

BRITE Constellation – 2 Years in Orbit



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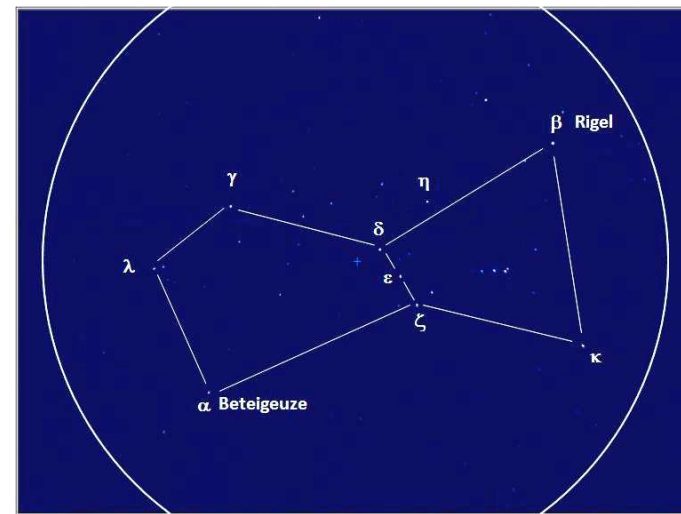
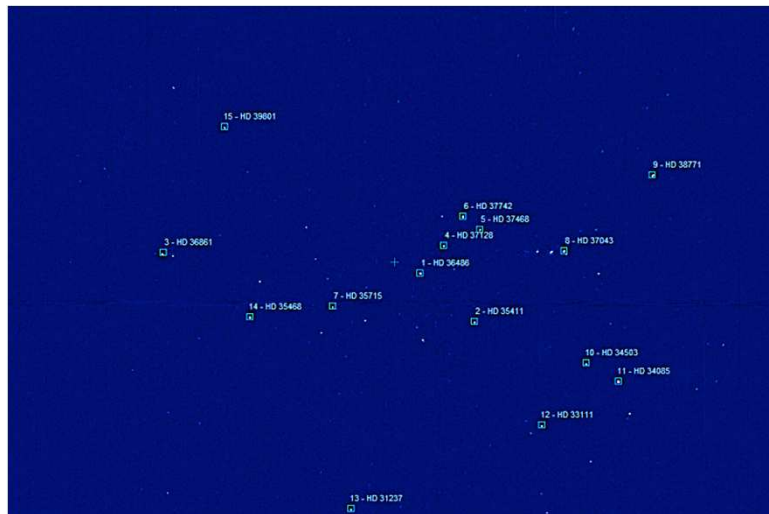
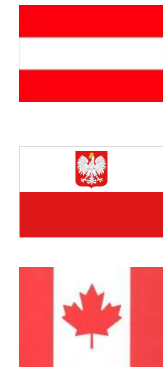
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- Summary

BRITE (BRiGht Target Explorer)

- First nanosatellite constellation dedicated to an astronomy mission (asteroseismology)
- 5 spacecraft operational in Space
 - Austria (BRITE-Austria/TUGSAT-1 & UniBRITE)
 - Poland (BRITE-PL1 „Lem“ & BRITE-PL2 „Heveliusz“)
 - Canada (BRITE-CAN1 „Toronto“)



Scientific Goals

- Photometric measurement of brightness and temperature variations of massive luminous stars (up to visual magnitude 4)
- Fastest data cadence: few minutes
- Time base: up to 2 years
- high duty cycle
- 2-colour (blue and red)
- 24° field of view



