

**SBIR · STTR**  
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# Sensors, Detectors and Instruments

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# Disclaimer

The NASA SBIR/STTR subtopic workshop was held for informational purposes only and was an opportunity for the small businesses community to explore and share ideas related to the general technical topic areas.

In the event of any inconsistency between data provided in this presentation and the Final Solicitation, the language in the Final Solicitation, including any amendments, will govern.

# Sensors, Detectors and Instruments

- ▶ NASA's interests in instruments encompasses exploration systems and space science research in the areas of astrophysics, earth science, heliophysics, planetary science and human health.
- ▶ The rapid development of small, low-cost remote sensing and in situ instruments is essential to implementing measurement capabilities on more affordable missions in the future.
- ▶ Key objectives of this SBIR topic:
  - ▶ Enable new measurements,
  - ▶ Develop and demonstrate instrument component and subsystem technologies that reduce the risk, cost, size, and development time of instruments.

# Sensors, Detectors and Instruments

- ▶ Pre-release subtopics that focus on sensors, detectors and instruments:
  - ▶ Lidar Remote Sensing Technologies
  - ▶ Active Microwave Technologies for Remote Sensing
  - ▶ Sensor and Detector Technology for Visible, IR, Far IR and Submillimeter
  - ▶ Surface and Subsurface Measurement Systems
  - ▶ Cryogenic Systems for Sensors and Detectors
  - ▶ Photonic Integrated Circuits
  - ▶ Liquid Quantity Sensing Capability
  - ▶ Technologies for Planetary Compositional Analysis and Mapping

# Sensors, Detectors and Instruments

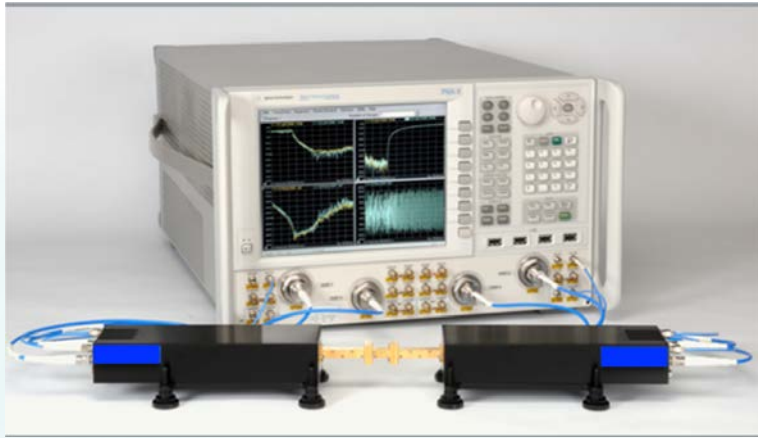
- ▶ NASA is seeking innovative materials, devices, subsystems and systems that will enable future measurements by making future instruments
  - ▶ More capable,
  - ▶ Smaller and lighter,
  - ▶ Lower power,
  - ▶ Compatible with new platforms like cubesats and smallsats,
  - ▶ More capable of surviving harsh environments like heat (Venus surface), cold (outer planet or moon surfaces), or high radiation (orbiting Jupiter).
- ▶ NASA also seeks ideas for new ways to make measurements and new instruments that can create instruments with some or all of the above characteristics.
- ▶ Small business commercialization of their technologies benefits the government by reducing the cost for the procurement of those technologies in the future.

# Why SBIR/STTR for Sensors, Detectors and Instruments

- ▶ SBIR/STTR enables NASA to tap into a resource of university and small business researchers
- ▶ In many cases these researchers don't have any other avenue to break in to the space business
- ▶ The capabilities are often unique and can enable future measurements that would not otherwise have an avenue to develop
- ▶ In some cases the technical capabilities are unknown to the technologists and scientists at NASA and the SBIR/STTR programs provide a venue for the companies and researchers to find each other.

# Success Story

## Company One.



Company One's Mini-VNA Extension Modules

- Company One manufactures state-of-the-art test and measurement equipment for mm-wave and THz applications.
- Prior to the development of the GPM Microwave Imager, Company One had received several SBIR awards for the development of millimeter wave receiver components.
- These components became the enabling receiver front end hardware for the millimeter wave channels of the GPM Microwave Imager.
- Company One has been an SBIR company for nearly 20 years.
- Today they employ over 50 engineers and have commercial business throughout the world.



