

COMMISSION 25

STELLAR PHOTOMETRY AND POLARIMETRY

PHOTOMETRIE ET POLARIMETRIE
STELLAIRE

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Arlo U. Landolt
Peter Martinez
Pierre Bastien, Sergei N. Fabrika,
Ronald L. Gilliland, Frank Grundahl,
Carme Jordi, Ulisse Munari

PROCEEDINGS BUSINESS MEETING on 18 August 2006

1. Introduction

Commission 25 is one of three Commissions under the umbrella of Division IX on *Optical and Infrared Techniques*. It is a technique oriented Commission.

2. Business Meeting

Commission 25's Business Meeting convened on Friday, August 18th during Session 2, with 18 individuals in attendance. Landolt reported that the Commission membership was 211, plus an additional 10 new members who would be admitted at the current General Assembly. He briefly reviewed the activity of the Commission during the past three years.

Landolt reported that the new president and vice-president of the commission were Peter Martinez and Eugene F. Milone. The membership of the Commission had been involved in nominating, and then voting, upon an Organizing Committee (OC) for the triennium 2006-2009. The new OC members are: Carme Jordi, Alexei Mironov, Edward G. Schmidt, Qian Sheng-Bang, and Christiaan J. Sterken.

C. Sterken, outgoing president of Division IX, reported on Division affairs. He described the dissolution of Commission 9, and its reconstitution as a series of Working Groups. He noted that a new Commission within Division IX was created during the IAU Executive Committee meeting (EC 81). The new Commission's name will be "Optical & Infrared Interferometry". Sterken informed the attendees that Commission 25 needed to better articulate its scientific mandate.

P. Martinez, incoming Commission 25 president, stated that he felt the Commission was an important one. He invited members to ensure that their and colleagues' e-mail addresses and other personal information in the IAU data base were up-to-date, for Landolt had noted the large number of bounces during attempts to contact the membership by e-mail. Martinez was interested in the possibility of organizing a symposium, across the electromagnetic spectrum, on standardization topics, for the IAU XXVII General Assembly in Rio de Janeiro.

K. Sekiguchi proposed the creation of a Commission 25 endorsed standard star database. The final product would be a one stop location for all standard star data access. He stated that there was a flood of new standard star information available from large survey projects. It would be useful to have a "One Stop" data depository or a gateway to the various recommended data servers via internet access. Such a database should be quality controlled by a group of experts, so that observers could easily choose suitable standard stars that they need to use for their observations. Also, it was suggested that the database should comply with the "Virtual

Observatory (VO)” standard, in order to take full advantage of the suite of data manipulating tools developed by the International VO Alliance group. It also was suggested that the standard star web page not only have the standard data information, but also should provide educational material on how to properly use those standards. Bessell noted that those involved with Virtual Observatory efforts already were considering such problems. Breger agreed that a cookbook on methods of doing and using photometry would be useful. He was in favor of such information, some of which will appear in Sterken’s workshop proceedings “The Future of Photometric, Spectrophotometric and Polarimetric Standardization”, the result of a meeting held in Blankenberge, Belgium in May 2006. Lub stated concerns regarding the transformability of data between different photometric systems.

Sekiguchi argued that to construct such a database may need considerable efforts. It was noted that an expert(s) would be required to compile and verify such standard star information. The new Commission president Peter Martinez and Kaz Sekiguchi will discuss this matter further to form a Working Group to pursue this idea.

3. Commission 25’s Science Session contained six reports

C. Sterken reported on the content of a workshop “The Future of Photometric, Spectrophotometric and Polarimetric Standardization” which took place in Blankenberge, Belgium, from 8 to 11 May 2006. The SOC consisted of members of C25 (Chris Sterken, Arlo Landolt, Carme Jordi, John Landstreet, Gene Milone, Ulisse Munari, Ralph Bohlin, Alex Mironov, Alan Tokunaga, and Pierre Bastien).

The following topics were explored:

- The current status of optical, infrared, spectrophotometric and polarimetric standard stars.
- Problems in defining standard systems: from observational viewpoint, from theoretical viewpoint and from practical viewpoint.
- Standardization needs as driven by small and large telescopes.
- The line between standardization and correct reduction algorithms.

There were 65 participants (1/3 from N America, many from Europe, S. America, Australia, New Zealand, Japan), and more than 50 papers were presented. Proceedings (ed. C. Sterken) will be published by ASP *Conference Series* early 2007.