BRITE Flight Model

magnetometer

S-band antenna

solar cells

telescope

star tracker

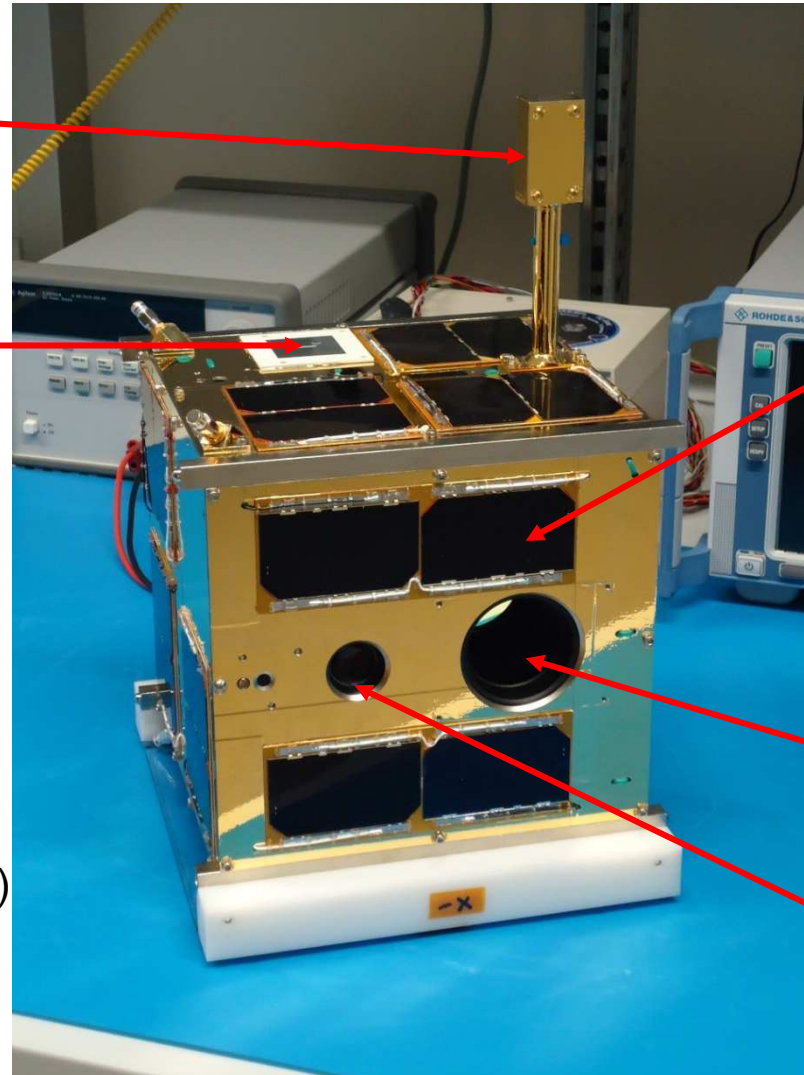
Size: 20 x 20 x 20 cm

Mass: 6.8 kg

Power: 6...10 W

S-Band downlink (256 kbit/s)

UHF uplink (9.6 kbit/s)



Launch

- TUGSAT-1/BRITE-Austria and UniBRITE were launched by PSLV-C20 of ISRO/ANTRIX on 25 February 2013 from the Satish Dhawan Space Centre in Sriharikota
- Sun-synchronous LEO orbit



Courtesy: ISRO

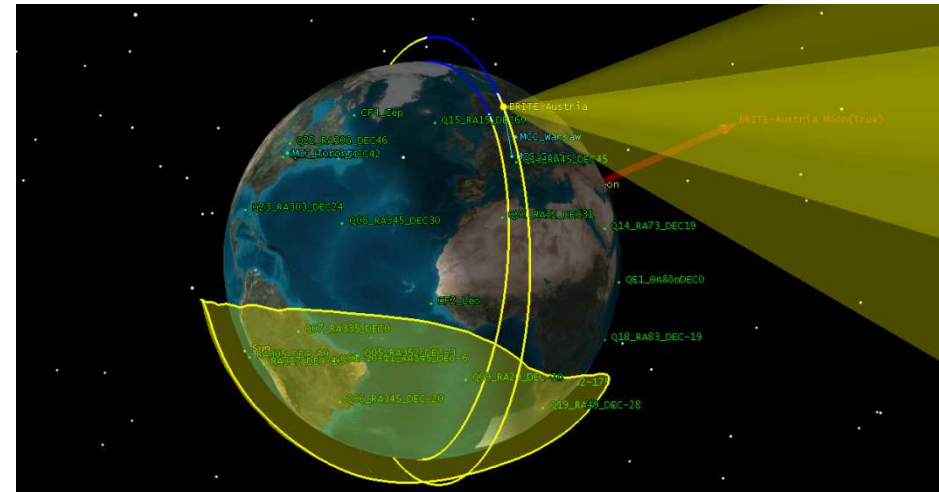
Mission Operations

- 14 orbits per day
 - 3 orbits in morning sequence
 - 3 - 4 orbits in evening sequence
- Automatic & remote ground stations operations supported
- BRITE-Austria operated from Graz
- UniBRITE operated from Toronto



