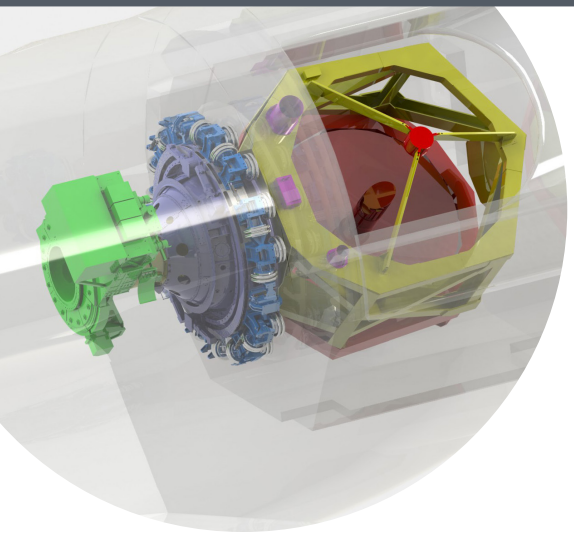
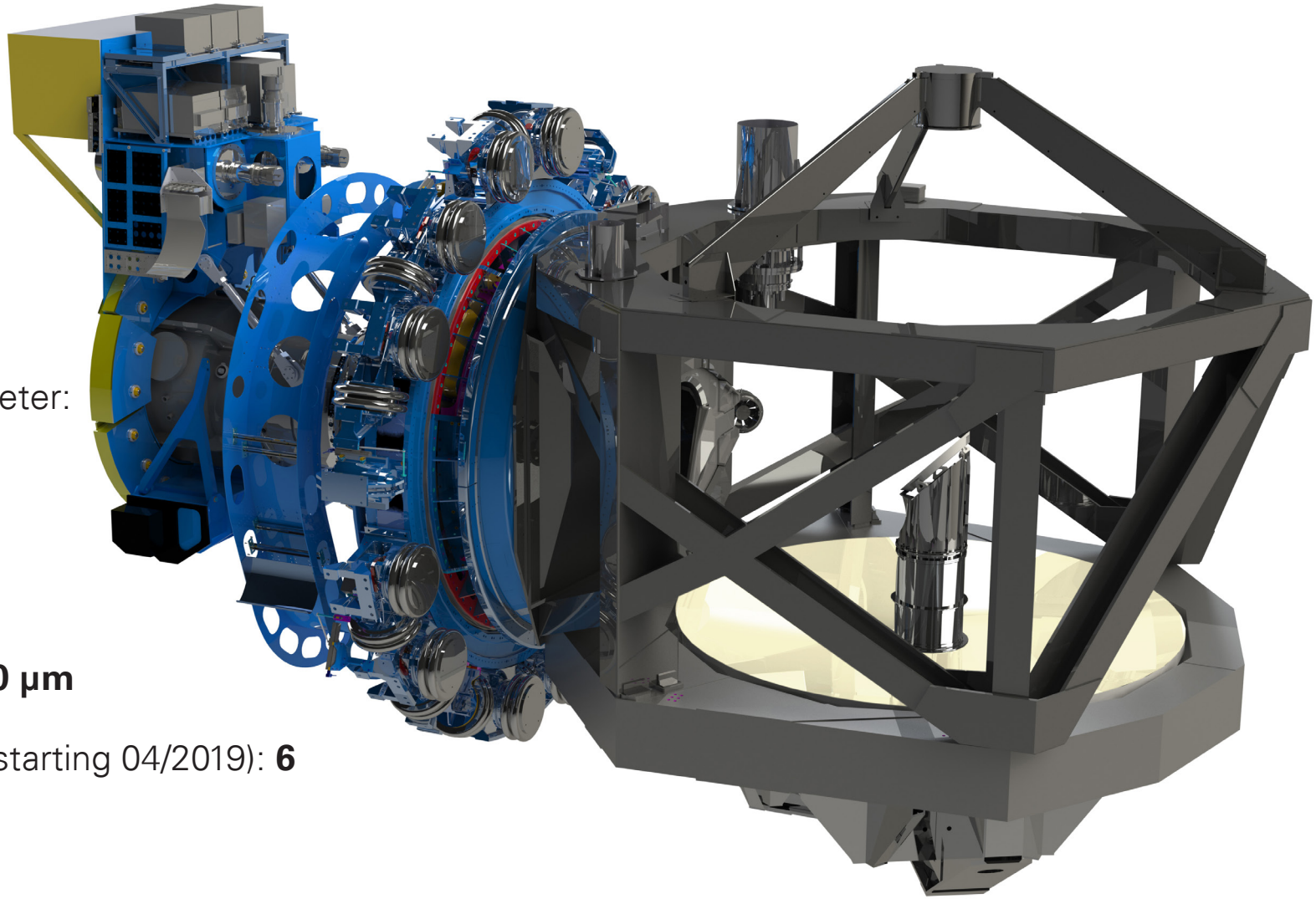
The SOFIA Telescope





