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# The Network Activities in HELAS

M. Roth

Max-Planck-Institut für Sonnensystemforschung, Katlenburg-Lindau, Germany

## Abstract

The Helio- and Asteroseismology Network (HELAS) is a Coordinated Action funded by the FP6-Infrastructure-Programme of the European Commission. The objective of HELAS is to co-ordinate European activities in helio- and asteroseismology. In order to achieve this objective HELAS runs six network activities. I describe these in this short contribution, with a special focus on the asteroseismology network activity.

## HELAS

The European Helio- and Asteroseismology Network (HELAS) has its major objective in bringing together the widely dispersed European research groups active in helio- and asteroseismology. HELAS will combine the core expertise of the individual research groups through six network activities in order to ensure European competence and competitiveness in this research area by spreading expertise, enhancing the synergy between helio- and asteroseismology, and improving the public understanding and interest in solar and stellar physics. These objectives will be achieved by organizing workshops of smaller groups within the individual network activities, by organizing annual conferences for the international audience, and by providing a common platform for the exchange of data and software among the participants.

The transfer of knowledge and data analysis techniques through HELAS will lead to a structuring of this field of research, as needed to prepare the European research community for important missions in the near future: the NASA space missions Solar Dynamics Observatory (SDO) and Kepler, the CNES missions CoRoT and PICARD, the ESA mission Solar Orbiter, the French/Spanish mission GOLF-NG, as well as ongoing and planned ground-based initiatives.

The funding of HELAS started on April 1, 2006 under the Sixth Framework Programme of the European Union and will last until March 31, 2010. HELAS receives a grant of 2.265.000 EURO.

Currently HELAS consists of ten members. Moreover HELAS will embed many of the activities of the European Network of Excellence in Asteroseismology (ENEAS).

## HELAS Members

HELAS will become an important contact point for the European groups active in helio- and asteroseismology. It is an integrative activity. Consequently, it is expected that the activities are not limited to the institutions directly taking part in the network. The contact addresses of the ten HELAS members are listed in Table 1.

## Network Activities

HELAS itself is not able to fund research and development. The major activity of HELAS is to contribute to the coordination of research and development on the European level by supporting the interaction of scientists. This coordination action is split into six network activities:

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|---|---|
| Kiepenheuer-Institut für Sonnenphysik<br>Schöneckstr. 6<br>79104 Freiburg, Germany<br>http://www.kis.uni-freiburg.de<br>Contact: Prof. Oskar von der Lühe<br>Tel.: +49 (0)761 3198 0<br>Fax: +49 (0)761 3198 111<br>E-mail: secr@kis.uni-freiburg.de | Instituto de Astrofísica de Canarias<br>C/ Vía Láctea, s/n<br>E38200 - La Laguna (Tenerife), España<br>http://www.iac.es<br>Contact: Pere L. Pallé<br>Tel.: +34 / 922 605 200<br>Fax: +34 / 922 605 210<br>E-mail: pere.l.palle@iac.es |
| Department of Applied Mathematics<br>University of Sheffield<br>Hicks Building<br>Hounsfield Road<br>Sheffield S3 7RH, U.K.<br>http://www.shef.ac.uk<br>Contact: Prof. Michael J. Thompson<br>Tel.: +44 (0)114 222 3733<br>Fax: +44 (0)114 222 3739<br>E-mail: Michael.Thompson@sheffield.ac.uk | Institut for Fysik og Astronomi<br>Aarhus Universitet<br>Ny Munkegade, Bygn. 1520<br><br>DK-8000 Århus C, Denmark<br>http://astro.phys.au.dk<br>Contact: Jørgen Christensen-Dalsgaard<br>Tel.: +45 8942 3614<br>Fax: +45 8612 0740<br>E-mail: jcd@phys.au.dk |
| Centro de Astrofisica<br>Universidade do Porto<br>Rua das Estrelas<br>P-4150-762 Porto, Portugal<br>http://www.astro.up.pt<br>Contact: Mario Joao P. F. G. Monteiro<br>Tel.: +351 - 226 089 830/857<br>Fax: +351 - 226 089 831<br>E-mail: mjm@astro.up.pt | Max-Planck-Institut für<br>Sonnensystemforschung<br>Max-Planck-Strasse 2<br>37191 Katlenburg-Lindau, Germany<br>http://www.mps.mpg.de/en/index.html<br>Contact: Laurent Gizon<br>Tel.: +49 (0)5556 979-439<br>Fax: +49 (0)5556 979-240<br>E-mail: gizon@mps.mpg.de |