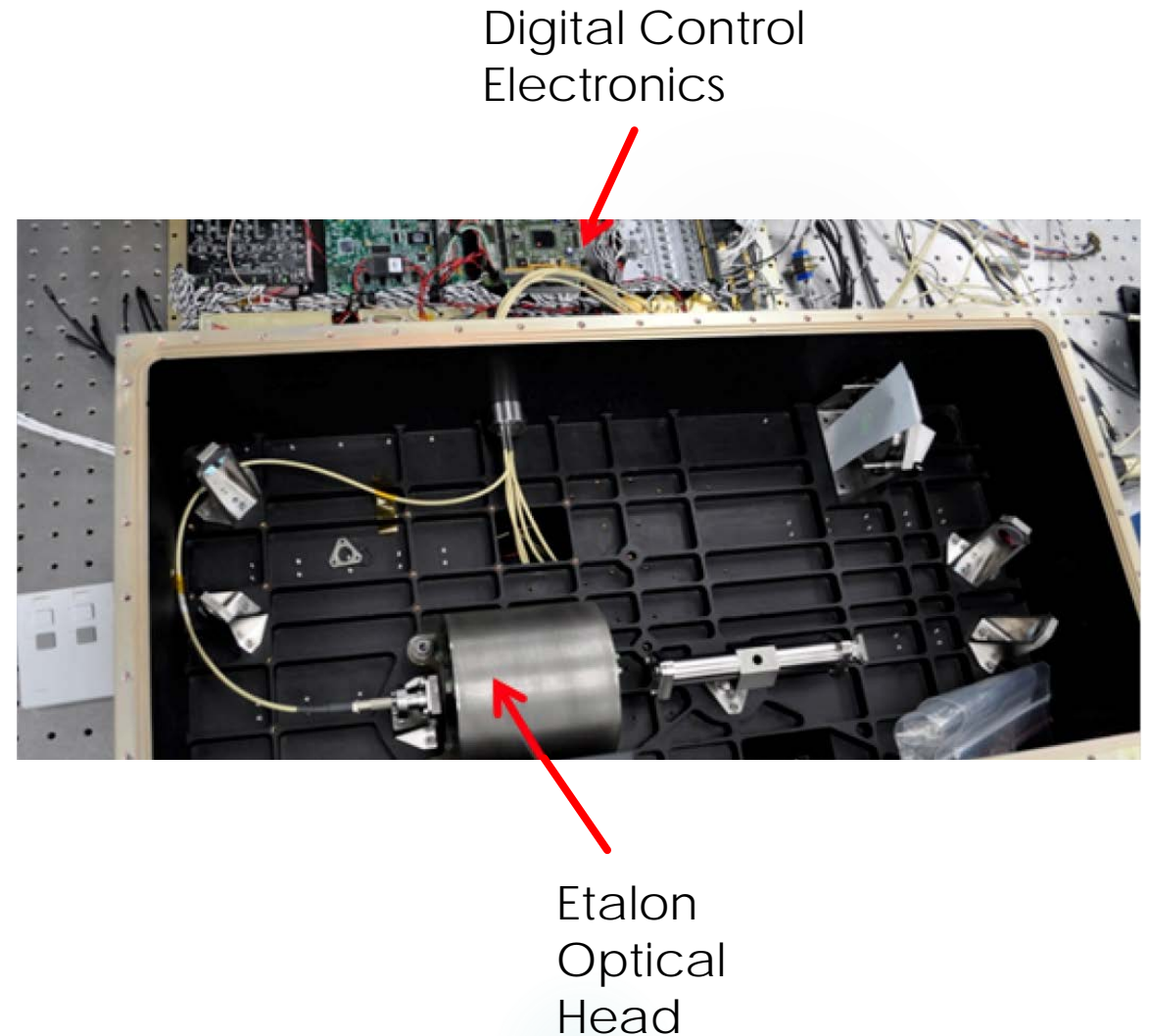
Microwave Imager



A test technician completes the final electrical integration of the GMI.  
Credits: Ball Aerospace

# Success Story

- Company 2 is a small sensor engineering company that produces custom product for government and industry customers.
- They proposed to design and fabricate a tunable Fabry-Perot interferometer along with the control electronics to act as the optical filter for the Cloud Aerosol Transport System (CATS) LIDAR on the International Space Station.
- The company ultimately delivered the flight version of this device.
- Company 2 already sells similar etalons to the scientific and engineering community.
- This was a modification of a previous design to improve performance.
- It had heritage from previous flight qualified hardware and NASA took advantage of that capability to improve the performance of one of its instruments.





- ▶ NASA's Science Mission Directorate (SMD) - <http://science.nasa.gov/>
- ▶ Decadal Survey Documents:
  - ▶ Astrophysics - [http://sites.nationalacademies.org/bpa/BPA\\_049810](http://sites.nationalacademies.org/bpa/BPA_049810)
  - ▶ Planetary - [http://sites.nationalacademies.org/ssb/completedprojects/ssb\\_065878](http://sites.nationalacademies.org/ssb/completedprojects/ssb_065878)
  - ▶ Earth Science - <http://science.nasa.gov/earth-science/decadal-surveys/>
  - ▶ Heliophysics - [http://sites.nationalacademies.org/SSB/CompletedProjects/SSB\\_056864](http://sites.nationalacademies.org/SSB/CompletedProjects/SSB_056864)
- ▶ Technology Roadmaps:
  - ▶ NASA Space Technology Roadmaps - <http://www.nasa.gov/offices/oct/home/roadmaps/index.html>
  - ▶ Astrophysics –
    - ▶ Cosmic Origins Program - <http://cor.gsfc.nasa.gov/cor.php>
    - ▶ Physics of the Cosmos Program – <http://pcos.gsfc.nasa.gov/>
    - ▶ Exoplanet Exploration Program - <https://exoplanets.nasa.gov/exep/>
  - ▶ Earth Science Technology Office (ESTO) - <https://esto.nasa.gov/>
  - ▶ The 2014 Heliophysics technology roadmap: <http://science.nasa.gov/heliophysics/>