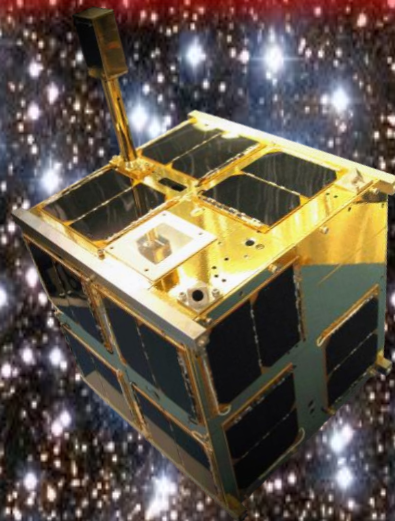


The **BRITE** Side of Stars



Celebrating the 10th Anniversary of
BRITE-Constellation

Electronic Proceedings

August 20 to 23, 2024, University of Vienna

<https://britestars.univie.ac.at/home>

Preface

A fully operational constellation of five BRITE (**B**Ri**g**ht **T**ar**g**et **E**xpl**o**rer) nano-satellites was established in 2014, as an Austrian-Canadian-Polish space-project. BRITE satellites provide high precision and continuous dual-broadband photometric time-series up to half a year, on timescales ranging from a few minutes to years.

Ten years later, the scientific achievements of [BRITE-Constellation](#) were discussed during a dedicated conference in Vienna. This conference is a follow-up of the conference in 2019: [Stars and Space](#) and has a title proposed by Andrzej Pigulski: [The BRITE Side of Stars](#). It led to discussions of open issues in the modelling of stars, including discrepancies between theory and observations; the physics needed to describe their structure and evolution; interactions with the environment; membership in related groups such as clusters. Other sessions addressed potential synergy between BRITE and current and upcoming projects, as well as potential successors to BRITE.

Hence, the focus of the conference was on:

- Bright stars with a mass-range from ~80 solar masses to less than 1 solar mass and of all evolutionary stages
- Theoretical Aspects: Pulsation, Evolution, Magnetism, interactions with the environment (winds, accretion, outbursts, etc.)
- Synergies and complementarities between BRITE-Constellation and other space missions and/or ground-based surveys
- Scientific and technical legacy
- Ongoing and follow-up missions, in space and on the ground

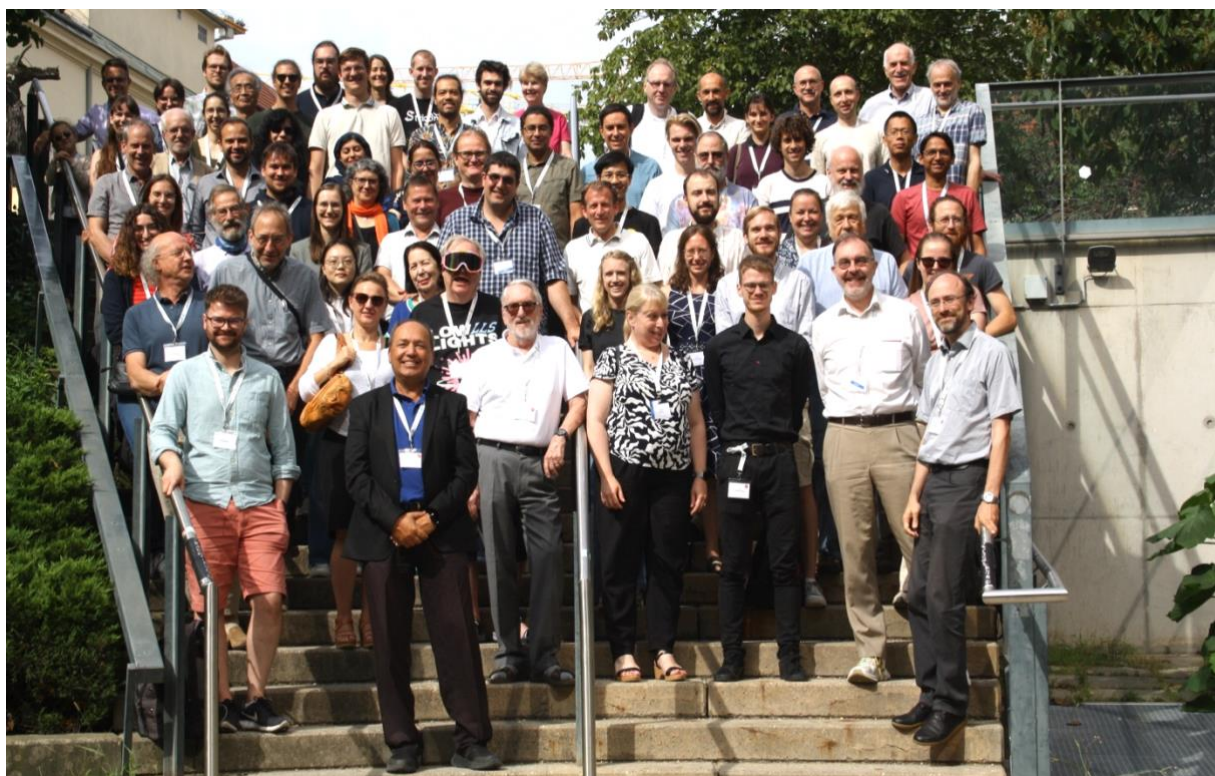
The conference attracted 105 registered participants from 27 countries, 24 of them with on-line presence. This response resulted in a very dense program. For greater ease, the organizers decided to adopt electronic proceedings. The CERN-based software Zenodo was chosen for the proceedings and was established by Samarth G. Kashyap of the Max Planck Institute for Solar System Research.

