

DIVISION IX / COMMISSION 25 / WORKING GROUP INFRARED ASTRONOMY

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1. Introduction

The WG-IR was created following a Joint Commission Meeting at the IAU General Assembly in Baltimore in 1988, a meeting that provided both diagnosis and prescription for the perceived ailments of infrared photometry at the time. The results were summarized in Milone (1989). The challenges involve how to explain the failure to systematically achieve the milli-magnitude precision expected of infrared photometry and an apparent 3% limit on system transformability. The proposed solution was to redefine the broadband Johnson system, the passbands of which had proven so unsatisfactory that over time effectively different systems proliferated although bearing the same *JHKLMNQ* designations; the new system needed to be better positioned and centered in the atmospheric windows of the Earth's atmosphere, and the variable water vapour content of the atmosphere needed to be measured in real time to better correct for atmospheric extinction.

The WG-IR was formalized by Ian McLean, then president of Commission 25, at the Buenos Aires IAU General Assembly in 1991, and Milone formally appointed to the chair. A subcommittee had been formed almost immediately in 1988 to look at ways to implement the recommendations put forward in Milone (1989). It established the procedure and criteria for judging the performance of existing infrared passbands and began experimenting with passband shapes, widths, and placements within the spectral windows of the Earth's atmosphere. The method and coding were initiated and largely carried out by Andy Young, with Milone running the simulations and Stagg assisting with profiles.

By 1993, preliminary recommendations were presented at the photometry meeting in Dublin (Young, Milone, & Stagg 1993). The full details of the criteria and results of the numerical simulations were presented by Young, Milone, & Stagg (1994). Subsequent work, described in WG-IR and/or Commission 25 reports, included the use of a new MODTRAN version (3.7) to check and extend previous work. This part of the program proved so successful in minimizing the effects of water vapour on the source flux transmitted through the passband that the second stage, real-time monitoring of IR extinction, was not pursued, although this procedure remains desirable for unoptimized passbands designed for specific Astrophysical purposes.

2. Developments within the past triennium

The WG-IR has had the policy of being open to input from its members at all times following the initial consultations with all segments of the infrared community.

During the 2003-2006 triennium, the WG concentrated on gathering and presenting evidence of the usefulness of the WG-IR infrared passband set. For the near infrared portion of the WG-IR set (namely i_z , i_J , i_H , i_K), field trials were conducted over the years 1999-2003 with the 1.8-m telescope at the Rothney Astrophysical Observatory of the University of Calgary. The results of those trials and the details of further work done to that date were presented in Milone & Young (2005). This paper contained, for the first time, evidence that not only were the WG-IR passbands more useful to secure precise transformations than all previous passbands, but that they were also superior in at least one measure of the signal to noise ratio. This evidence was further refined in Milone & Young (2007). As a consequence, the original purpose of the WG-IR largely has been achieved but opposition to the new passband system is still strong, and passbands that somewhat compromise the WG-IR recommendations have been advanced in order to provide more throughput, at the cost of precision and standardization. As a consequence, non-optimized passbands are still in use at the highest altitude infrared sites. The situation is described (and decried!) in Milone & Young (2007).

On the other hand, the *need* for improved IR passbands has been accepted by the community, by far and large. The work of Salas, Cruz-González, & Tapia (2006) in making use of Padé approximants to simulate atmospheric extinction as they define a new set of unoptimized intermediate IR passbands illustrates this well. In the near infrared, the work of Simons & Tokunaga (2002) and Tokunaga, Simons, & Vacca (2002) typify the new attitude; the work by this group was summarized recently by Tokunaga & Vacca (2007).

Perhaps the most important aspect of the WG-IR's work is the promise that the near-IR WG-IR passband set holds for highly precise photometry at intermediate and even low elevation sites.

3. Closing remarks

The future activities require fabrication and field testing of the remainder of the WG-IR passband set, namely the passbands i_L , $i_{L'}$, i_M , i_N , i_n , and i_Q . It is also desirable to extend the list of near infrared standard stars presented in Milone & Young (2005) to a fuller all-season set, and to extend them to fainter stars, as, for example, Landolt (1992) (and in earlier papers cited therein) has done for the visual Johnson-Cousins passbands.

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