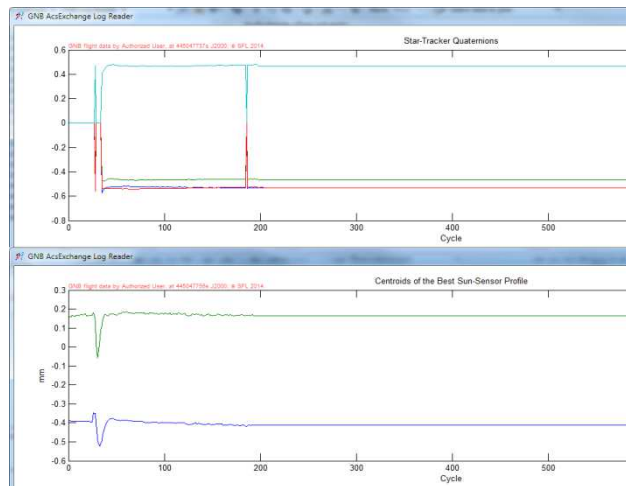
Management

- BRITE Executive Science Team (BEST)
 - ✓ Scientists from Austria, Canada, Poland
 - ✓ Defines targets
- Operation teams
 - ✓ Prepare commands for spacecraft,
 - ✓ up- and downloads

