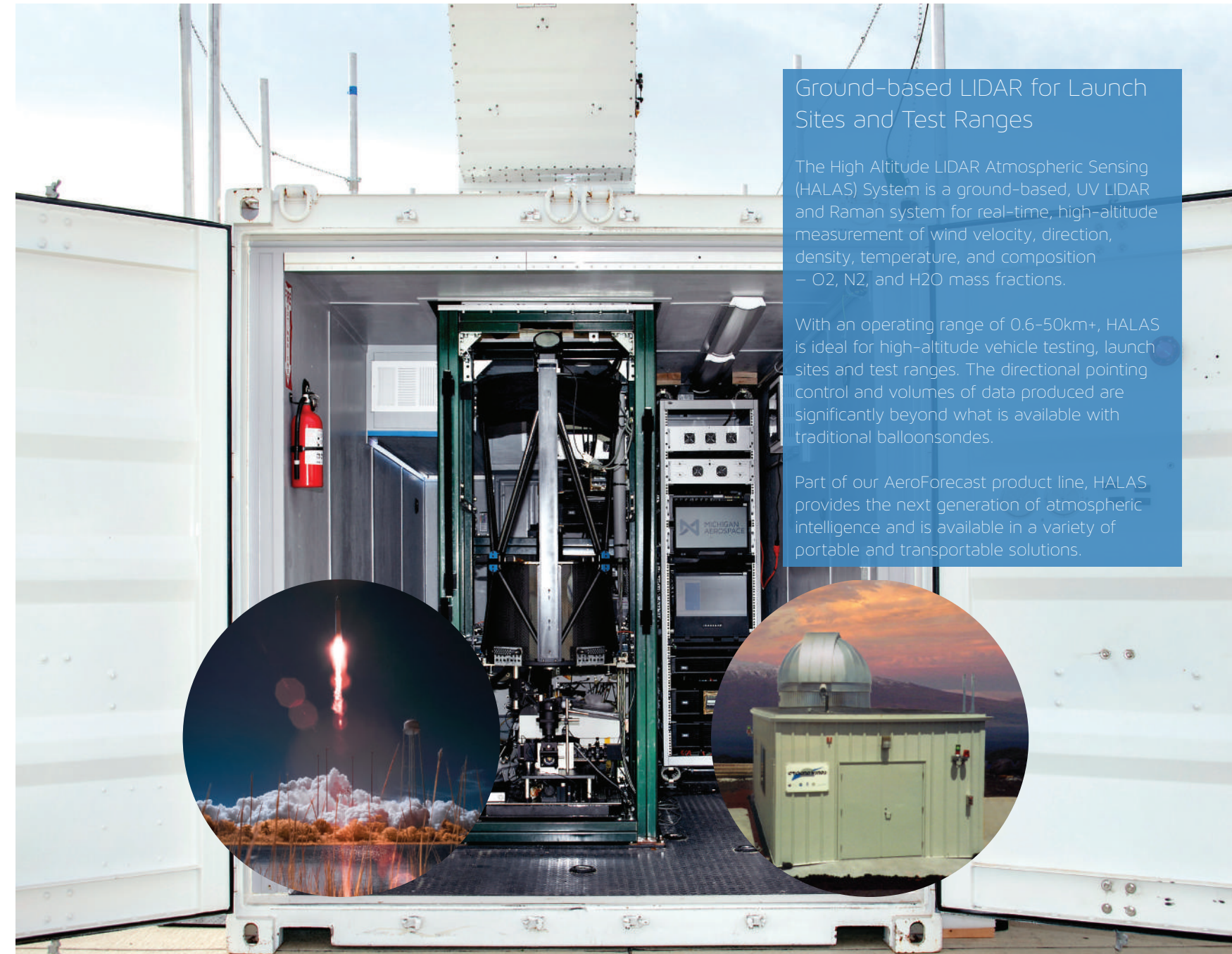
Earth

Ground-based LIDAR for Launch Sites and Test Ranges

The High Altitude LIDAR Atmospheric Sensing (HALAS) System is a ground-based, UV LIDAR and Raman system for real-time, high-altitude measurement of wind velocity, direction, density, temperature, and composition – O₂, N₂, and H₂O mass fractions.