Table 1: The ten HELAS member institutions. Addresses and contact details are given. To be continued

**Management** – The first activity handles the overall coordination and management of the consortium, the setting of the strategies, the financial management, and the interaction with the European Commission.
Coordinator: Oskar von der Lühe, Kiepenheuer-Institut für Sonnenphysik,
Project Scientist: Markus Roth, Max-Planck-Institut für Sonnensystemforschung.

**HELAS Forum** – The HELAS Forum serves as platform for discussing all network activities of HELAS and for developing the plans of mutual interest. Once a year an international conference is organized. The plan for these annual events is laid out in table 2.

Moreover the HELAS Forum will generate and exploit synergies between the network activities. An internet portal will allow the exchange and distribution of software and data. The internet portal will be accessible at: http://www.helas-eu.org
Chair: Pere Pallé, Instituto de Astrofísica de Canarias.

**Public Outreach** – The major objectives of public outreach in HELAS is the coordination of actions to raise awareness and interest in helio- and asteroseismology in the general public and at all levels of the educational system throughout Europe. This includes the preparation of state-of-the-art university lectures and other material for further outreach.
Chair: Jørgen Christensen-Dalsgaard, Institut for Fysik og Astronomi.

INAF
National Institute for Astrophysics
Viale del Parco Mellini 84
I-00136 Roma, Italy
http://www.iasf-roma.inaf.it
Contact: Maria Pia Di Mauro
Tel.: +39 06 4993 ext 4087
Fax:+39 0620660188
E-mail: mariapia.dimauro@iasf-roma.inaf.it

Instituut voor Sterrenkunde
Katholieke Universiteit Leuven
Celestijnenlaan 200 D
B - 3001 Leuven, Belgium
http://www.ster.kuleuven.be
Contact: Conny Aerts
Tel.: +32/16/32 70 28
Fax: +32/16/32 79 99
E-mail: conny@ster.kuleuven.be

Instytut Astronomiczny
Uniwersytet Wrocławski
ul. Kopernika 11
Pl-51-622 Wrocław, Poland
http://www.astro.uni.wroc.pl
Contact: Jadwiga Daszyńska-Daszkiewicz
Tel.: +48 71 37 29 373
Fax: +48 71 37 29 378
E-mail: daszynska@astro.uni.wroc.pl

Observatoire de la Côte d'Azur
Bd. de l'Observatoire
B.P. 4229
F-06304 Nice Cedex 04 France
http://www.obs-nice.fr
Contact: Thierry Corbard
Tel.: +33 (0)492003011
Fax: +33 (0)492003033
E-mail: Thierry.CORBARD@obs-nice.fr

Table 1: Continued.

**Global Helioseismology** – This network activity coordinates methods and software developments for global helioseismology. Furthermore data analysis tools and solar models will be distributed in the HELAS community. Additionally, expertise and techniques will be shared with asteroseismology. To coordinate the activities in global helioseismology three workshops will be held on the topics

- Low frequency spectral range, Canary Islands, Summer 2007
- Solar-cycle variations and magnetic effects on stellar oscillations, Sheffield, 2008
- New insights into the Sun, Porto, 2009.

Chair: Michael Thompson, University of Sheffield.

**Local Helioseismology** – This network activity concentrates on local helioseismology. There it is necessary to identify the needs and to develop actions for structuring research in the field of local helioseismology. The development and distribution of specific software is meant to provide Europe with the means to participate in the analysis and interpretation of HMI-SDO data. The first workshop "Roadmap for local helioseismology" was held September 25–27, 2006 in Nice. The next two workshops are

- Local helioseismology and solar MHD processes, Freiburg, 2008
- Local helioseismology with SDO data, Katlenburg-Lindau, 2009.