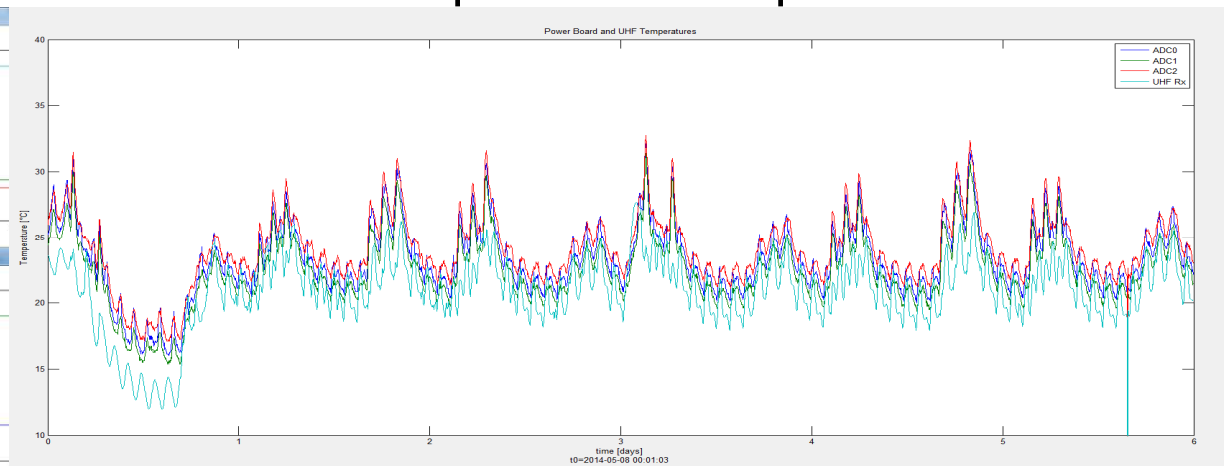


Satellite Performance

Attitude



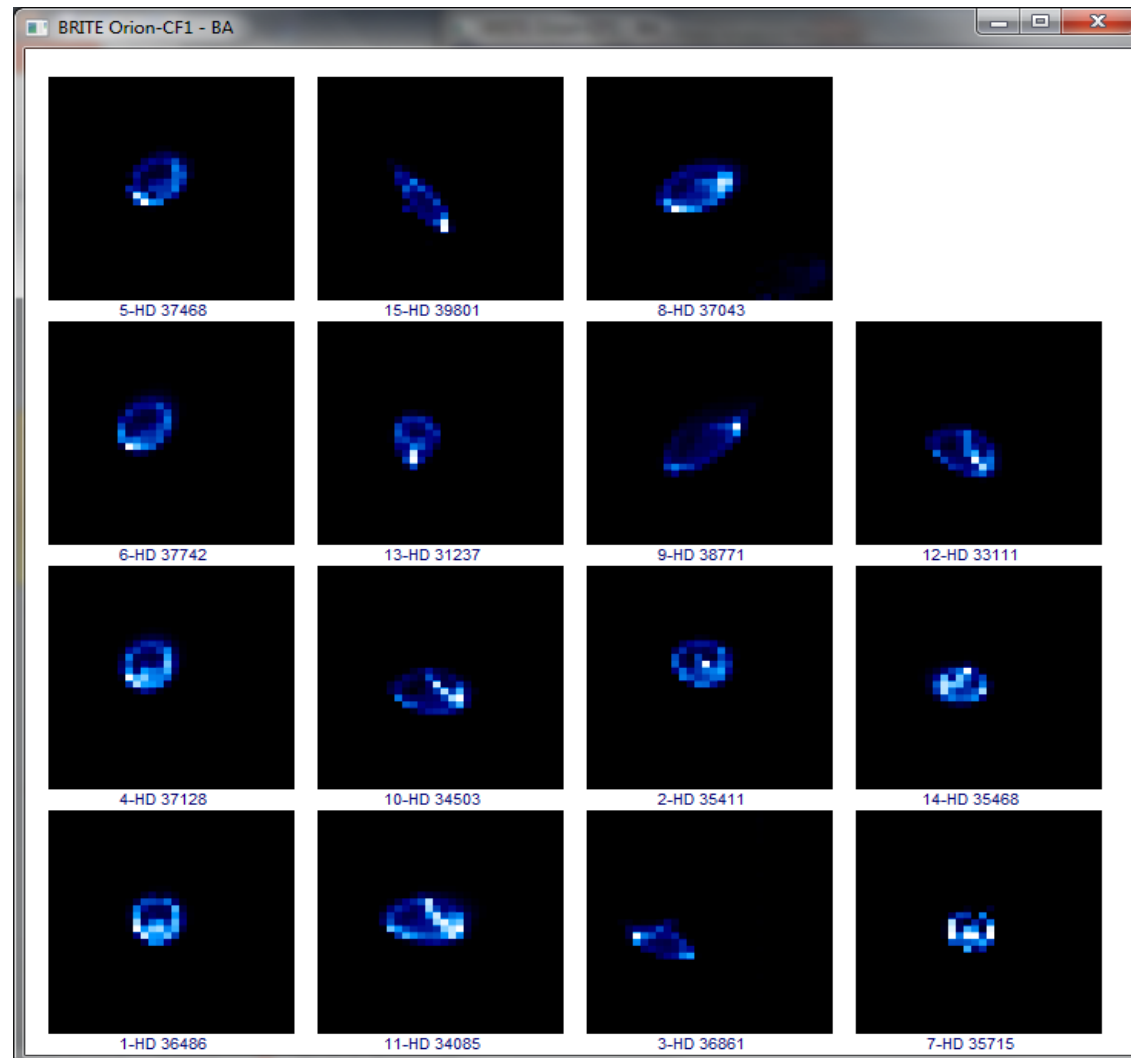
Spacecraft temperature



- RMS pointing stability in X / Y: 1.6 / 1.5 pixels (2 – 3 pixels)
- Up to 20 subrasters: 32x32 to 24x24 pixels
- Typical 1 sec integrations, stacking available
- CCD deterioration due to radiation -> chopping