With an operating range of 0.6-50km+, HALAS is ideal for high-altitude vehicle testing, launch sites and test ranges. The directional pointing control and volumes of data produced are significantly beyond what is available with traditional balloonsondes.

Part of our AeroForecast product line, HALAS provides the next generation of atmospheric intelligence and is available in a variety of portable and transportable solutions.



Optical Air Data System

Aeroforecast-OADS is a UV-LIDAR solution for optical air data measurements on all types of airborne platforms – fixed wing, rotorcraft, high altitude, high dynamic, manned and unmanned. Using our Fabry-Perot approach, we can measure wind speed, density, and temperature directly and simultaneously to provide a full air data solution at all altitudes and in completely clear air.

Precision Air Drop System

Aeroforecast-PADS is a long-range, airborne profiling LIDAR that increases the precision and accuracy of air drop operations. Our system allows payload delivery from above the boundary layer without the need for drop-sondes, requiring fewer passes over the drop zone. This translates to improved safety of the air crew and recipients on the ground.

Global Hawk Wind LIDAR

Michigan Aerospace provided a critical subsystem for the NASA Global Hawk (Hurricane Hunter) TWiLiTE LIDAR. TWiLiTE will provide wind profiles for improved forecasting and tracking of hurricanes and other severe weather conditions.



Space

Space

Cloud Aerosol Transport System

Michigan Aerospace built the interferometer for one of the channels on the Cloud Aerosol Transport System (CATS). CATS was developed by NASA Goddard and provides atmospheric data to better understand climate change and improve weather models. It is now operational on the International Space Station.

CATS measures clouds, dust, and smoke, and can be used by air traffic controllers to steer aircraft away from volcanic ash.

