

# **GESTRA – German Experimental Space Surveillance and Tracking Radar**

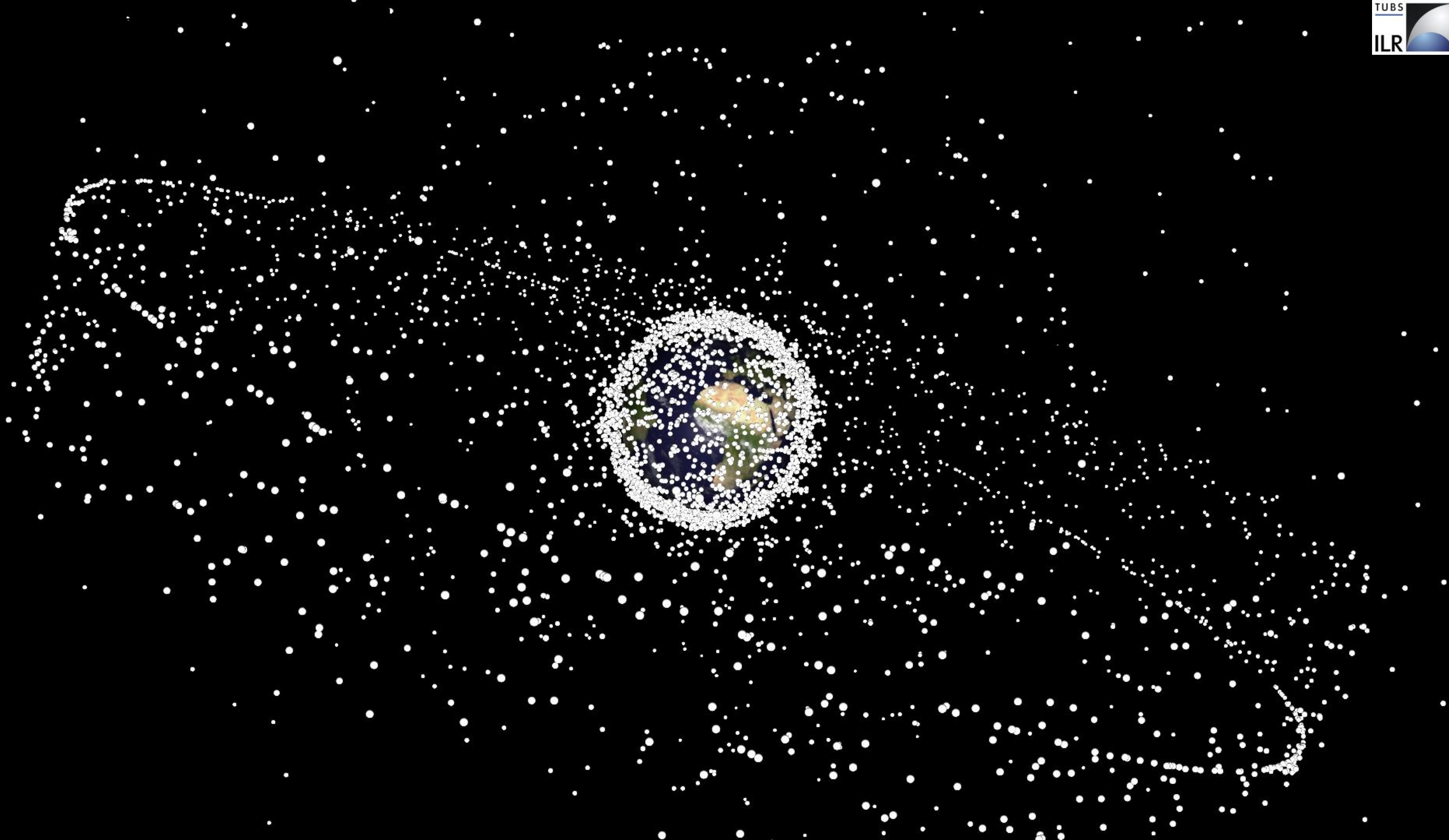
A high-performance experimental radar for space surveillance