Raster Photometry

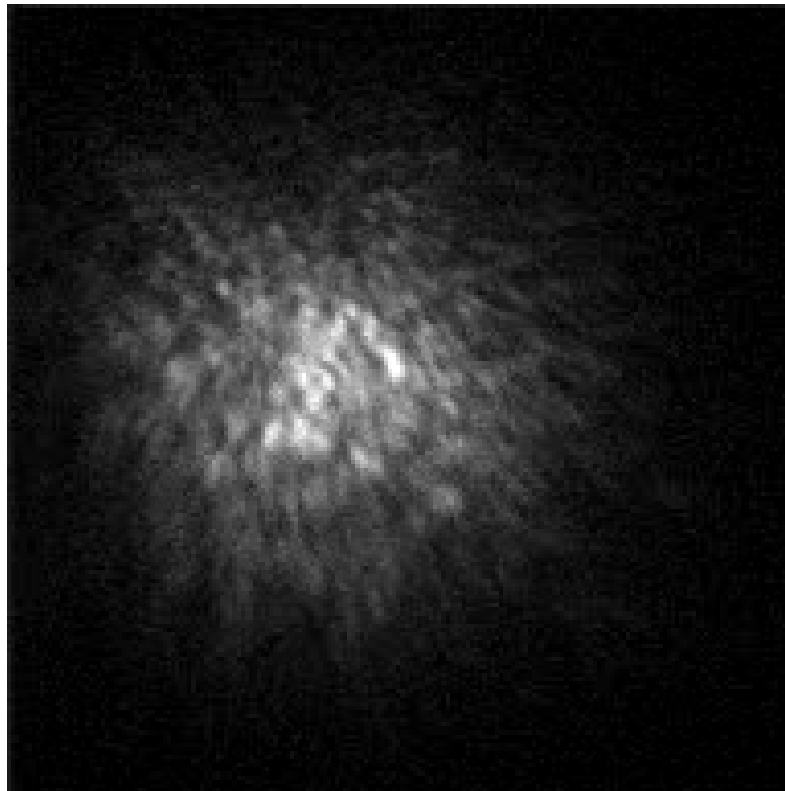
- Raster: 24 x 24 pixels



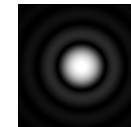
All 15 rasters during one observation, spacecraft pointing at Orion