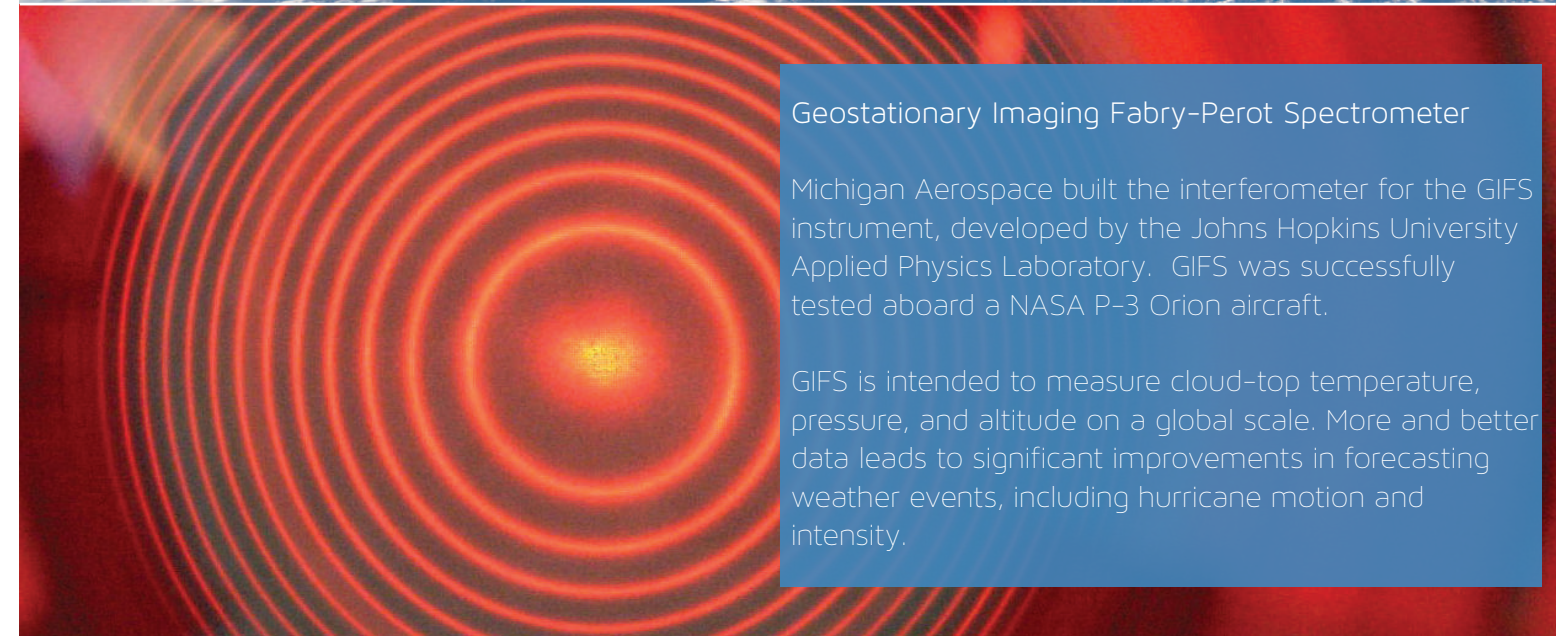


Credit: STS-105 Shuttle Crew/NASA

Geostationary Imaging Fabry-Perot Spectrometer

Michigan Aerospace built the interferometer for the GIFS instrument, developed by the Johns Hopkins University Applied Physics Laboratory. GIFS was successfully tested aboard a NASA P-3 Orion aircraft.

GIFS is intended to measure cloud-top temperature, pressure, and altitude on a global scale. More and better data leads to significant improvements in forecasting weather events, including hurricane motion and intensity.



Products

