

# **ILWS Related Activities in Germany (Update)**

**Prague, June 11 -12, 2008**



# Overview

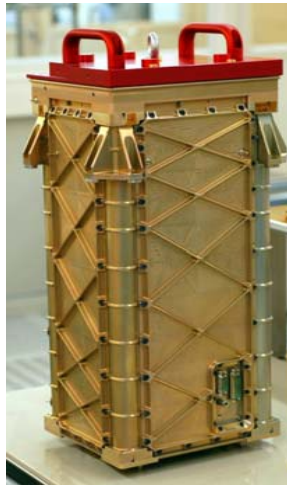
- Update is based on previous ILWS Presentations
  
- Focus on recent developments and achievements
  - SOL-ACES
  - Sunrise
  - Solar Orbiter
  
- No details on German participations in ESA missions
  - Ulysses (several instruments)
  - SOHO (several instruments)
  - Cluster (several instruments)
  - BepiColombo (magnetometer)
  
- List of further German contributions to Missions on Solar Research

# SoIACES: Mission & Instrument Characteristics

## Mission Characteristics:

- Start of operation / launch: 7. February 2008
- Launcher: Space Shuttle (NASA)
- Nominal / extended (TBC) mission duration: 18 / 36 months
- Orbit characteristics: ISS orbit (altitude ~400 km)
- Observation schedule: max. 20 minutes per orbit

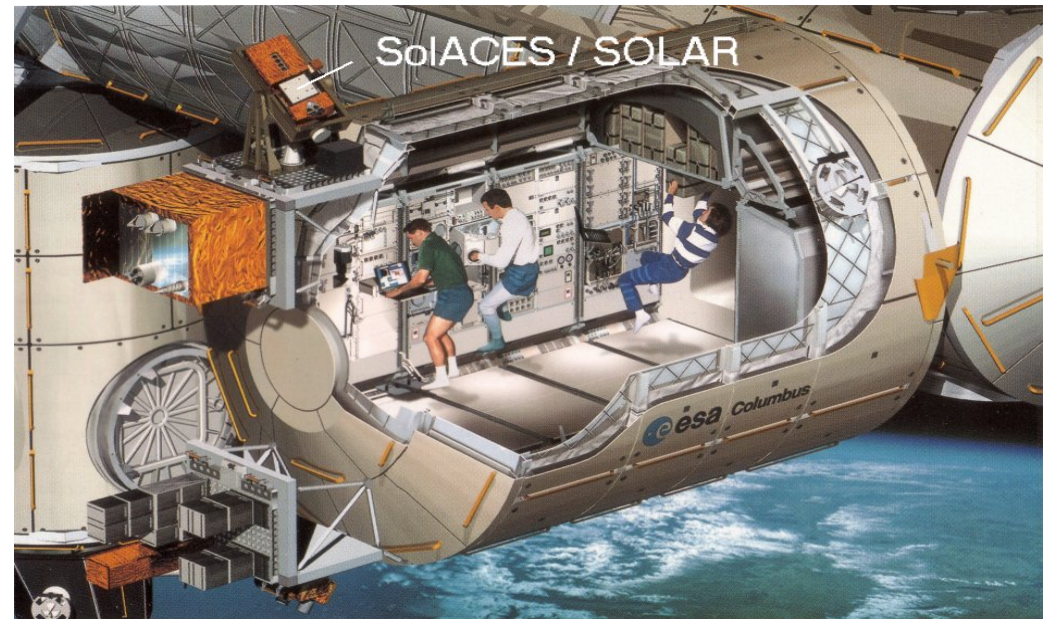
SoIACES  
Flight Model  
(with cover)



Fraunhofer Institut  
Physikalische  
Messtechnik

## Instrument Characteristics:

- Mass: 23.0 kg
- Size: 25 x 29 x 60 cm<sup>3</sup>
- Electrical power consumption:  
typ. < 25 W / max. 60 W
- Data rate: ~1.0 kbit/s
- Spectral range: 17...220 nm (EUV/UV)
- Spectral resolution: 0.5...2 nm
- Radiometric accuracy: < 3%



SoIACES / SOLAR on Columbus (© ESA)



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## SolACES: Current Status (I)

