

## **DIVISION G**

## **STARS AND STELLAR PHYSICS**

### **PRESIDENT**

**David R. Soderblom**

### **VICE-PRESIDENT**

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Robert Szabo, Carlos Allende Prieto**

## **DIVISION G COMMISSIONS AND WORKING GROUPS**

**G1: Binary and multiple star systems**

**G2: Massive Stars**

**G3: Stellar evolution**

**G4: Pulsating stars**

**G5: Stellar and planetary atmospheres**

**Inter-division G-H-J: Stellar clusters throughout cosmic space and time**

**Inter-division D-G-H-J: Galaxy spectral energy distributions**

**WG: Active B stars**

**WG: Ap and related stars**

**WG: Red giants and supergiants**

**Inter-division E-F-G WG: Impact of magnetic activity on solar and stellar environments**

## **TRIENNIAL REPORT 2018–2021**

### **1. Activities of IAU Division G during 2018-2021**

by David Soderblom (President)

Astronomy overall is continuing its growth, discoveries, and achievements as it enjoys wide support from the public and uses its innate ability to fascinate as a seed for education, outreach, and technical development. The field of stars and stellar physics has benefited at least as much as any other discipline within astronomy, and especially so from the projects and missions that are seeking to find and understand planets around other stars (exoplanets) and to delineate the composition and dynamics of our Galaxy. For example, the high-precision photometry missions such as Corot, Kepler, and TESS, have yielded huge datasets of extraordinary quality that enable detailed studies of stars. It has been said that the output from the stellar physics side of the Kepler mission has exceeded that from the planet-finding side, which is no small feat. Both the size and quality of these data break many barriers.

The IAU's Division G continues to provide an environment for stellar astronomers

to advance their science through supported symposia, PhD prizes, and other activities. Thus summary covers the calendar years 2018, 2019, and 2020.

### 1.1. *IAU Symposia Supported*

The following IAU-sponsored symposia included significant involvement of Division G:

- IAUS 340: Long-term datasets for the understanding of solar and stellar magnetic cycles
- IAUS 341: Challenges in panchromatic modeling with next-generation facilities
- IAUS 346: High-mass x-ray binaries: Illuminating the passage from massive binaries to merging compact objects
- IAUS 348: 21st century astrometry: crossing the dark and habitable frontiers
- IAUS 349: Under one sky: The IAU centenary symposium
- IAUS 351: Star clusters: From the Milky Way to the early universe
- IAUS 354: Solar and stellar magnetic fields: Origins and manifestations
- IAUS 357: White dwarfs as probes of fundamental physics and tracers of planetary, stellar, and Galactic evolution

2018 was the year of the Vienna General Assembly and saw a significant number of stellar-related topics. 2019 was also busy, but due to the pandemic, 2020 has had few astronomy symposia overall. In addition to the above, Division G has supported other IAU-sponsored meetings as needed and appropriate, such as Regional IAU meetings. Also, as with all the IAU's divisions, Division G assembled a program for the Division Days as part of the GA. The next GA, in South Korea, will also feature new stellar astrophysics.

### 1.2. *Support for Symposium Proposals*

Each year the IAU receives applications to hold astronomical symposia under the IAU's auspices. Successful proposals receive some funding for travel of participants, plus the recognition that comes with the IAU approval. Evaluating these proposals involves substantial effort by division officers. Before the deadline, the division officers will work with applicants when approached to help them draft proposals more likely to meet the IAU's guidelines and policies.

### 1.3. *Support for Commissions and Working Groups*

All of Division G's commissions and working groups have been active in this triennium. Each commission has filed its own report. The division supports the commissions and working groups by ensuring they continue and that any problems are worked out.

### 1.4. *Ph.D. Prizes*

All the IAU's scientific divisions award a prize each year for the best Ph.D. thesis among the applicants in their field. In order to give recipients broader visibility, in 2019 the winner presented an on-line colloquium about his thesis that was well received.

In 2018, the recipient was Dr. Adam Jermyn from the United Kingdom on "Turbulence and Transport in Stars and Planets." In 2019, the prize recipient was Dr. Simon Blouin from Canada, on the topic of "Modeling of high-density effects at the photospheres of cool white dwarfs." As this is written the 2020 awardee has not yet been named.

### 1.5. *Communication with Division Members*

During the past triennium, the Division G President tried to improve communication with the division's membership by sending out an e-mail newsletter several times per year. The content would include announcements from the IAU, and also the passings of deceased colleagues. Responses from division members has shown that the newsletters are, in fact, read and appreciated.

## 2. Challenges and Opportunities

The past year has been difficult for everyone due to Covid-19 and its effects. But many of the problems arising from Covid for scientists have been developing for some time. Among the challenges facing Division G, the IAU, and astronomy are:

- Staying connected with our research colleagues. The change to purely on-line meetings has meant a leveling of access for people who in the past may not have been able to attend a symposium in person. At the same time, that misses the critical aspect of meeting people face to face for informal talks, as that is how networks are built and reinforced, and new ideas get changed into concrete collaborations. The current practice of international symposia has taken place mostly after World War II and has especially grown in the last couple of decades. It may be time to develop new traditions for the next generation.

- Making knowledge known effectively. Symposium proceedings printed on paper were once a critical means of sharing the knowledge of leading researchers, but they have ceased to be effective. As any editor of such a publication can tell you, it is very difficult to get the speakers to provide written texts on time, as they feel the readers are no longer there. Making presentation files available helps a lot, and even better would be recording the presentation as it is given, but that takes real effort and resources to do well. Again, new protocols are called for, including conscious policies relating to what is considered a publication for critical career stages.

- Broadening the reach of the IAU. The membership – and especially the active involvement – of the IAU tends to involve some countries more than others, and that should evolve. At the highest level the IAU has had, for example, presidents from all continents, but the representation among other officers is lower.

- Encouraging broader thinking by reducing the height of walls. By that I mean that the IAU necessarily is organized into nine divisions, mostly related to our research interests. But our interests can be broad, as seen by the multiple divisions that many IAU members sign up for. Let's keep widening our individual grasps.

- Engaging early-career astronomers in the IAU, for this organization essentially belongs to them.

David R. Soderblom  
*president of Division G*