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Division IX: Optical and infrared techniques

Christiaan Sterken

John B. Hearnshaw

Martin Cullum

Michel Dennefeldt

Rolf Peter Kudritzki

See next page for additional authors

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Authors

Christiaan Sterken, John B. Hearnshaw, Martin Cullum, Michel Dennefeldt, Rolf Peter Kudritzki, Arlo U. Landolt, Peter R. Lawson, Peter Martinez, Birgitta Nordstrom, Ding Qiang Su, Andrei Tokovinin, and Stephane Udry

Division IX: Optical and Infrared Techniques

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Abstract. This document introduces the reports by the Commissions and Working Groups of Division IX.

Keywords. Photometry, Polarimetry, Radial velocities, Instruments

Division IX covers three Commissions: *Instrumentation and Techniques*, *Stellar Photometry and Polarimetry* and *Radial Velocities* (C9, C25 and C30, respectively). The Division hosts one Working Group (*WG on Optical and Infrared Interferometry*), Commission 25 has a *WG on Infrared Astronomy*, and Commission 30 incorporates 3 Working Groups: *WG on Standard radial-velocity stars*, *WG on Bibliography of stellar radial velocities* and *Ninth catalog of the orbital elements of spectroscopic binary stars*.

Division IX provides a forum for astronomers engaged in the innovation, development, and calibration of optical instrumentation and observational procedures, including data processing. The Reports of Commissions 9, 25 and 30 highlight the research topics covered from 2002 to 2005. For a detailed account of progress over the last triennium, we refer to the following Reports of Commissions and Working Groups.

A new initiative was undertaken when the IAU became a Cooperating Organization for the SPIE (The International Society for Optical Engineering) international conference *Astronomical Telescopes & Instrumentation: The Industrial Revolution in Astronomy* on 21–25 June 2004 in Glasgow, Scotland UK. The meeting featured conferences on Space Telescope systems, interferometry, ground-based telescopes, advancements in adaptive optics, ground-based instrumentation, information technologies, technology advancements, detector advancements, etc. Division IX was the coordinating body between SPIE and the IAU for this event.

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Working Group on Optical/IR Interferometry

By P. Lawson

1.1. *Introduction*

The Working Group on Optical/IR Interferometry is a Division-level working group within Division IX (Optical and Infrared Techniques), that was established at the General Assembly in Manchester in 2000. Its goal is to encourage international cooperation and collaboration in topics in stellar interferometry and to conduct work to further progress in this field.

The Working Group is Chaired by Peter Lawson (United States) with a Scientific Organizing Committee composed of the following: John Davis (Australia), Christopher Haniff (United Kingdom), Christian Hummel (United States), Pierre Lna (France), Christoph Leinert (Germany), Harold McAlister (United States), Denis Mourard (France), Andreas Quirrenbach (Netherlands), Charles Townes (United States).

Since the last report in 2003, the Working Group has held two formal meetings and has focused its attention on the completion of a data exchange standard, a competition involving a formal comparison of imaging algorithms, and ongoing development of the Working Group's website. The results of these activities are reported here.

1.2. *Data Exchange Standard for Interferometry*

The motivation for creating a data format specific to optical/infrared interferometry is that existing formats for radio interferometry data, such as UV-FITS, are ill-suited to optical data. The measured data at radio and optical wavelengths, as well as their associated noise models, are substantially different.

Efforts by the Working Group prior to 2003 resulted in the adoption of a format based on FITS that would faithfully represent calibrated imaging data and facilitate the exchange of data between different interferometer groups. The standard was frozen in April 2003 and has since been adopted by numerous groups worldwide. Software tools to support the OI-FITS standard are publically available and a detailed description of the format has been published (Pauls *et al.* 2005).

1.3. *Imaging Beauty Contest*

It has been evident for many years that new software is needed that is specifically tailored to optical/infrared interferometry data. At the 2001 meeting of the Working Group it was suggested that the existing software suites should be compared using controlled data sets. From this arose the idea of an imaging beauty contest. Following the initial release of the OI-FITS format in early 2003, the contest was undertaken with the results presented at the SPIE Conference on Astronomical Telescopes and Instrumentation, in Glasgow Scotland in June 2004.

There were several motivations for the contest:

- (a) Encourage the use of the new OI-FITS format, identify problems in its definition, and revise it as necessary;
- (b) Engage the interferometry community in a formal assessment of existing software;
- (c) Encourage the development of new software tailored to the needs of optical interferometry.

It was agreed amongst the organizers that the contest data sets would only be provided in the OI-FITS format. This would oblige contestants to work with the data format before using the data in their programs. Test data were provided as a preliminary to the contest itself. This would allow contestants to see if their software could reproduce a simple image, in this case a binary star with a given separation, magnitude difference, and orientation.

The contest data was then presented without any information as to what it represented. This provided a blind test. As part of the contest the participants were asked not only to produce images, but to interpret in the images what they believed to be true features.

Four entries were received. The results of the contest are described in detail in a SPIE paper by Lawson *et al.* (2004).

The results of the contest were extremely encouraging and pointed to the need of a more challenging contest. A new contest for 2006 is in preparation.

1.4. Working Group website: *Optical Long Baseline Interferometry News*

The website of the Working Group continues to maintain a list of preprints, refereed publications, future meetings, and resources for students and scientists interested in long-baseline optical interferometry. Also accessible through the website is in an email forum that is in wide use within the optical interferometry community, having now over 300 subscribers. The address of the website is <http://olbin.jpl.nasa.gov>.

Peter Lawson

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