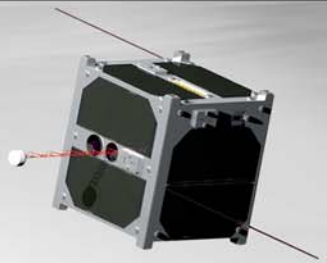
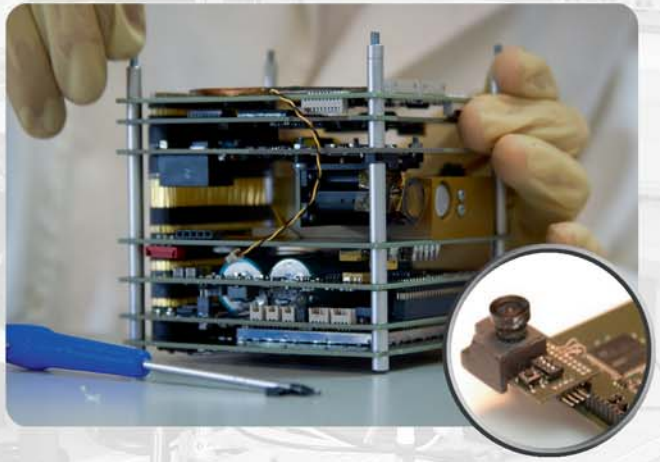


SPACE TECHNOLOGY

The laboratory of space technology provides services for development and testing of different kind of equipment. For example electronic boards, controllers, radio transmitters, receivers, cameras, etc. can be designed, assembled, prototyped, and tested here.

As the founding partner of the European Space Agency Business Incubator Centre (ESA BIC) in Estonia, we provide expertise, knowledge and data, laboratory and testing facilities to support small and medium size enterprises in their product development.

The first Estonian nanosatellite ESTCube-1, successfully launched in 2013 and operated in space for two years, was designed and constructed in this laboratory. In cooperation with several universities and research institutes we can also provide in orbit space technology validation service on nanosatellites as a part of our upcoming future developments.



MODERN LABORATORIES

for space technology, calibration and testing

The laboratory complex of Tartu Observatory is devoted to three main activities:

- development and testing of space technology;
- environmental testing;
- optics.

The laboratories include special electrostatic discharge (ESD) safe areas, cleanroom and anechoic environment.

All laboratories include automatic control of ambient temperature and humidity conditions.

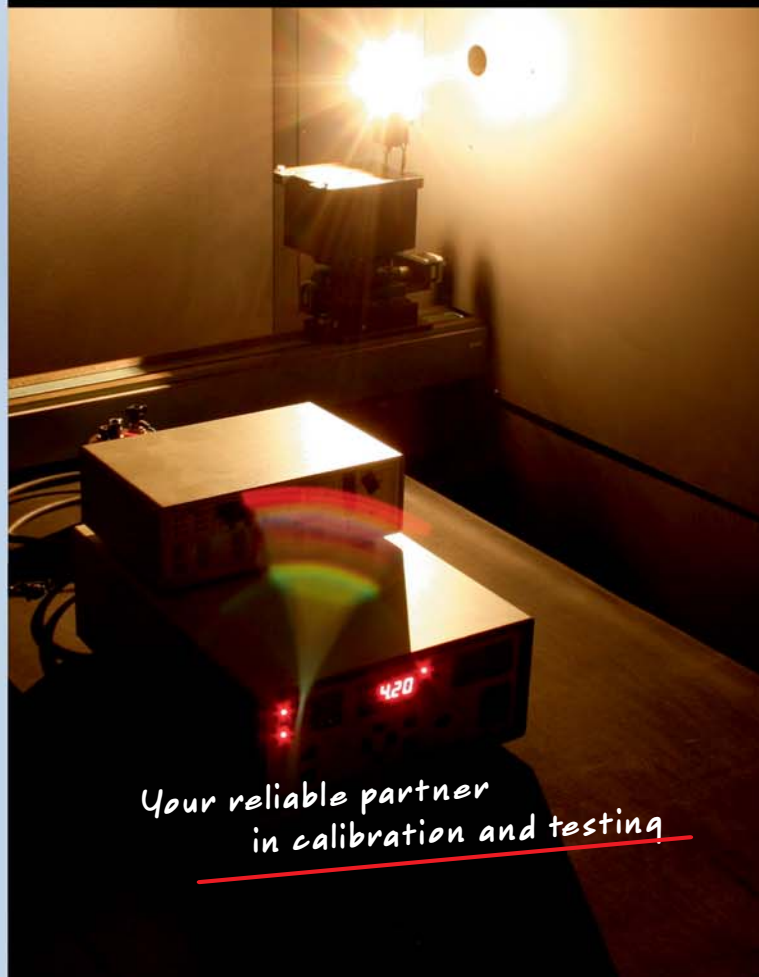
TARTU OBSERVATORY
space research centre

Testing and Calibration Laboratories
Observatooriumi 1, Tõravere
EE-61602 Tartumaa, Estonia
https://www.to.ee/eng/services/

