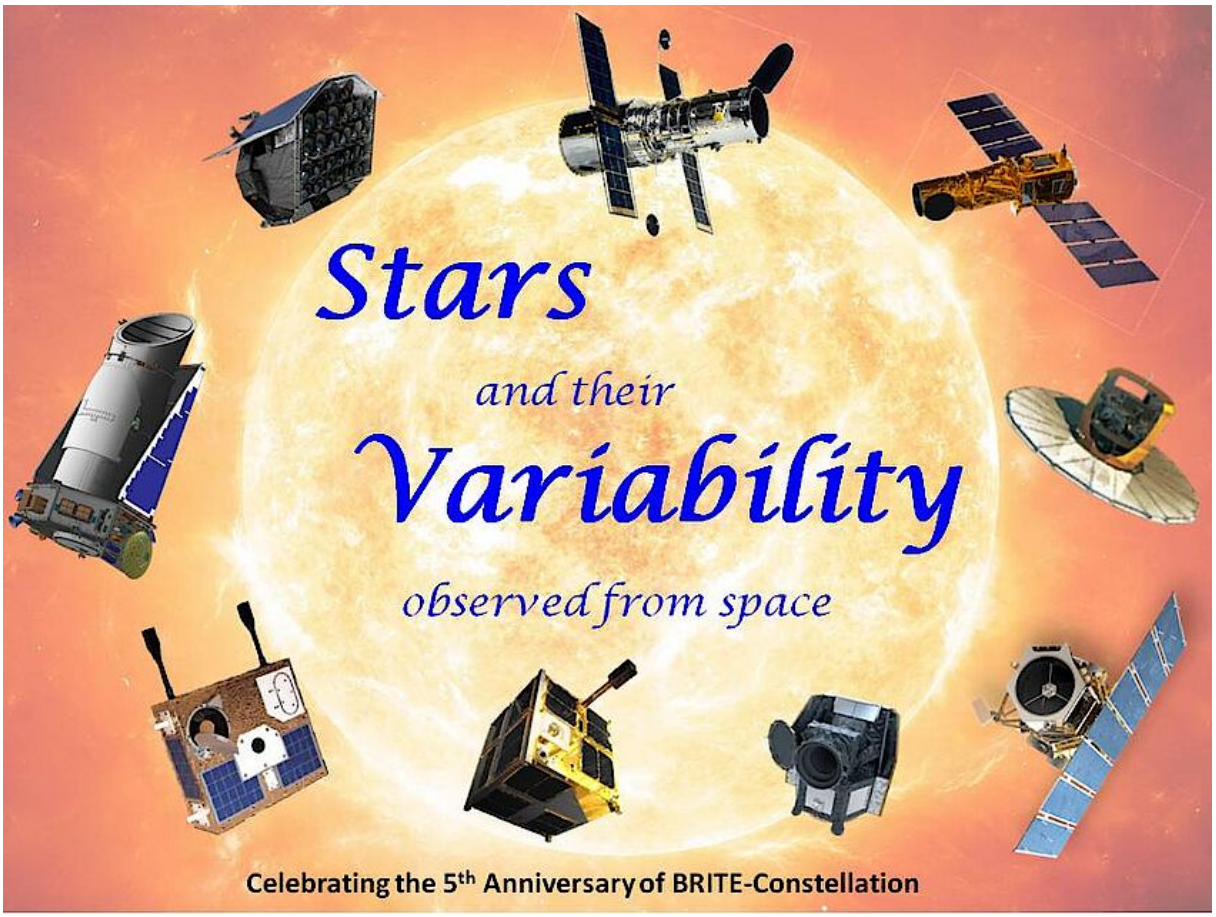
Proceedings of the conference

Stars and their variability, observed from space

held in Vienna on August 19-23, 2019



Credit: University of Vienna

Preface

Motivation for this conference

Stars are the most visible components of the Universe. They are crucial elements for understanding many problem areas in astrophysics, e.g., the history and evolution of our Universe, of galaxies and of our local solar system, and stars host zillions of planets (which we expect to discover in the near future). The variability of stars provides powerful access to their structure, environment and evolution.