- **Launch:** 7. February 2008 with Columbus to the ISS on Shuttle flight STS-122
- **Commissioning & first calibration / science measurements:** March – May 2008
- **Nominal science operations:** from June 2008
  - ⇒ **complementary measurements** of the solar radiation of SolACES with **SOLSPEC** (France) and **SOVIM** (CH)
  - ⇒ **absolutely (flux) calibrated spectra** of the Sun in the wavelength range 17...3000 nm; variations of the **solar constant**
- **Ground operations center (SOLAR payload):** Belgian User Support and Operation Centre (B.USOC)

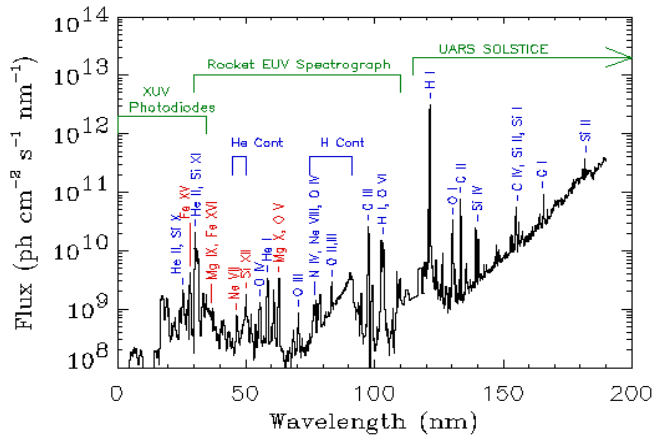


SolACES / SOLAR on STS-122 (© NASA / ESA)

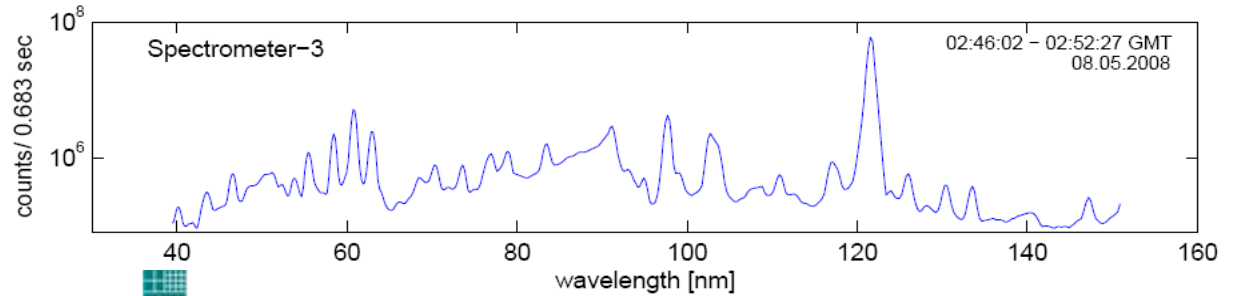
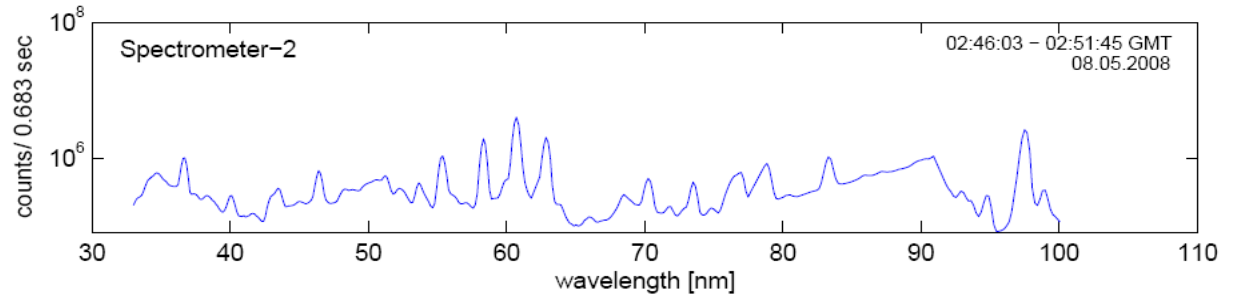
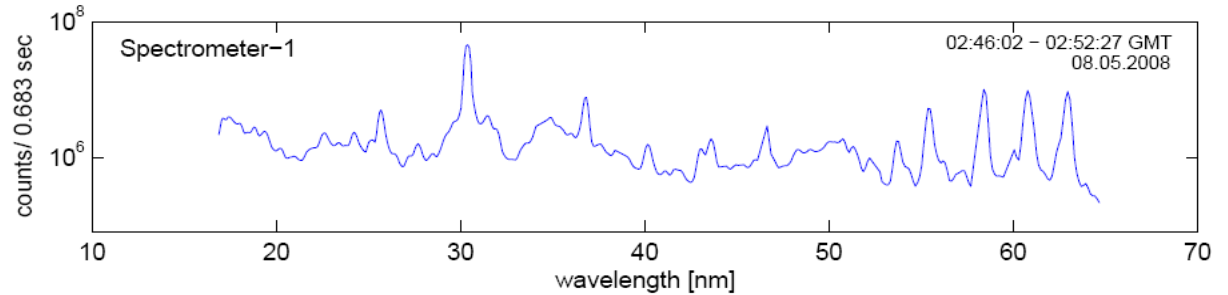
# SolACES: Current Status (II)

