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SMARTY: The mileS Moderate Resolution neAr infRared sTellar librarY

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We present a 0.35-2.4 μm stellar spectral library composed by 31 stars observed with the Gemini Near-IR Spectrograph (GNIRS) on the 8.1 m Gemini North telescope in Mauna Kea, Hawaii. These stars are present in the MILES library, and thus various parameters derived from the optical are available. Furthermore, out of those, 26 are presented for the first time in the NIR and 5 were used as control sample. The SMARTY library will be made available to the community.

Most of the observed galaxies cannot be resolved and therefore are studied through the evolutionary synthesis of simple stellar populations (SSPs). Spectroscopic observations are increasingly being directed towards the near-infrared (NIR, e.g. James Webb Telescope), thus we need to understand the stellar populations that dominate the galaxies' light in this spectral region. However, due to observational and theoretical difficulties, different SSP models differ in their predictions in the NIR.

In this context, having reliable stellar libraries in the NIR is essential as this is one of the most important ingredients to develop reliable stellar population synthesis models. The stellar libraries can be either theoretical or empirical, each offering distinct advantages and limitations. However, both theoretical and empirical libraries not only benefit from but also depend on each other. For example, empirical stars derive their atmospheric parameters through comparisons with theoretical stars, while theoretical stars can undergo testing and calibration based on empirical stars.

In light of these considerations, the SMARTY library comprises 31 stars carefully selected from the MILES stars (Sánchez-Blázquez et al., 2006), strategically positioned across diverse regions of the HR diagram. This selection was intended to facilitate the test of theoretical stars. In Fig. 1, the comprehensive coverage of empirical NIR stellar libraries is depicted, including SMARTY.

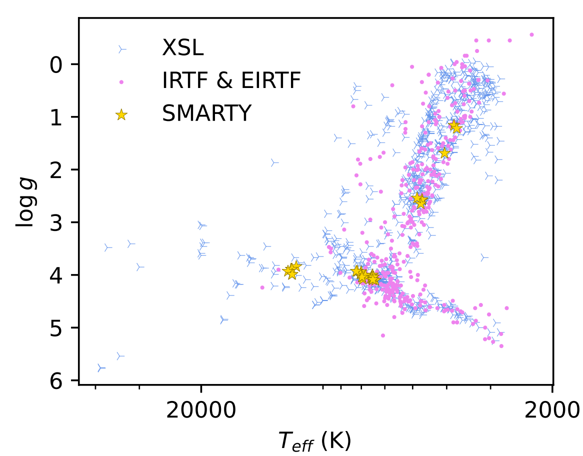

Figure 1. HR diagram for existent observed stellar spectral libraries in the NIR. In blue are the stars from XSL (Verro et al., 2022); in violet, from IRTF/E-IRTF (Cushing et al., 2005; Rayner et al., 2009; Villaume et al., 2017); and in yellow are the stars from SMARTY library.

Ensuring the quality of the spectra is crucial, given its foundational role in numerous applications. In view of this, as the SMARTY observations were made in poor weather, compromising the spectra quality, we made post-reduction flux corrections. First we normalized SMARTY spectra by adjusting polynomial functions to align its continuum and removing it, then we multiplied this normalized flux to the adjusted continuum of reference stellar spectra. We used three groups of reference spectra: *i*) the 5 control stars from other NIR libraries; *ii*) the interpolated (Vazdekis et al., 2003) IRTF stars with similar atmospheric parameters; *iii*) the theoretical spectra from Coelho et al. (2020) with matching parameters.

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The average difference between the 5 corrected spectra and their respective control spectra is 1%, which indicates a good quality for SMARTY spectra.

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