Stars represent laboratory sites for physical processes that cannot be tested experimentally on Earth. They are crucial for understanding basic physics, such as nuclear physics, particle physics, statistical physics, hydrodynamics, atomic physics and opacities, and many more such topics. In theoretical modelling we are facing the limitations of the basic radiation, plasma and other physics, which oversimplify (or ignore) the treatment of radiation–matter coupling, magnetic fields, dynamical processes, etc. Experience tells us that once the physics is properly accounted for, our picture of how stars work has frequently to be changed.

Observing stars from satellites has increased significantly the data volume and parameter space for realistic modelling of these most prominent objects in the Universe. Variability can now be traced down to incredibly low noise levels and long time-intervals, through the availability of satellites. New observing capabilities have improved precision and accuracy, which in turn have uncovered new populations of stars and revealed limits in our physical understanding of their structure and evolution. In particular, the BRITE-Constellation has demonstrated the unique advantage of nano-satellites for exploring stars which are bright (and close) enough to allow access to fundamental techniques like interferometry, highly accurate parallaxes, direct imaging, very high spectral and temporal resolution, etc. These are the advantages that led us in 2009 to the funding of the first BRITE satellites.

All this considered, it does not come as a surprise that the Canadian Astronomy Data Centre (CADC) lists for 2019 a total of 345 conferences, meetings and workshops, of which about 60% deal with stars and usually last several days. In other words, on average there is at least one meeting *every day* somewhere in the world dedicated to stars. Our conference of 261 participants from 44 different countries world-wide and occupying a full week confirms the enthusiasm for this topic in the community.

Concept

During our conference, which was nicknamed “Stars and Space”, our plan was to discuss issues in stellar modelling which are still undecided owing to discrepancies between theory and observation, to highlight the physics needed to describe their structure, in particular convection, rotation, magnetic fields, and evolution (from genesis to end of life), to elaborate on the interaction of stars with their environments (winds out and in, outbursts, magnetic fields, etc.), and to discuss their properties as isolated objects but also being members of ensembles (from binaries to clusters). What are the most recent achievements in space observations and theory? We also aimed to attract the younger generation, and to develop a strategy for the future.

This concept is reflected in the structure of our conference. Six short “flashlight” presentations give examples of the impact of space observations on our understanding of stars. The following seven sections focussed on the wide parameter space needed to describe stellar properties, on pulsations (asteroseismology), on variabilities other than pulsations, on modelling of stars, on ensembles of stars (binaries and clusters) and on stellar spheres of influence. A special section was devoted to the lessons we have learned so far, and the final session to future activities.

The video streaming of the entire conference is available via:
https://starsandspace.univie.ac.at/home/conference-streams/

Team

To organise such a conference without serious problems would not be possible without a dedicated science and local organisation team. Members of the SOC were Conny Aerts, Jadwiga Daszynska-Daskiewicz, Marc-Antoine Dupret (co-chair), Laurent Eyer, Luca Fossati, Martin Groenewegen, Hans Kjeldsen, Franz Kerschbaum, Coralie Neiner, Hiromoto Shibahashi, Nicole St.Louis, Werner Weiss (chair) and Konstanze Zwintz. Members of the LOC were Luca Fossati, Anneliese Haika, Shelley-Anne Harrisberg, Patrick Harnisch, Gabor Herbst-Kiss, Dorothea Holzschuh, Bernhard Hörl, Thomas Kallinger, Theresa Lueftinger, Lina Rummler, Stefanie Schauer, Sarah Stidl, Stefan Wallner, Werner Weiss (chair) and Konstanze Zwintz, who all did an excellent job. In addition, I express my thanks also to Dietrich Baade, Otto Koudelka, Anthony Moffat, Andrzej Pigulski and Gregg Wade for their continuous support.

Last, but certainly not least, the enormous efforts of the editorial team with Coralie Neiner as editor-in-chief have to be acknowledged. We hope that these Proceedings will serve as a powerful reference for future projects.

Acknowledgements

Manpower is one important aspect of the organisation of a conference; funding is another. Funding was crucial, in particular for supporting students, pre-docs and young post-docs. We are therefore grateful to the following sponsors:

- University of Vienna (Rectorate and Faculty of Earth Sciences, Geography and Astronomy)
- Austrian Research Promotion Agency (FFG)
- RUAG Space GmbH, Vienna Conference Service
- Ströck-Brot GmbH
- Josef Manner & Comp.

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