TARTU OBSERVATORY
space research centre

LABORATORIES

Space technology
Calibration
Testing



Your reliable partner in calibration and testing

ENVIRONMENTAL TESTING

Laboratories for environmental testing include test stations for climatic conditions (temperature and humidity), sinusoidal and random vibration, mechanical shock, thermal vacuum, and electromagnetic compatibility in an anechoic chamber.

Climatic conditions in a chamber

- Dimensions of the climatic chamber test space 400 mm × 470 mm × 345 mm;
- Temperature (-40…+150) °C;
- Humidity (30…90)%.

Vibration and shock

- Sinusoidal (5...4000) Hz, max acceleration 720 m/s^2 (73 g), max force 1.5 kN;
- Random (5...4000) Hz,max acceleration 480 m/s^2 (50 g), max force 1 kN;
- High impact shock, Shock Response Spectrum (SRS) frequency range 1 Hz ... 10 kHz, acceleration up to 98 km/s^2 (10 000 g).

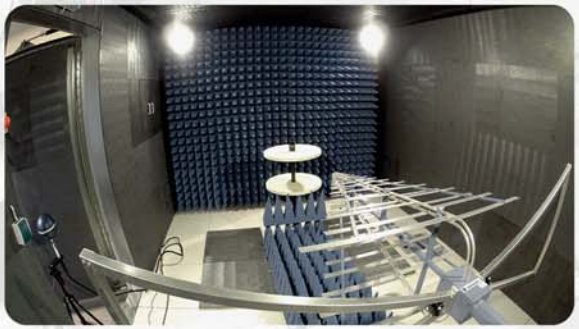
The figures are depending on load.

Thermal vacuum

- Chamber volume 220 L;
- Inner diameter 651 mm;
- Inner length 650 mm;
- Lowest pressure 5×10^{-7} hPa;
- Adjustable temperature range (-40…+250) °C.

Electromagnetic compatibility

The anechoic chamber located at the laboratories of Tartu Observatory is based on the Frankonia Ultra Compact Chamber with ferrite absorbers on all walls and additional hybrid absorbers on one of the walls.



The chamber is suitable for RF immunity and precompliance measurements according to the standard IEC/EN 61000-4-3.

- Dimensions of the test space: 4 m × 3 m × 2.5 m;
- Frequency range 30 MHZ…18 GHz;
- Distance from the test object 1 m;
- Size of uniform field area 0.5 m x 0.5 m.

OPTICS

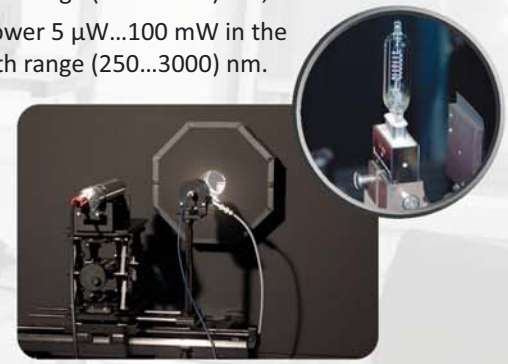
The laboratories for optical measurements, are located in the cleanroom environment (Class 8, ISO 14644-1).

Spectral responsivity of radiometric sensors

- Irradiance and radiance in the wavelength range (340…1500) nm;
- Angular responsivity;
- Inherent stray light effects;
- Uniformity of the flat-field view;
- Temperature effects.

Calibration and characterization of light sources

- Spectral irradiance and radiance in the wavelength range (340…1500) nm;
- Optical power 5 µW…100 mW in the wavelength range (250…3000) nm.



Ground support for remote sensing measurements

- 10 m x 10 m reference panel with removable roof for calibration of air- and space borne remote sensing spectral sensors.

Characterization of materials

- Reflectance and transmittance in the wavelength range (340…1500) nm;
- Ultraviolet (UV) durability tests.