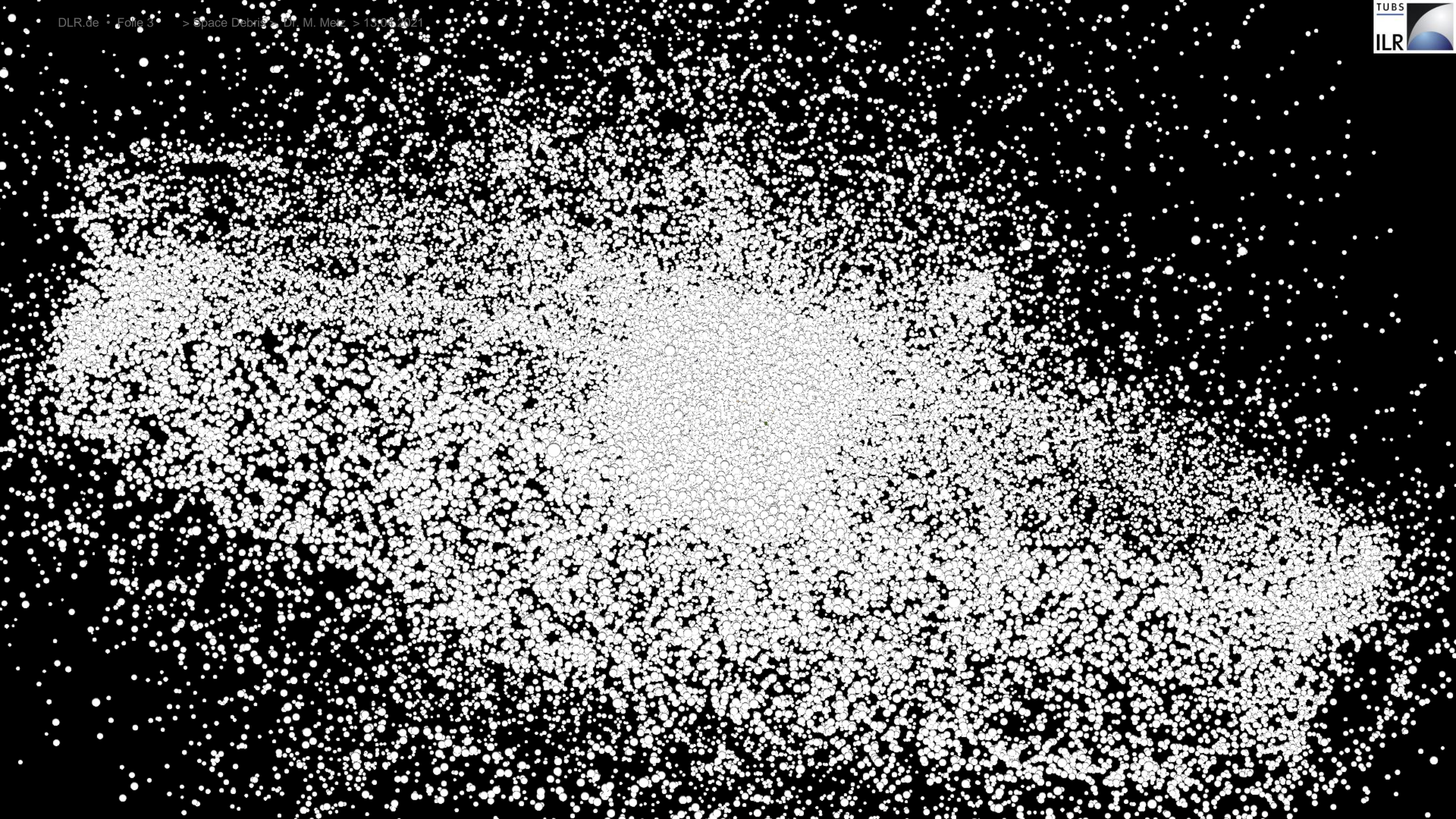
Technical presentation delivered to the  
58<sup>th</sup> session of the Scientific and Technical Subcommittee of UNCOPUOS