## First EUV / UV (raw) spectra of the Sun by SolACES

(taken on 8. May 2008; not calibrated)



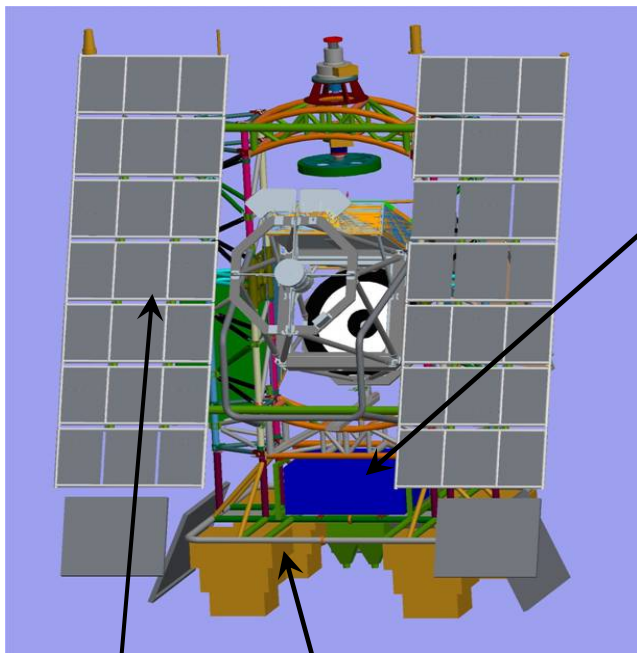
EUV / UV wavelength calibration  
(T.N. Woods et al., 1999)



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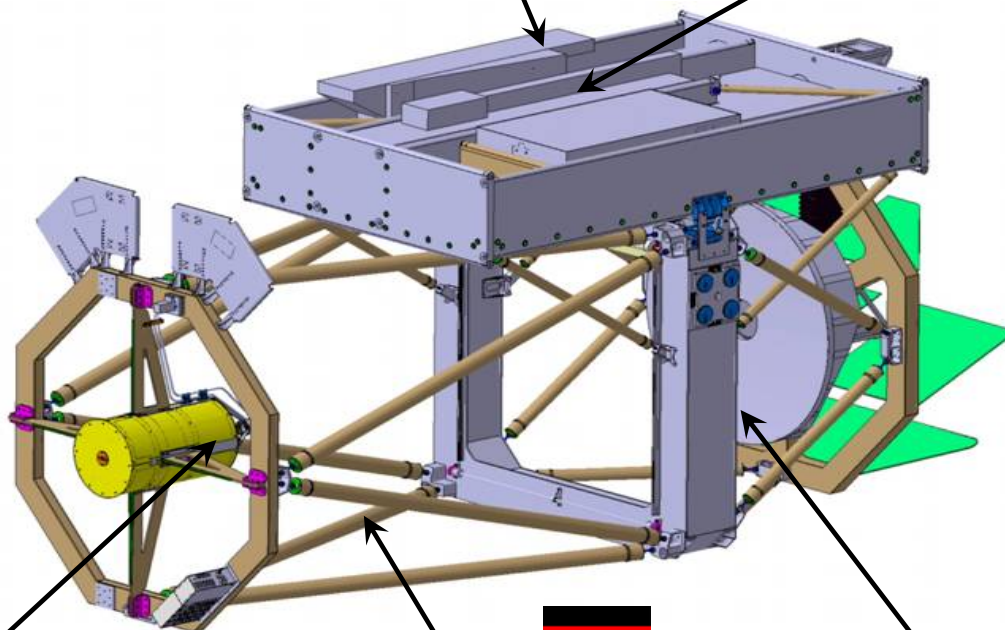
Gondola- und Pointingsystem (HAO)



Power- and Telemetrysystem (HAO)