LIDAR receivers and transmitters are key components of our atmospheric measurement instruments. Michigan Aerospace has a long history of leading the development of these technologies.

From tunable Fabry-Perot etalons to fully integrated interferometers, Michigan Aerospace technology provides advanced features including:

- Spring-mounted ring geometry
- Intra-gap capacitive feedback
- Piezoelectric nano-positioning with digital servo control

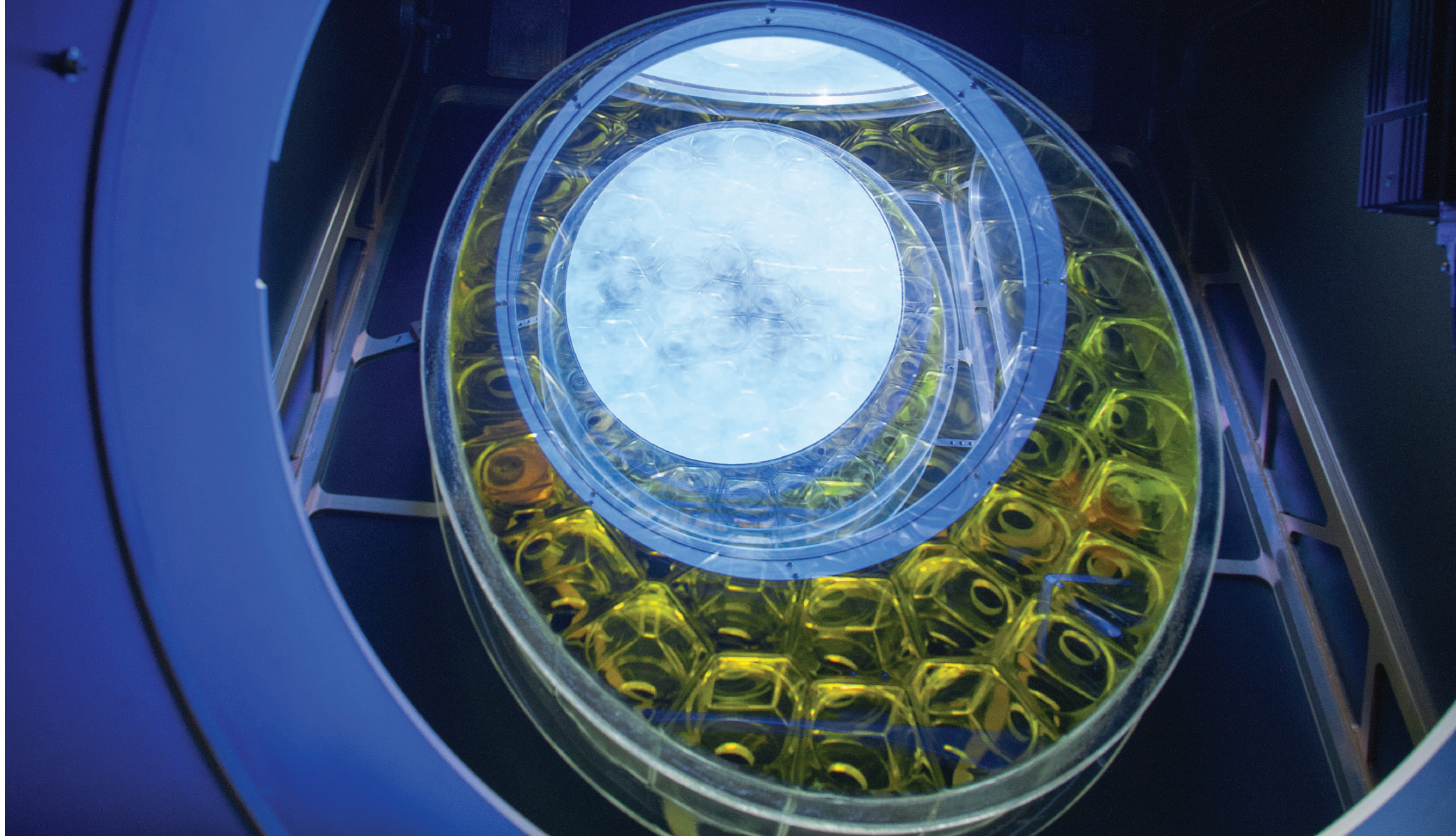
Whether it is end-to-end solutions or individual subsystems, Michigan Aerospace provides a flexible approach to widely varying requirements for:

LIDAR Receiver Subsystems

- Telescopes
- Receive optics
- Interferometers/detectors
- Raman channels

LIDAR Transmitter Subsystems

- Lasers
- Transmit optics
- Scanners



Tunable Fabry-Perot Etalons

Our Fabry-Perot etalon designs provide the highest level of optical performance, reliability, and stability available. These designs are the result of years of experience meeting the exacting requirements of air and spaceflight and are uniquely valuable to our customers because of their ruggedness, thermal stability, and tuning flexibility.

Features:

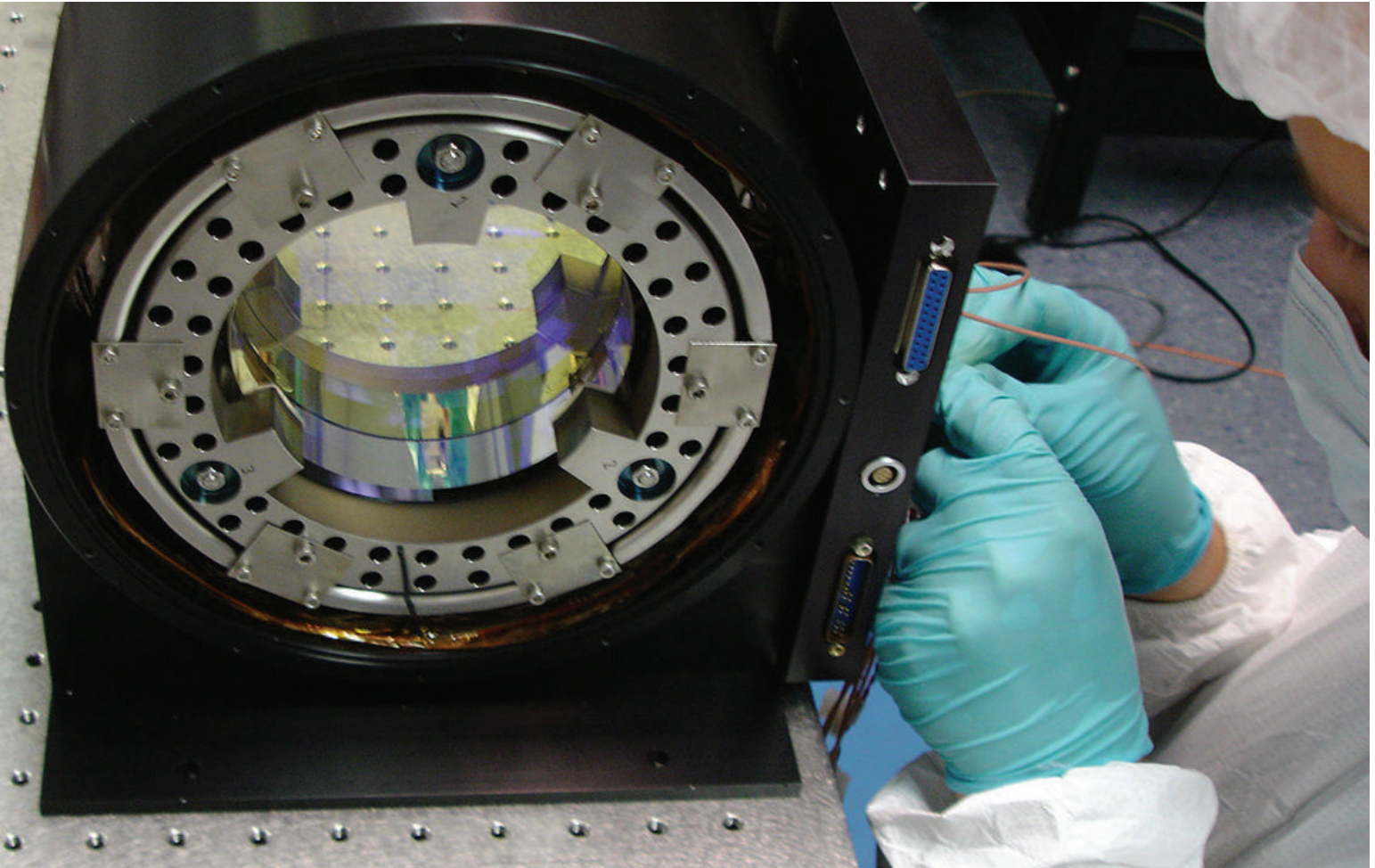
- Spring-arm ring mounting geometry allows our etalons to operate over a wide range of temperatures and dynamic loads.
- Compliant spring-arm support of the plates minimizes radial stress without significant degradation of finesse or throughput.
- Invar construction ensures exceptional thermal stability and uniformity.

Parameter	Standard	Available
Etalon Gap	1.5 cm	0.005 – 8.5 cm
Dynamic Tuning Range	3 microns	Up to 20 microns with ferroelectric actuation
Etalon Clear Aperture	5.0 cm	Up to 15.0 cm
Surface Quality	$\lambda/150$ @ 633 nm	Surface quality of up to $\lambda/200$ available
Wavelength(s)	355 nm	Broadband or single-wavelength coatings available from deep IR to UV
Operating Temperature	10 – 50 °C	Cryogenic or room-temperature designs available
Etalon Stability	0.2% FSR @355nm	N/A
Etalon Controller Resolution	20 bit	N/A
Piezoelectric Drive Voltage	0 – 900 V	May be adjusted for optimal balance of dynamic range and resolution depending on application
Control Electronics Operating Temperature	0 – 30 °C	N/A
Controller Size	3U Rack-Mount Enclosure	Housing can be modified to suit specific dimensional requirements
Controller Interface	Ethernet	Custom, API or custom Windows program