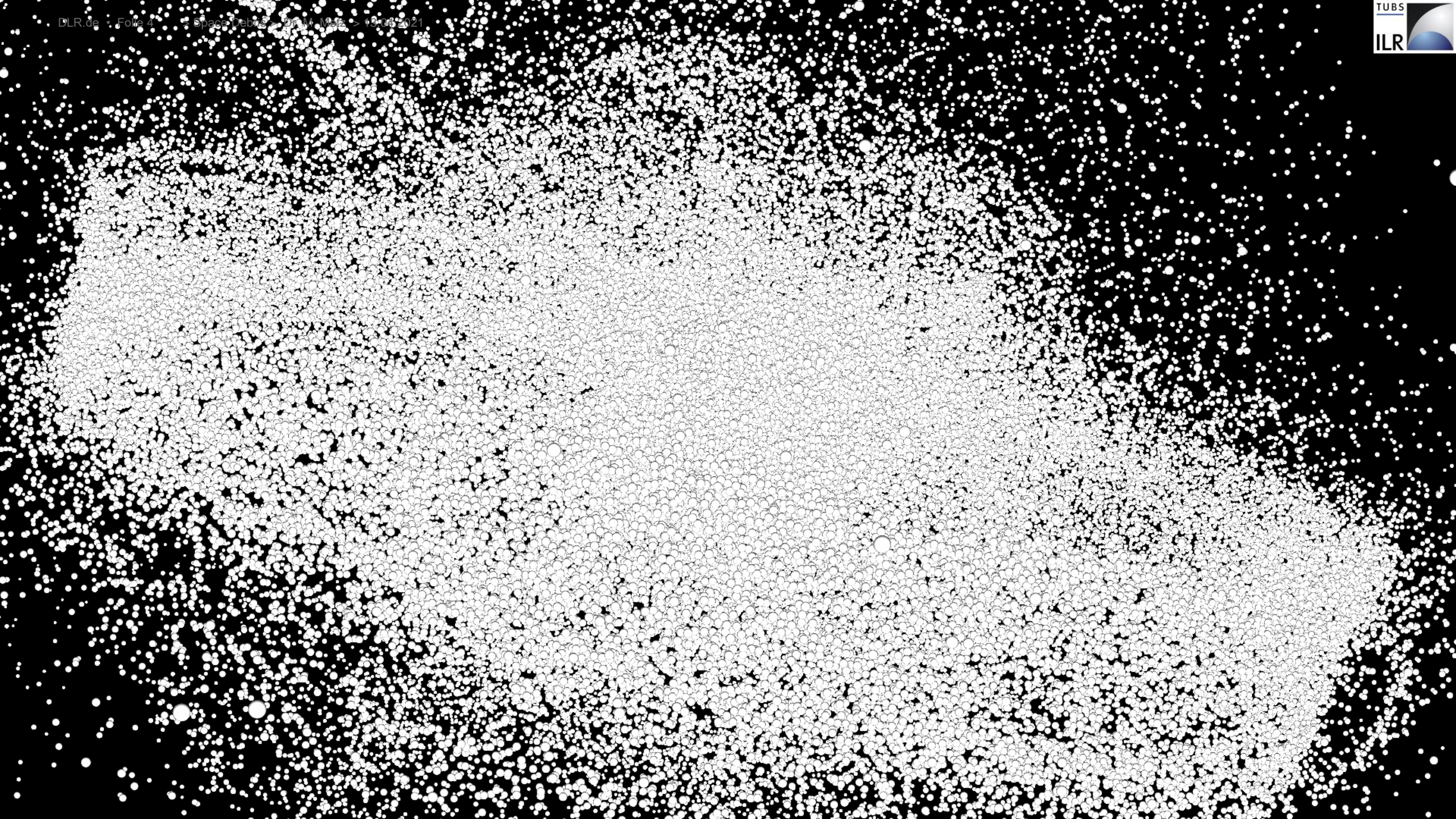


Knowledge for Tomorrow









## In more than 60 years of space flight history:

> 6.000 launches

~ 10.600 satellites launched

~ 6.200 satellites in orbit & ~ 2.000 R/B

~ 3.600\* active satellites today

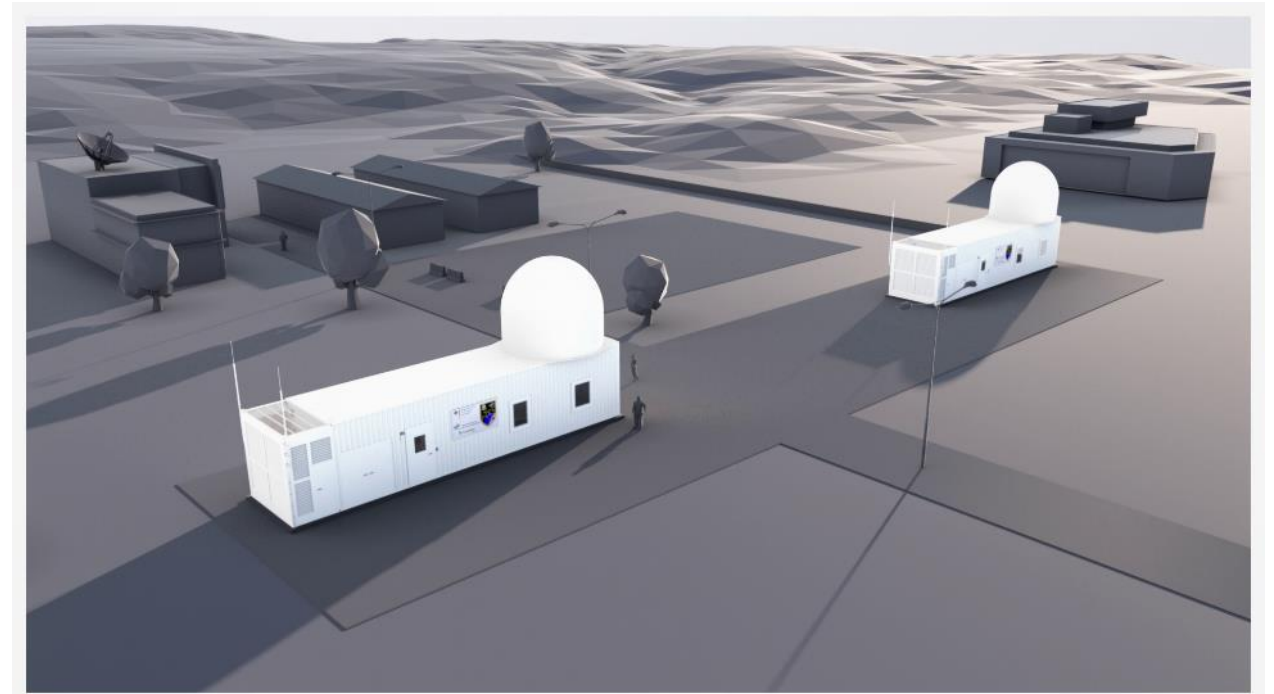
# German national contribution

- The space strategy of the German federal government outlines the necessity of a national competence for the detection and evaluation of the space situation
- Since 2012 the German Space Situational Awareness Center in Udem is operational as a joint project of BMVg (Ministry of Defence) and BMWi (Ministry of Economic Affairs and Energy)
- In December 2014 the DLR Space Agency assigned the Fraunhofer FHR to develop and build an experimental radar system, GESTRA:  
“**German Experimental Space Surveillance and Tracking Radar**”



# GESTRA – High performance radar for space surveillance

- Close monostatic pulsed phased array radar operating in L-band ( $\sim 1.3$  GHz)
- Space surveillance of the low Earth orbits (LEO) up to altitudes of 3000 km
- Enhanced surveillance flexibility by combining mechanical and electronical beam steering
- Various operational and experimental modes for surveillance and tracking (e.g. Track-while-Scan)
- Partly mobile shelters
- Remotely controlled by the German Space Situational Awareness Centre (GSSAC) in Uedem



## GESTRA - Design

- Shelter dimensions 18 m x 4 m x 4 m
- Weight ~ 90 metric tons
- Separate areas for heat exchanger, cold water unit, operating room and radar system
- Removable radome
- Scissor lift table for maintenance and transport
- 3-axis positioner
- Liquid-cooled antenna
- Highly flexible energy chain