Chair: Laurent Gizon, Max-Planck-Institut für Sonnensystemforschung.

| | Conference Title | Location | Date |
|---|---|---|---|
| (1) | SOHO-18 / GONG 2006 / HELAS-I<br>Beyond the Spherical Sun | Sheffield,<br>Great Britain | August 7 –11, 2006 |
| (2) | HELAS-II<br>Helioseismic, Asteroseismology<br>and MHD Connections | Göttingen,<br>Germany | August 20 – 24, 2007 |
| (3) | HELAS-III<br>CoRoT-Conference | Paris-Meudon,<br>France | Summer 2008 |
| (4) | HELAS-IV<br>Four Years of HELAS | Tenerife,<br>Spain | Summer 2009 |

Table 2: Plan for the annual international HELAS symposia. Titles, locations and dates are given. These are still preliminary for the years 2008 and 2009.

**Asteroseismology** – This scientific network activity develops programmes to ensure European competitiveness in the field of asteroseismology. This comprises comparisons of model and frequency calculations in order to improve their reliability. Furthermore the developments of stellar modelling software will be coordinated and its results distributed within the HELAS community. The following section gives more details on the objectives of this network activity and the topics of the four organized workshops.
Chair: Conny Aerts, Instituut voor Sterrenkunde.

## Specific Objectives of the Asteroseismology Network Activity

The major objective of the asteroseismology activity in HELAS is to promote a vital exchange between groups acting on the field of stellar physics. Collaborations will be initiated between the scientists that work on the theoretical description of the physical properties of stars and on the interpretation of stellar oscillation data. In particular, for stellar modelling different codes are circulating. HELAS aims at rationalizing the work on further code developments. For this a comparison of all different stellar evolution codes is necessary. It is a key work package of HELAS to compare the stellar models produced by these codes. The idea is then to update the codes coherently as soon as the physical details in the stars become understood. This work was initiated by the asteroseismology community to become prepared for the advent of CoRoT. HELAS will support these efforts.

HELAS will also coordinate activities that concentrate on analysing and interpreting stellar oscillation data. This comprises the development, testing and application of techniques for interpretation of asteroseismic data, including inversion techniques, as well as the improvement of stellar model and oscillation frequency calculations. Especially, in stellar modelling the need for nonstandard models that include effects of rotation, diffusion and magnetic fields is identified. The aim is also to rationalize methods of pulsation mode identification from time series photometry and spectroscopy, by combining both types of data sets.

A major task of HELAS is to make software tools for data analysis, data management and stellar modelling available to the whole helio- and asteroseismology community in generally accessible and documented form. Furthermore some exemplary asteroseismic data sets and

basic reference models will be available. The spread of the available tools over Europe will result in a larger community that makes use of these tools. This will promote the development of new data analysis tools, as new ideas for new techniques will come up faster. HELAS will offer a platform for discussing this development of the next generation tools.

Asteroseismology needs long time series. Large observing proposals need to be coordinated to make observations with unprecedented extent in time coverage and precision possible. HELAS will provide support for proposals for multi-site campaigns using existing and future facilities. Considering the setup of new facilities, HELAS will be the platform to exchange ideas and to formulate the needs of the asteroseismic community.

Besides the "Future of Asteroseismology Workshop" in Vienna, one workshop was held on "Comparison and tests of stellar evolution codes" November 20–23, 2006 in Porto. Two more workshops will be organized by HELAS on the topics:

- Interpretation of asteroseismic data, Wrocław, 2008
- Synergies between solar and stellar modelling, Rome, 2009.

## Contacts

The European Helio- and Asteroseismology Network can be contacted at:

HELAS Project Office
Kiepenheuer-Institut für Sonnenphysik
Schöneckstr. 6
79104 Freiburg / Germany
Tel.: +49 761 3198 182
FAX: +49 761 3198 111
e-Mail: helas@kis.uni-freiburg.de
WWW: `http://www.helas-eu.org`

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## References

HELAS website 2006, `http://www.helas-eu.org/`

## DISCUSSION

*Kupka:* Considering the issue of updating the microphysics, it is simply not clear what is better. For instance, yesterday I heard for the first time for a long time that OP opacities are better than OPAL ones for some applications. There are some potential surprises that people are aware of that make them reluctant to change anything they are using.

*Roth:* What we are trying to do is to help in thinking about what happens if one changes things in one or the other code and then compare the results. The idea of HELAS is not to do the science but to bring scientists together to do it.

*Hatzes:* You said you'll support multisite observing campaigns. Does that include funding of travel to observatories if you get the time?

*Roth:* No.