

The STUDIO UV astronomy mission: A step toward a European balloon observatory

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Why balloons?



- ❖ A flexible and affordable alternative to space telescopes
- ❖ Shorter development times
- ❖ Comparably good observing conditions in many wavelength ranges

Why not?



- ❖ Entry burden is still high
- ❖ Research groups have to shoulder part of development as well

ESBO solution?



- ❖ A community-accessible balloon-based observatory
- ❖ A service-centered infrastructure for broad astronomical use
- ❖ Regular flights
- ❖ Proposal-based access to observation time

Presentation Content

Introduction to ESBO project



STUDIO scientific objectives



Key elements of STUDIO



Flight plan and manufacturing status



Read More on ESBO!



The ongoing ESBO Design Study represents the second step towards ESBO.

- H2020-funded project ORISON (innOvative Research Infrastructure based on Stratospheric balloONS)
- Assessment of community interest and scientific needs with regard to a balloon-based research infrastructure
- General feasibility of a balloon-based observatory

- H2020 Project ESBO DS
- STUDIO (Stratospheric UV Demonstrator of an Imaging Observatory) prototype:
 - Demonstrates a next-generation UV instrument
 - Demonstrates the maturity of critical technologies
 - Ensures the provision of the prototype for scientific use after 2021

- European Stratospheric Balloon Observatory:
 - Regularly flying telescopes
 - Instrument flight opportunity/open observation time access
 - Refill consumables, upgrade and/or exchange instruments in between flights
 - Reuse of platform hardware (safe landing)



Flares from cool dwarf stars

Up to now, no systematic UV monitoring of “flare stars” exists.

Unknowns and scientific interests:

- flare occurrence rate
- flare energy number distribution
- flare’s multi-wavelength behaviour

STUDIO enables simultaneous UV and visible observations, by continuous monitoring of prominent objects.

Variable hot compact stars

Hot compact stars have so far been studied predominantly at high Galactic latitudes.

Scientific value:

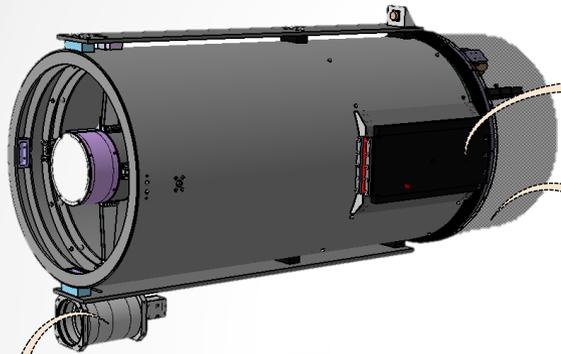
- Diverse types of pulsators are important to improve asteroseismic models.
- Ultracompact binaries are strong sources of gravitational wave radiation and crucial calibrators for the future space mission eLISA.

STUDIO surveys the Galactic plane, with a UV imaging telescope to uncover many new variable hot stars.

STUDIO key elements: Flexibility and Modularity

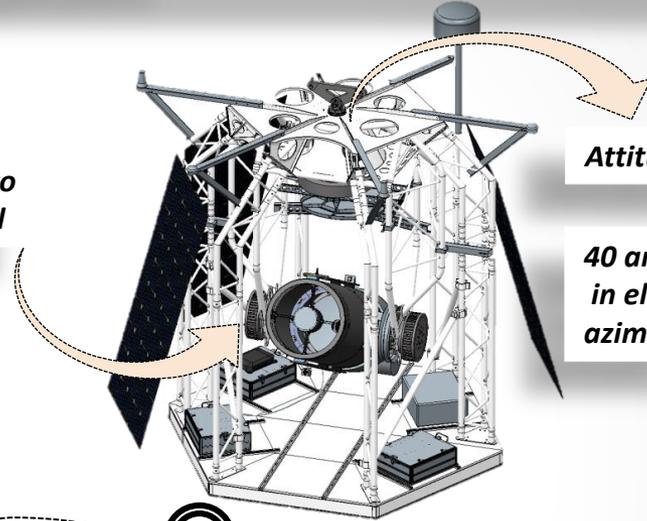
❖ A 0.5 m Aperture Telescope suitable for observations in UV to near infrared (NIR)