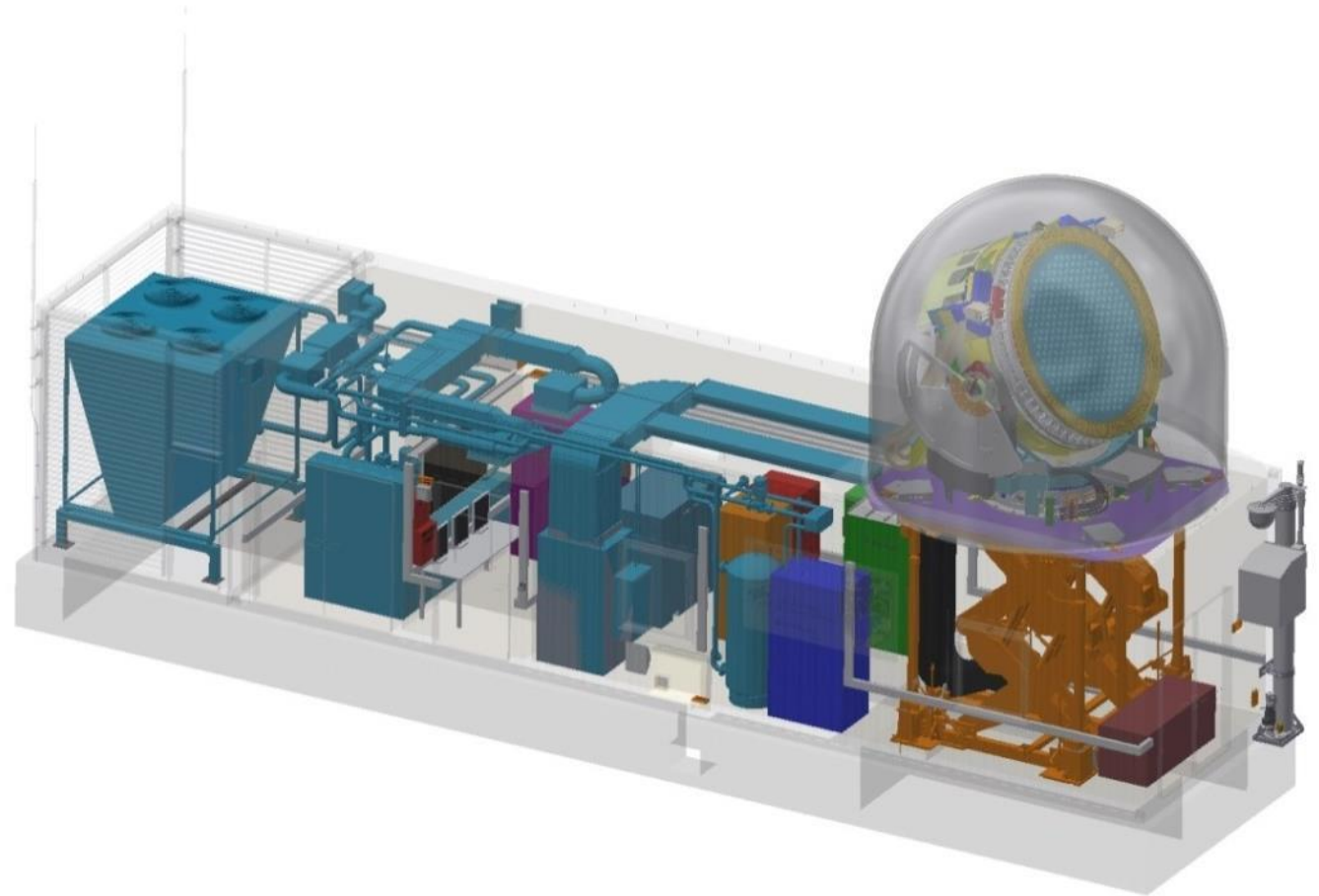


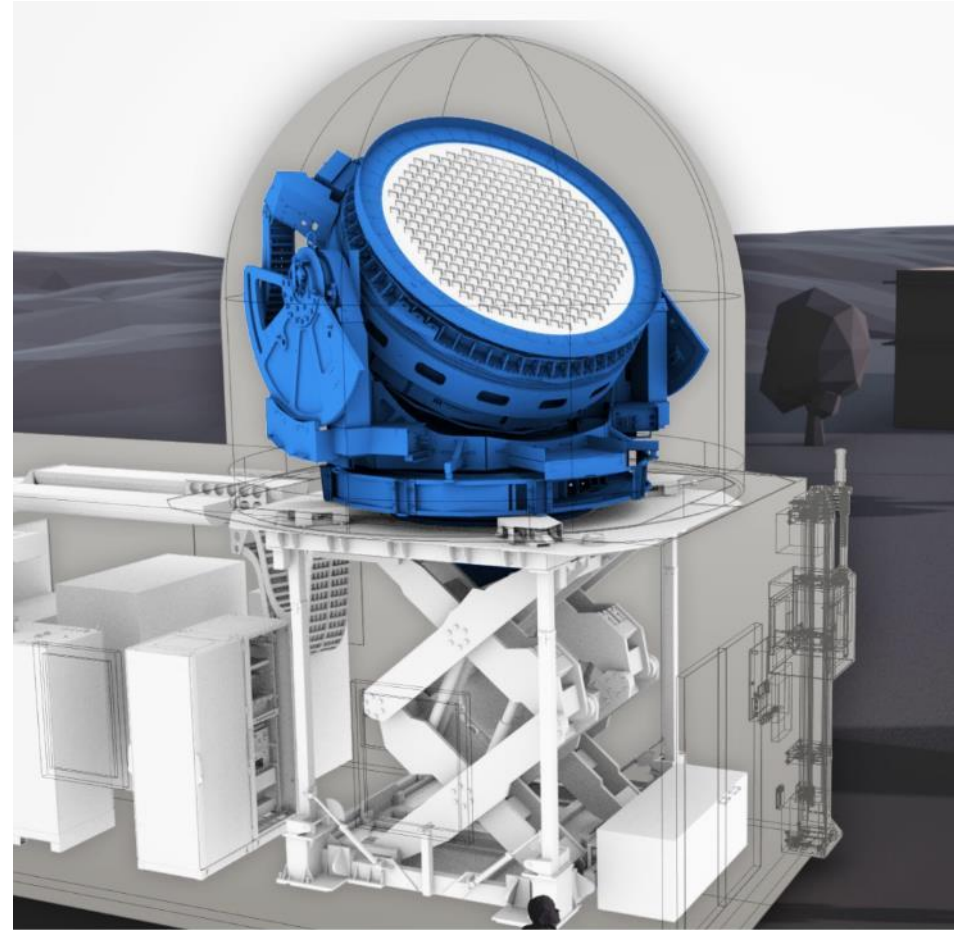
Image Source: Fraunhofer FHR





## Positioner with antenna

- Planar phased array antenna with **256** active elements and integrated liquid cooling