Management of the conference was performed by the Scientific (SOC) and the Local (LOC) Organising Committee. Members of SOC are Dietrich Baade, Gerald Handler, Catherine Lovekin (co-chair), Anthony Moffat, Bert Pablo, Andrzej Pigulski, Slavek Rucinski, Gregg Wade, Werner Weiss (chair) and Konstanze Zwintz. Members of LOC are Rudolf Albrecht, Salim

Ansari, Fabian Haberhauer, Anneliese Haika, Otto Koudelka, Thomas Lebzelter, Mathias Lechthaler, Stefan Meingast (co-chair), Martin Piecka, Lukas Steinwender, Werner Weiss (chair) and Isabella Wizani. With additional help provided by Damian Fabbian, David Hernandez, Janine Jochum, Lilly Kormann, Luise Pevestorff, and Tadej Ruzicic,

Werner W. Weiss

This conference would not have been possible to organise without the significant support of sponsors:



Conference group photo, excluding remotely attending participants (photo T. Lebzelter)

The Conference Layout was structured in session-blocks, focusing on BRITE related topics, as is presented in the following.

Tuesday, after the welcome of the audience, the first block was dedicated to “*The BRITE Story*”, chaired by G. Handler, and addressing the roots of BRITE-Constellation and the technical and scientific developments till launch. The following two blocks were dedicated to “*Modelling and Observations*”, chaired by K. Zwintz and T. Kallinger.

Wednesday started with three blocks “*Asteroseismology*”, chaired by G. Wade, D. Bowman and J. Daszynska-Daszkiewicz), followed by the first block of “*Individual Stars and Groups*”, chaired by K. Strassmeier.

For **Thursday** three more blocks on “*Individual stars and groups*”, chaired by V. Antoci, O. Kochukhov and H. Saio were scheduled. Thursday ended with the the first block of the session “*Satellite-Highlights*”, chaired by F. Kupka.

Friday started with the second block of this session and was chaired by E. Paurzen. The last conference session was dedicated to “*Projects in Preparation*” and chaired by C. Neiner.

The conference finished on Friday with a discussion of various topics, as suggested by the audience. Finally, Konstanze Zwintz closed the conference with support by Gregg Wade by remembering the highlights of the BRITE-Constellation mission throughout the years with photos and videos documenting important steps. At the end, the work of Mission Scientist Rainer Kuschnig was honored with a special present.



Discussing Posters (T.Lebzelter)

On Tuesday evening a reception was organised at the Arcaded Courtyard (Arkadenhof) of the main building of the University of Vienna. On the following Wednesday evening, an informal celebration of 10-years of BRITE-Constellation was arranged at “Almhaus”, in the court next to the conference venue. These two events strengthened social contacts, allowed for discussions, and triggered meetings of “good old” research colleagues who had not met in person for quite a while.

On Thursday and Friday the participants had the opportunity to explore astronomy-related locations in Vienna with guided tours:

-- **University Observatory** - the roots of astronomy in Austria (tour guide was Fabian Haberhauer)

The University Observatory of Vienna is situated in a beautiful park around 25 minutes from the conference venue and is a splendid neo-renaissance observatory, housing for 7 years the world largest refracting telescope - the 10.5 meter long refractor having been built by Howard Grubb, F.R.A.S.

-- **Kuffner Observatory** – the beginning of astrophysics in Austria (tour guide was Günter Wuchterl)

The Kuffner Observatory was built by Moritz von Kuffner and houses the second-largest meridian circle of Austria, a vertical circular telescope and a refractor which Karl Schwarzschild used to develop his ground-braking technique of photographic plate calibration. Another highlight was the visit to the recently renovated largest Heliometer of the world.