A. G. D. Philip and V. Straizys, reported by Philip, described progress in their program of classifying faint stars through use of the Strömvil photometric system. Since 1996 a group of astronomers has been working on setting up and then using the Strömvil photometric system, a combination of the four Strömngren and three Vilnius system filters. The system was announced in Straizys *et al.* (*Baltic Astron.* 5, 83, 1996). The major ability of the Strömvil system is that, from photoelectric measures alone, one can determine the reddening, temperature, gravity and metallicity of stars. With all the new surveys that have been made and ones yet to be made, such a system will be of great use to identify the nature of the new faint stars that will be identified and classify them by stellar type. And since the reddening can be calculated for each region, the intrinsic properties of these stars can be determined.

The main observational programs underway in the Strömvil system at present are:

- Setting up the primary standards. Kazlauskas *et al.* (*Baltic Astron.* 14, 465, 2005) have published a list of 780 photoelectric standards in the northern hemisphere.
- At the Vatican Advanced Technology Telescope on Mt. Graham, Boyle and Philip have been making CCD Strömvil measures of open and globular clusters. Observations are taken in each run of the rich open cluster M 67. These measures are matched to the high-accuracy CCD photometry of Laugalys *et al.* (*Baltic Astron.* 13, 1, 2004) by constraining the corrections to each flatfield to provide the needed one percent photometry in new program fields with only a few standards for zero-point calibration.
- At Casleo, in Argentina, Philip and Pintado have been observing clusters with the 2.15m telescope.
- On the data reduction side Janusz and Boyle have written the CommandLog which automates the process of data reduction for members of our group. This will ensure that all observations will be reduced in exactly the same way.

F. Vrba described near-IR *H*-band photometry of 18 early-L to early-T dwarf objects. These data come from observations in the U.S. Naval Observatory near-IR astrometry program which has now obtained observations of more than 40 objects for longer than 5 years. He noted that

while brown dwarfs of this spectral range are thought to not possess the mechanisms of variability found in late-M stars, they could be variable over timescales of months or years due to global atmospheric changes, such as dust formation and destruction. Thus the USNO database is ideal to test long term variability of these objects. He found no evidence for light variability in the IR on timescales of days to years. In fact, his data indicated a high level of brightness consistency, statistically more constant than surrounding field stars. This is in contrast to at least some studies which have found variability of as high as 50% for a subsample of these same objects.

A. Landolt reported on the status of *UBVRI* broad-band standard star sequences that were nearing completion around the sky. Observations and data reductions have been completed for updated sequences around the sky at the celestial equator, and for a new set of sequences centered at -45 degrees declination. Manuscripts are in preparation. Sequences at $+45$ degrees declination, begun at Kitt Peak National Observatory telescopes, are being completed at Lowell Observatory. The sequences at all three declinations are photoelectrically based, and cover a range of color indices and the approximate magnitude interval $10 < V < 15$. Data for CCD-based *UBVRI* photometric sequences are being obtained around the celestial equator. These sequences approach 20th magnitude.

E. Craine and D. L. Crawford, in a short report read by Landolt, told about *The Global Network of Astronomical Telescopes* (GNAT). GNAT is in the process of implementing a distributed network of scan mode telescopes. This system is being used to photometrically monitor stars in fixed declination bands, typically within about 10 degrees of the celestial equator. Continuous imaging is obtained with time delay integration of the $1K \times 1K$ CCD cameras, and stars between $19 < m < 11$ are recorded. Monitoring has been underway for some six years, typically 2.5 to 3 years in each declination band. Observations are being made on nearly every clear photometric night of about 2.5 million stars during the course of a year. Craine and Crawford report that they have discovered about 50,000 new variable stars, but equally interesting, have extensive observations of equatorial band stars which do not appear to vary within the sensitivity of the survey (a function of stellar brightness). Craine and Crawford note that this is a ripe area for collaborators to assist in the creation of large catalogues of relatively faint comparison stars and secondary standard stars. Additional information may be found at www.eGNAT.org.

B. Smalley gave a status report on the ASTRA Spectrophotometer Project. The ASTRA (*Automated Spectrophotometric Telescope Research Associates*) Cassegrain Spectrophotometer and its automated 0.5-m f/16 telescope are being integrated at the Fairborn Observatory near Nogales, Arizona. The spectrograph uses both a grating and a cross-dispersing prism to produce spectra from both the first and the second orders simultaneously. The square 30 arc second sky fields for each order do not overlap. The resolution is 7\AA in second and 14\AA in first order. The wavelength range is of approximately $\lambda\lambda 3300-9000$. Vega will be the primary flux standard and the anticipated internal star-to-star precision will be better than 1%. The first test observation of the Solar Spectrum was recently taken and scientific observations are expected to begin in 2007. Once fully operational there will be a call for collaborative projects.

Arlo U. Landolt
president of the Commission