Primary Mirror Effective Diameter:
2.7 m

Installation Weight:
15.4 t

Nominal Operational
Wavelenght Range: **0.3 - 1600 µm**

No. of Instruments available (starting 04/2019): **6**

Universität Stuttgart

The SOFIA Telescope

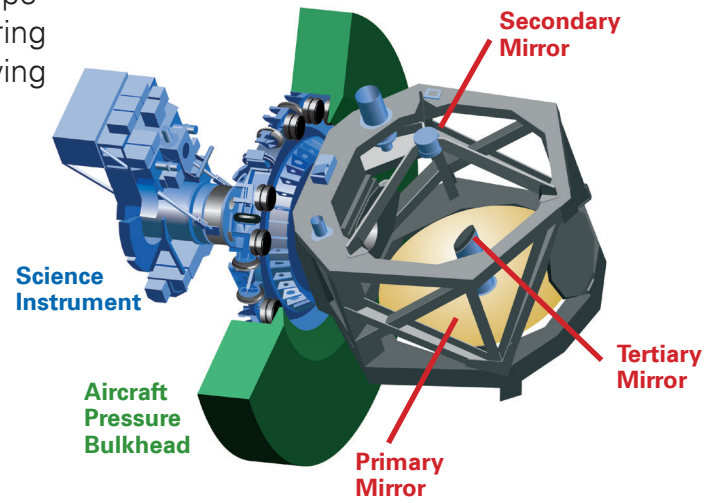
The SOFIA Telescope Assembly was designed and built under a DLR contract with the German companies MAN-Technologie (MAN, now MT-Mechatronics) and Kayser-Threde (KT). Dozens of European companies contributed to the development of the telescope-assembly under subcontracts with MAN/KT. After being pre-assembled and tested in Germany the telescope was air-shipped to the integration site in Waco, Texas, in September 2002. After being installed into the modified 747SP and subsequent thorough tests on the ground the SOFIA telescope had its maiden flight on April 26, 2007. Shortly after that SOFIA was ferried to the to NASA Dryden Flight Research Center (now, Armstrong), then to the NASA research aircraft operations facility in Palmdale, California, entering an extensive flight test program with following milestones for the telescope:

- December 2007: first flight with activated Telescope Assembly
- December 2009: first open door flight
- May 2010: first light flight
- November 2010: first science flight
- May 2014: Full Operation Capability

Credits
Produced under the auspices of the University of Stuttgart:
IRS - Institut für Raumfahrtsysteme
© pictures (front page)
Image copyyright: Telescope: DSI; Detail of the milkyway: A.Fujii
© pictures (back side)
Telescope: DSI
Detail of the milkyway: A.Fujii

Key Telescope Characteristics:

Weight of telescope: ca. 15,400 kg.
Configuration: Cassegrain telescope with Nasmyth focus; permanent access to science instrument from cabin
Structural layout: Carbon fiber-structure in dumbbell configuration with trusswork metering tube
Rotation isolation system: spherical hydrostatic bearing with 2 rings, 1.2 m diameter, 10-30 bars hydraulic pressure
Rotation drive system: gear drive for coarse elevation, and brushless DC spherical segment motor drives for fine elevation, cross-elevation and line-of-sight (L.O.S.)



Vibration isolation system: 12 radial & 12 axial air springs plus 3 damper elements
Primary mirror (PM): diameter 2.70 m, effective aperture 2.50 m, lightweighted ZERODUR structure on 18-point whiffle-tree support, PM ratio f/1.28, aluminum coated
Secondary mirror (SM): Silicon-Carbide (SiC) material, 352 mm diameter, aluminum coated
SM functions: focus, alignment, chopping (2-axis in arbitrary directions, offset, three point, stationary)
Tertiary mirror (TM): 2 flat mirrors, dichroic (gold coated) and non-dichroic (aluminum coated)
System focal ratio: f/19.6
Wavelength range: 0.3 to 1,600 microns
Unvignetted field of view: 8 arcminutes
Ranges of motion: elevation 15-70 degrees (20-60 degrees unvignetted), cross-elevation and L.O.S. ± 3.0 degrees
Image quality: 80% energy in 1.5 arcseconds circle
Image stability: 0.8 arcseconds at start of operation, with the goal of 0.2 arcseconds

Deutsches SOFIA Institut

SOFIA, the „Stratospheric Observatory for Infrared Astronomy" is a joint project of the Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR; German Aerospace Center, grant: 50OK0901, 50OK1301 and 50OK1701) and the National Aeronautics and Space Administration (NASA). It is funded on behalf of DLR by the Federal Ministry for Economic Affairs and Energy based on legislation by the German Parliament, the State of Baden-Württemberg and the University of Stuttgart. Scientific operation for Germany is coordinated by the German SOFIA-Institute (DSI) of the University of Stuttgart, in the USA by the Universities Space Research Association (USRA).

Deutsches SOFIA Institut | Pfaffenwaldring 29 | 70 569 Stuttgart |
Tel.: (0711) 685-623 79 | **www.dsi.uni-stuttgart.de**