Snapshot during a coffee-break (T.Lebzelter)

-- Touring downtown **Vienna's astronomical highlights** (tour guide was Anneliese Haika)

On the walking tour through Vienna, we saw various locations which were important for the development of astronomy in Vienna.



Top: Lecture room (S.Ansari)

Bottom: BRITE Celebration (S.Ansari)



Opening of the Conference

The participants were welcomed on Tuesday morning by the conference-chair, Werner W. Weiss, who then introduced representatives of institutions which played a key-role for getting BRITE off the ground, as well as the current conference.

The representative of the Austrian Ministry in charge of research, space and science (BMBWF), Mag. Sophie Hoffmann, was asked as a first speaker to address the participants. For many decades, this ministry and its predecessors has funded various projects concerning astrophysical research and also paved the way to BRITE.

The other fundamental actor for getting astrophysics “off-the-ground” is the Austrian Research and Promotion Agency (FFG) with its Austrian Space Application Programme (ASAP). ASAP was represented by the director, Dr. Andreas Geisler, who welcomed the participants.

Organising a conference requires a solid budget right from the start. The Austrian Space Forum (ASF), represented by Dr. Gernot Grömer, and AUSTROSPACE, represented by DI Hans Martin Steiner, were the first sponsors who supported the conference, and they welcomed the audience in the name of supporting institutions.

The final welcome-speaker was Vice-Dean Univ.Prof. Dr. Franz Kerschbaum, who greeted the participants in the name of the University of Vienna, the local home-institution of BRITE.

Presentations

The BRITE Story

S. Rucinski: [When BRITE was a solely Canadian project: The distant prehistory](#)

D. Kekez & R. Zee: [BRITE Engineering at the Space Flight Laboratory \(SFL\) and Capabilities for the Future](#)

K. Carroll: [Developing the Engineering Foundation for the BRITEs at Dynacon](#)

O. Koudelka: [The Origin of Austrian BRITEs](#)

T. Zawistowski et al.: [Polish Contribution to the BRITE Constellation: LEM and HEWELIUSZ spacecraft](#)

R. Kuschnig: [Operating BRITE-Constellation - A Review of Experiences](#)

K. Zwintz et al.: [Catalogues of BRITE-Constellation Data](#)

C. Grant: [BRITE's Legacy](#)

I. Marboe: [BRITE Austria - A Catalyst for the Austrian Outer Space Act](#)

Theory and Observations: Modelling

L. Bugnet: [Magnetic fields in stellar radiative interiors](#)

S. Marsden et al.: BRITEpol: Magnetic fields of the brightest stars, the cool star sample

O. Khochukhov: [Surface Structure Studies of CP Stars in the Age of Space Photometry](#)

C. Gutteridge et al.: [Mapping The Surface of Pulsating Magnetic Stars with Zeeman-Doppler Imaging](#)

F. Kupka: [Modelling Convective Overshooting in the Age of Precision Asteroseismology](#)

A. Kashi: [Colliding winds and accretion against wind in massive binaries](#)

J. Daszynska-Daszkiwicz et al.: [Constraints on stellar opacities from asteroseismology of \$\delta\$ Sct and SX Phe pulsators](#)

J. Labadie-Bartz: [Building Be star disks from scratch: clues from space photometry and high-cadence spectroscopy](#)

Asteroseismology

- T. Kallinger: [Unbiased seismic forward modelling](#)
- D. Reese et al.: [Non-adiabatic oscillation calculations in rapidly rotating stars](#)
- S. Mathis: [Modelling transport and mixing processes in rotating stars in 1D and multi-D stellar evolution codes](#)
- D. Fabbian: [\(M\)RHD numerical simulations: powerful tool for insight into \(variable\) stars](#)
- C. Neiner: [Magneto-asteroseismology of hot stars](#)
- I. Einramhof: [Unveiling complex magnetic field configurations in red giant stars](#)
- J. Ballot et al.: [Detecting magnetic field inside stars with asteroseismology](#)
- L. Bessila & St. Mathis: [Stochastic Excitation of p-modes with Rotation and Magnetic Fields](#)
- G. Houdek: [The effect of convection on solar-type pulsations](#)
- M. Farnir: [Detailed characterisation of the Gemma subgiant with EGGMiMoSA and PORTE-CLES](#)
- S. G. Kashyap: [Stellar Active Latitudes from Seismic Travel Times](#)
- K. M. Smith: [Unveiling Stellar Nature Through Oscillation Pattern Recognition](#)
- P. Beck: [Tales of stellar & binary co-evolution, told by stellar oscillations](#)
- L. Fellay & M-A Dupret: [Non-adiabatic modelling of gravito-inertial and Rossby tidally excited oscillations](#)
- P. Kołaczek-Szymański: [Eccentric ellipsoidal variables \(EEVs, "heartbeat stars"\) and their tidally excited oscillations \(TEOs\)](#)
- A. Oplistova: [Modelling of Massive Multiple Systems with VLTI Interferometry, BRITE Photometry, and Spectroscopy](#)