Piezoelectric Nano-Positioning

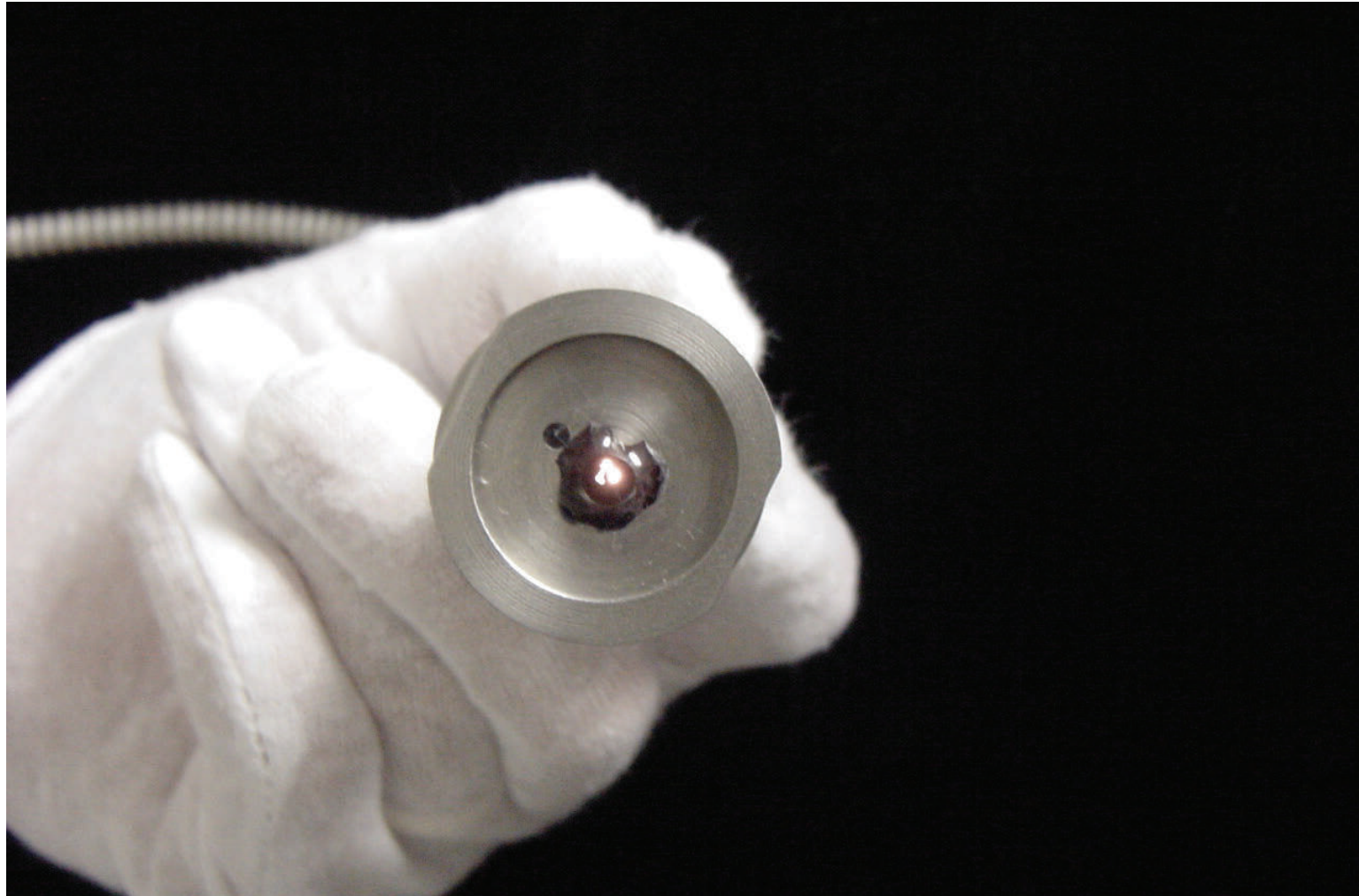
Our piezoelectric nano-positioners provide compact, precise, and robust positioning of optical components for maximum accuracy, reliability, and stability.

This proven design delivers optimum optical performance in the lab, high-vacuum cryogenic environments, and in space.



Custom Fiber Optic Assemblies

Our high-precision custom fiber optic assemblies are adaptable to a wide range of unique optical requirements. Fiber optic assemblies include hexagonal and cubic close packing with fiber diameters ranging from 150 to 400 μm .



Michigan Aerospace brings unique, proven technology as well as depth and breadth of experience to lower the risk of your atmospheric measurement needs. Atmospheric Intelligence for Earth, Air, and Space.

Michigan Aerospace is part of the Springmatter™ commercialization umbrella, providing assistance to innovators and companies that need a little help bringing their concepts to life.

Call or email us now to see if we can help.



1777 Highland Drive Ste B
Ann Arbor, Michigan 48108
www.MichAero.com
sales@michaero.com
734.975.8777