- 3-axis positioner for selecting the Field of View
- Integration of energy chains



# GESTRA – receive shelter at its operational site



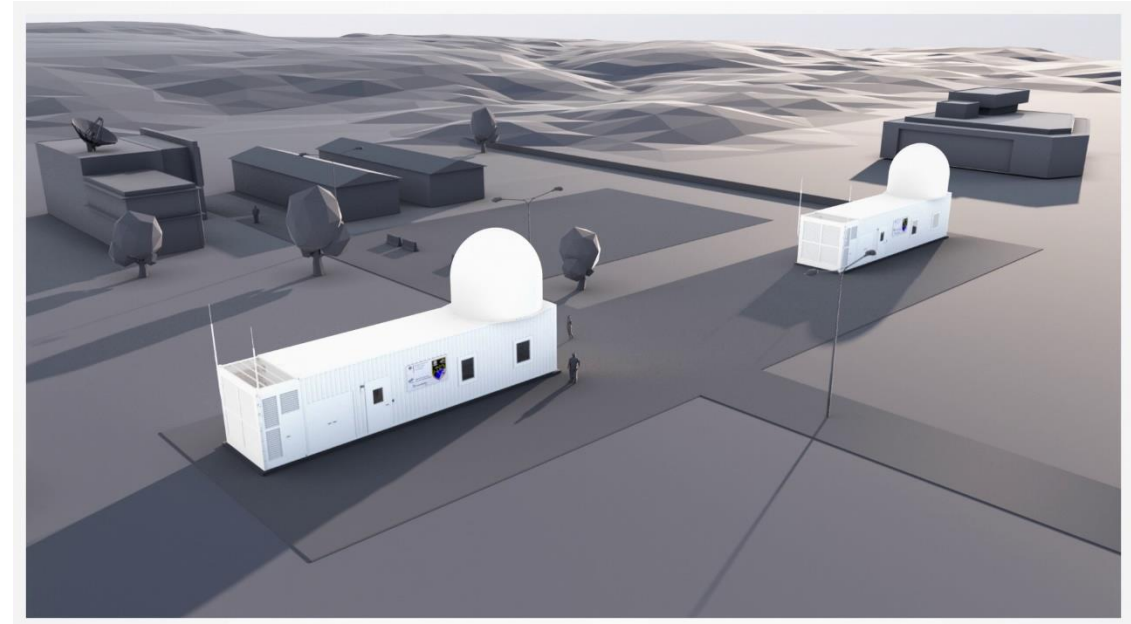
# GESTRA – transmit shelter at its operational site