Individual Stars and Groups

H. Saio: [Short timescale light variations in Be stars](#)

D. Mkrtichian: [Detection of high-degree non-radial pulsations in rapidly rotating bright A stars](#)

J. A. Guzik et al.: [Deneb's Variability as Viewed by BRITE Constellation and the Solar Mass Ejection Imager](#)

Z. Mikulasek et al.: [Probing the magnetospheres of chemically peculiar stars through the dips in their light curves](#)

N. Werner: QUVIK, the Quick Ultra Violet Kilonova surveyor

Z. Guo: [Asymmetric Rotational Splittings Due to Non-spherical Distortion In \$\delta\$ Scuti & \$\beta\$ Cephei type P modes](#)

E. Paunzen et al.: [Chemically peculiar stars investigated by the BRITE mission](#)

K. Thomson-Paressant: [A first statistical picture of magnetism in delta-Scuti stars](#)

I. Voloshina & A. Tarasenkova: [New photometric observations of RZ LMi](#)

T. Granzer: [Evidence for new pulsation modes in Betelgeuse from BRITE data](#)

G. Handler: [Pulsation in binary stars](#)

L. Steinwender: [Unsupervised Classification of RR Lyrae Stars](#)

P. DeCat: [Asteroseismology of OB stars in the space era: what did we learn from the observations?](#)

D. Bowman: [Asteroseismology of the \$\beta\$ Cep star HD192575](#)

M. Messineo: [BPRP spectra of bright late-type stars in the Galactic Disk](#)

L. Barrault: [Measuring internal magnetism in gamma-Dor stars from dips in the gravity-mode period spacing pattern](#)

E. Aydi: [BRITE redefining nova emission](#)

J. Kolar: Doubly eclipsing systems: observing and statistics

C. T. Nguyen: [PARSEC stellar evolutionary model: Rotation, Thermohaline mixing, Envelope Overshooting](#)

T. Ramiamananantsoa: BRITE Photometry of Zeta Puppis

A. Moffat: [Wolf-Rayet Stars with BRITE](#)

Satellites – Highlights

S. Ansari: [Gaia Mission - Status and Updates](#)

L. Eyser: [The Variable Universe with the Gaia mission](#)

T. Lebzelter et al.: [Long period variables and Gaia](#)

N. Aftab et al.: [Eclipse Does Not Hide, but Reveals: Comprehensive X-ray Reprocessing Studies in High and Low Mass X-ray Binaries with XMM-Newton](#)

M. Lendl: [3.5+ Years of Characterising Exoplanetary Systems with CHEOPS](#)

K. Strassmeier: [From BRITE to PLATO: the increasing need for ground-based support](#)

F. Majidi: MAUVE, UV-Vis spectrophotometry to monitor stars

D. Leskiw et al.: [A First BRITE, SMEI and TESS Analysis of the Suspected Merger Product theta-Scorpii](#)

Projects in Preparation

J. Matthews: [BRITE. MOST. What is next?](#)

V. Antoci: [Beyond BRITE - Expanding Bright Star Research through Kepler and TESS](#)

D. Bowman: [The CubeSpec space mission: high-resolution optical time-series spectroscopy for asteroseismology of massive stars](#)

R. Albrecht & G. Grömer: [ADLER-1 1, First Results from the APID-1 Space Debris Instrument](#)

K. Zwintz: [The PLATO Mission](#)

B. Indahl: MANTIS Mission

POSTERS

A. Brito: [The significance of electrostatic properties in the interiors of low-mass stars](#)

A. Cooray: NASA SPHEREx mission

A, Derekas: [Pulsating stars with substellar companions](#)

N. Faltova: [Catalogue of variable stars in open cluster fields](#)

M. Kajan: [Unveiling Stellar Aurorae](#)

S. G. Kashyap: [Can deep-learning outperform traditional techniques for denoising asteroseismic spectra?](#)

E. Paunzen: [Apparent Non-Variable Stars from the Kepler Mission](#)

D. Reese: [Inverting stellar rotation profiles in rapidly rotating stars](#)

E. Vorobyov: The mystery of FU Orionis resolved

E. Yoldaş: [Determination of X-Ray Flare Behavior during Solar Activity with OPEA Model](#)

M. Zejda: [Stellar astrophysics with QUVIK](#)

Y. Zhang: [Investigation of the Impact of Rotation on Intermediate Stars](#)

Management of the electronic Proceedings

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