

# Building-up a database of spectro-photometric standards from the UV to the NIR

J. Vernet<sup>1</sup>, F. Kerber<sup>1</sup>, V. Mainieri<sup>1</sup>, T. Rauch<sup>2</sup>, F. Saitta<sup>1</sup>,  
S. D'Odorico<sup>1</sup>, R. Bohlin<sup>3</sup>, V. Ivanov<sup>4</sup>, C. Lidman<sup>4</sup>, E. Mason<sup>4</sup>,  
A. Smette<sup>4</sup>, J. Walsh<sup>5</sup>, R. Fosbury<sup>5</sup>, P. Goldoni<sup>6</sup>, P. Groot<sup>7</sup>,  
F. Hammer<sup>8</sup>, L. Kaper<sup>9</sup>, M. Horrobin<sup>10</sup>, P. Kjaergaard-Rasmussen<sup>11</sup>  
and F. Royer<sup>8</sup>

<sup>1</sup>ESO, Karl-Schwarzschild-Str. 2, 85748 Garching bei München, Germany; <sup>2</sup>Institute for Astronomy and Astrophysics, Kepler Center for Astro and Particle Physics, Eberhard Karls University, Sand 1, 72076 Tübingen, Germany; <sup>3</sup>STScI, 3700 San Martin Drive, Baltimore, MD 21218, USA; <sup>4</sup>ESO, Alonso de Cordova 3107, Vitacura, Santiago 19, Chile; <sup>5</sup>ST-ECF, Karl-Schwarzschild-Str. 2, D-85748 Garching bei München, Germany; <sup>6</sup>Service d'Astrophysique, Centre d'Etudes de Saclay, F-91190 Gif-sur-Yvette Cédex, France; <sup>7</sup>Radboud Univ. Nijmegen, Postbus 9010, 6500 GL Nijmegen, The Netherlands; <sup>8</sup>Observatoire de Paris, 5, place Jules Janssen, F-92195 Meudon, France; <sup>9</sup>Astronomical Institute Anton Pannekoek, Universiteit van Amsterdam, Kruislaan 403, 1098 SJ Amsterdam, The Netherlands; <sup>10</sup>Physikalisches Institut Universität zu Köln Zùlpicher Str. 77 D-50937 Köln; <sup>11</sup>Niels Bohr Institute for Astronomy, Blegdamsvej 17, DK-2100 Copenhagen, Denmark

We present results of a project aimed at establishing a set of 12 spectro-photometric standards over a wide wavelength range from 320 to 2500 nm. Currently no such set of standard stars covering the near-IR is available. Our strategy is to extend the useful range of existing well-established optical flux standards (Oke 1990, Hamuy *et al.* 1992, 1994) into the near-IR by means of integral field spectroscopy with SINFONI at the VLT combined with state-of-the-art white dwarf stellar atmospheric models (TMAP, Holberg *et al.* 2008). As a solid reference, we use two primary HST standard white dwarfs GD71 and GD153 and one HST secondary standard BD+17 4708. The data were collected through an ESO "Observatory Programme" over ~40 nights between February 2007 and September 2008.

Flux measurements were done in eight telluric absorption-free windows (one in the *J*-band, four in the *H*-band, three in the *K*-band). This careful choice of 'clean' atmospheric windows and the stability of SINFONI make it possible to achieve an accuracy of 3 to 6% depending on the wavelength band and stellar magnitude, which is well within our original goal of 10% accuracy.

While this project was originally tailored to the needs of the wide wavelength range (320-2500 nm) of X-shooter on the VLT, it will also benefit any other near-IR spectrographs, providing a huge improvement over existing flux calibration methods.

## References

- Oke, J. B. 1990, *A&A* 99, 1621  
Hamuy, M., Walker, A. R., Suntzeff, N. B., *et al.*, 1992, *PASP* 104, 533  
Hamuy, M., Walker, A. R., Suntzeff, N. B., *et al.*, 1994, *PASP* 106, 566  
Holberg, J. B., Sion, E. M., Oswalt, T., *et al.*, 2008, *ApJ* 135, 1225