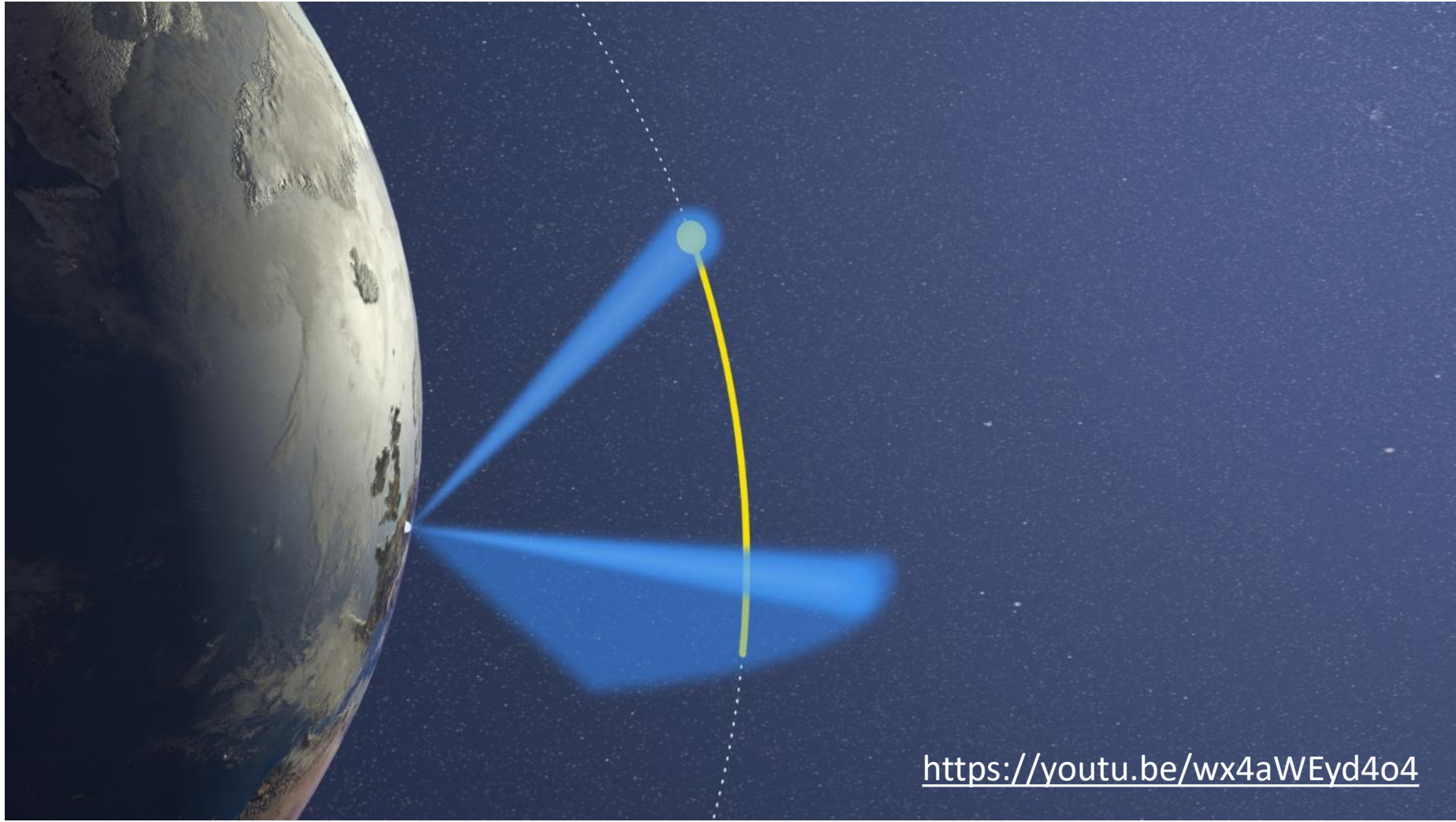
# GESTRA Operations

GESTRA will be operated by the German Space Situational Awareness Centre (GSSAC), to

- Build-up a national catalogue of objects in LEO
- Contribute measurements to the European Union's Space Surveillance and Tracking Programme (EU SST)
- Provide input for further national R&D activities



## Watch „GESTRA in operations“



# Acknowledgments

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Federal Ministry  
for Economic Affairs  
and Energy



**Fraunhofer**

**FHR**

Fraunhofer Institute for High Frequency  
Physics and Radar Techniques



**DLR Space Agency**