Data Handling System (MPS)

Instrumentassembli (MPS)  
SUFI-Instrument (MPS / KIS)  
SUPOS-Instrument (MPS / KIS)  
IMAX-Instrument (IAC)



Imagestabilisation (KIS)

Telescope



Ø1m Main mirror



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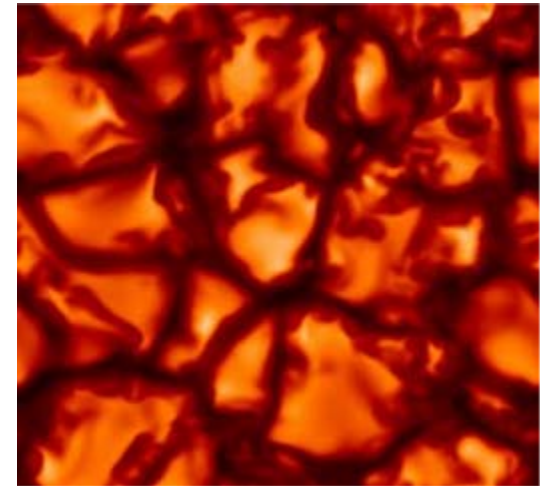
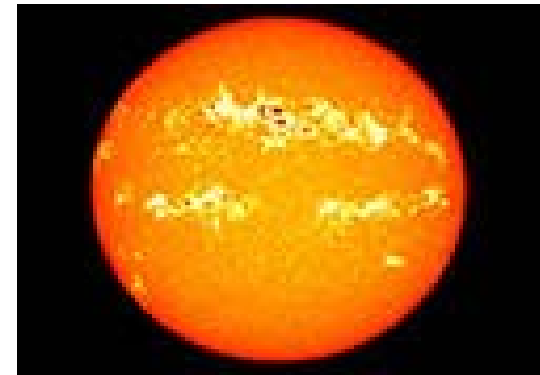
# Sunrise – scientific objectives and status

## Main goals of Sunrise:



- **High-resolution imaging of the Sun (spatial resolution 30-100 km) in the UV- and visible wavelength range**
- **Spectral Measurements of the dynamics of the solar atmosphere**
- **Polarimetric Measurements of the solar magnetic field**







## Status of Sunrise:

- **Successful test-flight of the gondola over Ft. Sumner (USA) in October 2007**
- **Mirror and telescope structure are ready for integration**
- **Balloon launch of Sunrise is planned for summer 2009 from ESRANGE (Sweden)**



# SOLAR ORBITER Reference Payload

Instrument	
<b>In-Situ instruments</b>	
Solar Wind Plasma Analyzer (SWA)	
Radio & Plasma Wave Analyzer (RPW)	
Magnetometer (MAG)	
Energetic Particle Detector (EPD)	
Interplanetary Dust Detector (DPD)	


Instrument	
<b>Remote sensing instruments</b>	
Visible Imager & Magnetograph (VIM) Polarimetric and Helioseismic Imager (PHI)	
EUV Spectrometer (EUS)	
EUV full-Sun and high-resolution Imager (EUI)	
Coronagraph (COR)	
Spectrometer Telescope Imaging X-rays (STIX)	
Heliospheric Imager/Wide Field Coronagraph (HI)	
Spectro-Coronagraph and EUV disk-spectrometer (METIS)	

Germany scientists were highly involved in the science definition and well represented in the responses to the AO for Solar Orbiter



# List of further German contributions to Missions on Solar Research

Instrument/Project	German Institute	Contributions	Science Objectives
Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESSI)	Astrophysikalisches Institut Potsdam	Software for data analysis	Energy dissipation and particle acceleration in solar flares
Solar Dynamics Observatory (SDO)	Max Planck Institute for Solar System Research	Operation of a German Data Center	Solar Imaging, Space Weather
STEREO (Solar Terrestrial Relations Observatory)	Max Planck Institute for Solar System Research and University Kiel	Telescope-doors, parts of particle instruments and data analysis	Solar Imaging 3 dimensions, Coronal Mass Ejections and Space Weather
THEMIS – Time History of Events and Macroscale Interactions during Substorms	Technical University Braunschweig	Fluxgate-Magnetometers for the five satellites	Magnetosphere of the Earth and physical causes of polar storms
TWINS Lyman alpha	University Bonn	Lyman Alpha-Detectors for 2 satellites	Near Earth geocoronal and interplanetary hydrogen



**Thank you  
for  
your attention !**