Ultrapraecision

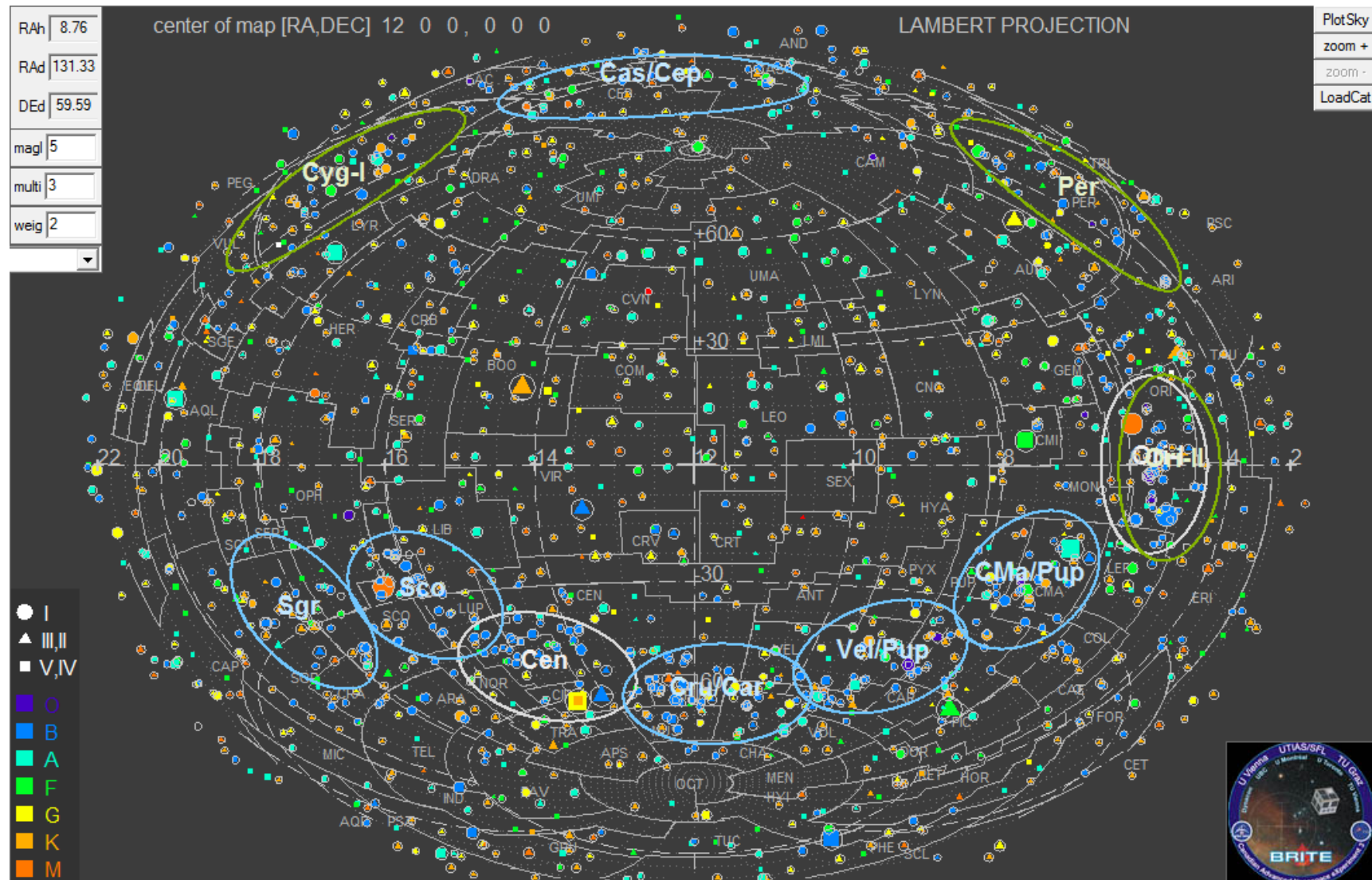
from ground



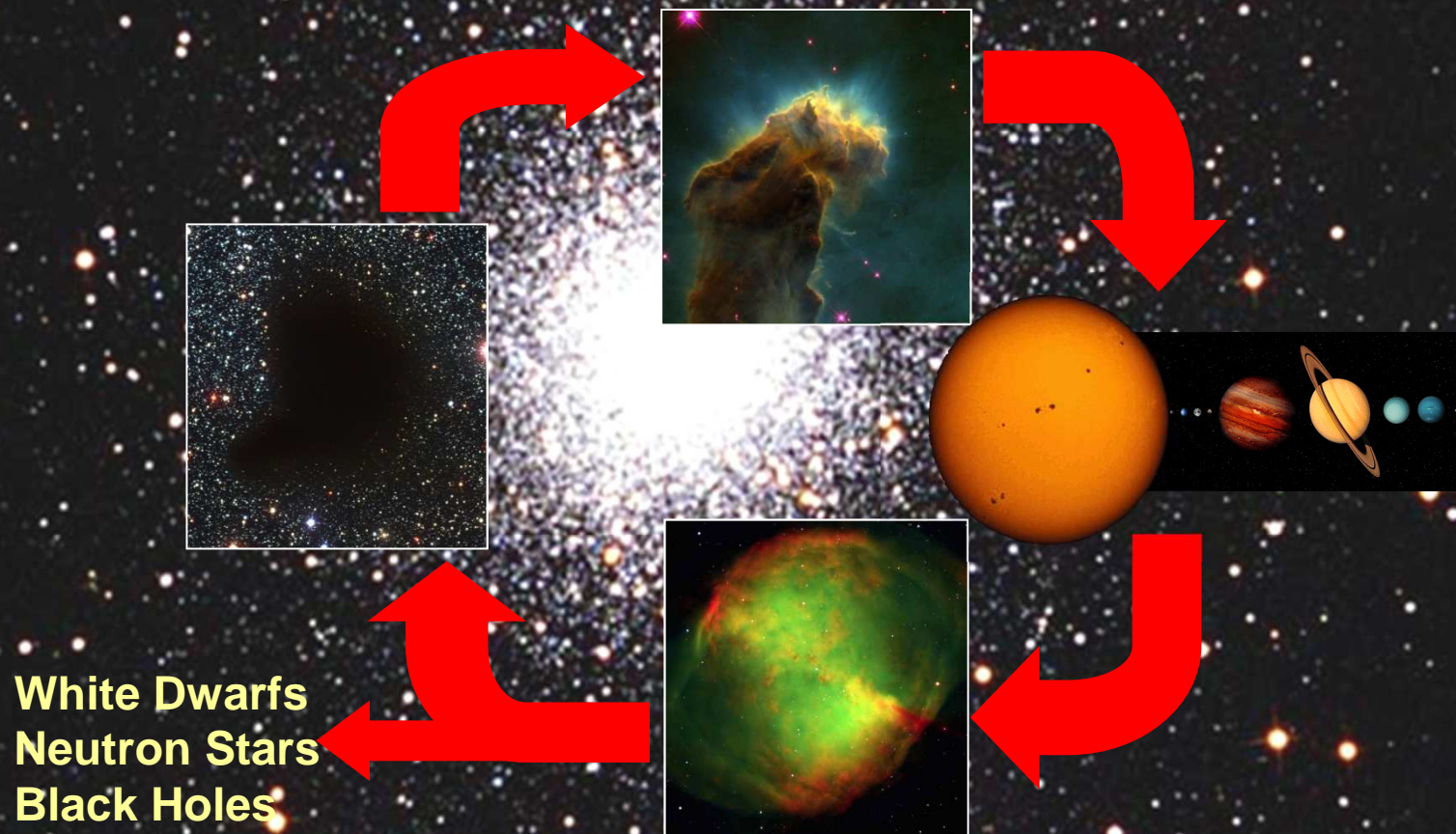
in space



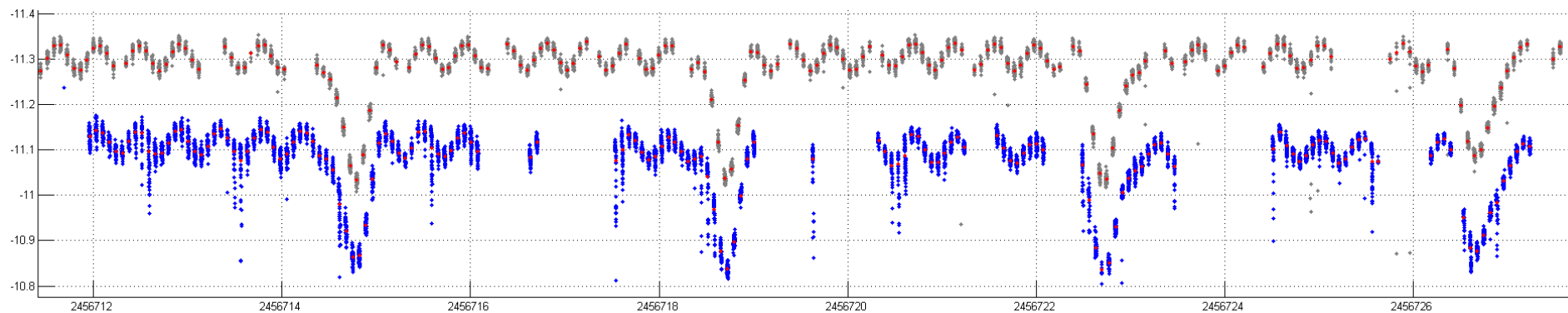
Observations Planning



Life Cycle of Matter



Light Curve for Orion

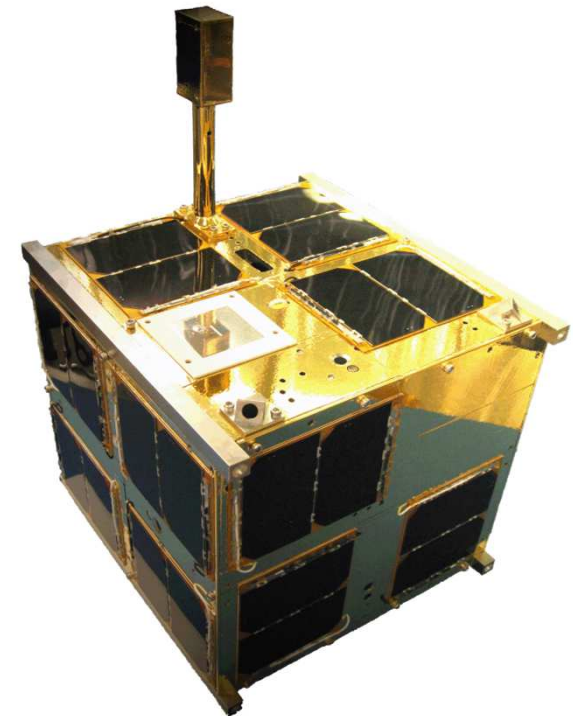


Gray curve: TUGSAT-1/BRITE-Austria (blue filter)

Blue curve: UniBRITE (red filter)

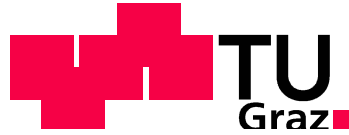
Bright Star Bonus

- ✓ **Interferometry**
 - angular diameter
- ✓ **Adaptive Optics & Lucky Image**
 - stellar & debris disks
- ✓ **Parallax with high accuracy**
 - linear diameter
- ✓ **Very high spectral resolution spectroscopy**
 - stellar fundamental parameters & atmosphere
 - (Doppler) surface imaging
- ✓ **Time resolved spectroscopy**
 - asteroseismology
- ✓ **Spectropolarimetry**
 - magnetic field structures
- ✓ **Multi-wavelengths options**
- ✓ **“Easy” access to telescope time**
of medium size telescopes



Summary

- BRITE-Constellation is the world 's first nanosatellite constellation dedicated to astronomy
- 5 components of BRITE-Constellation operational
- Scientific & technical requirements fully met
- Science fields: 150^d in Orion, Centaurus, Perseus, and Vela Pupis.
- Observing program developed till end 2016
- Scientific data analysis under way



Thank you for your attention!