❖ a versatile, modular gondola for astronomical applications



Dovetail interface to the gondola gimbal

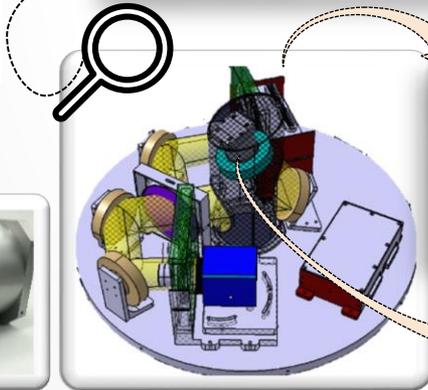
Telescope Instrumentation Platform (TIP)



Attitude Control Unit

40 arcsec accuracy in elevation and azimuth

Star Tracker and Baffle



❖ Advanced photon-counting, imaging microchannel plate (MCP) detector



COTS Tip/Tilt actuator and controller

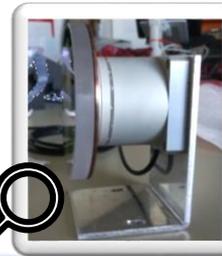
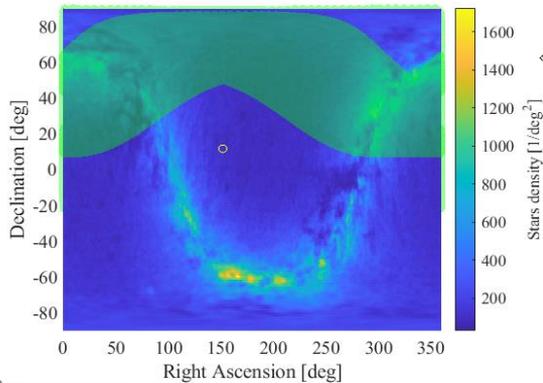
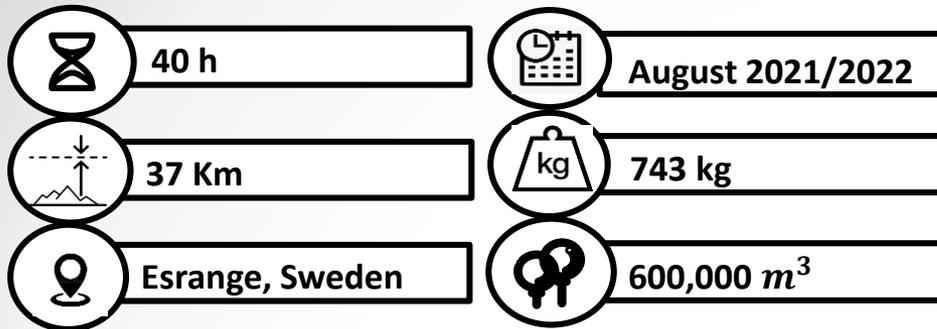


Image Stabilization System
Residual jitter of 0.5 arcsec
Stability over 300 sec

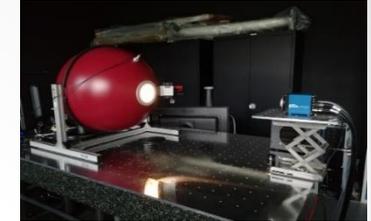
STUDIO flight plan



Accessible area of the sky during summer turnaround conditions over Kiruna

Manufacturing and tests

Go Back



STUDIO components are currently being manufactured and tested. AIT phase starts in Autumn 2020

- *The balloon-borne STUDIO platform enables UV observations that would otherwise only be possible with space-based telescopes.*
- *All elements and their interfaces are designed modular and easy to change.*
- *STUDIO demonstrates the ESBO concept, for a balloon-based, regularly-flying observatory.*



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Read More on ESBO-DS



And follow our progress here:



This poster participates in the

OSPA

Outstanding Student Poster Award Contest

