Brown Dwarfs
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An Efficient Low-Resolution NIR Classification Scheme for M, L, and T dwarfs and Its Application to Young BDs

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1. The NICS/Amici low-resolution NIR library of cool atmospheres

We present the preliminary results of a programme aimed at defining a low-resolution near-infrared spectral classification scheme for faint M, L, and T-dwarfs. The method is based on the global shape of R$\sim$100 complete near-infrared spectra from 0.8 to 2.4μm as obtained through a high-throughput prism-based optical element, the Amici device, mounted inside the NICS instrument at the TNG 3.5m telescope (Baffa et al. 2001; Oliva 2000). The aim of our project is to provide an efficient classification scheme based on very low-resolution near infrared spectroscopy, which can be carried on at a 4m-class telescope. The results for the L-type dwarfs have already been presented in Testi et al. (2001), sample spectra for the M and T-dwarfs range are shown in Figure 1. A preliminary application of the method to the classification of young embedded brown-dwarf candidates has been successfully attempted by Testi et al. (2002) and Natta et al. (2002). The method is shown to be accurate and competitive: the high system throughput coupled with the possibility of obtaining in a "single shot" the complete spectrum of the objects make the NICS/TNG system more efficient than existing large telescopes.

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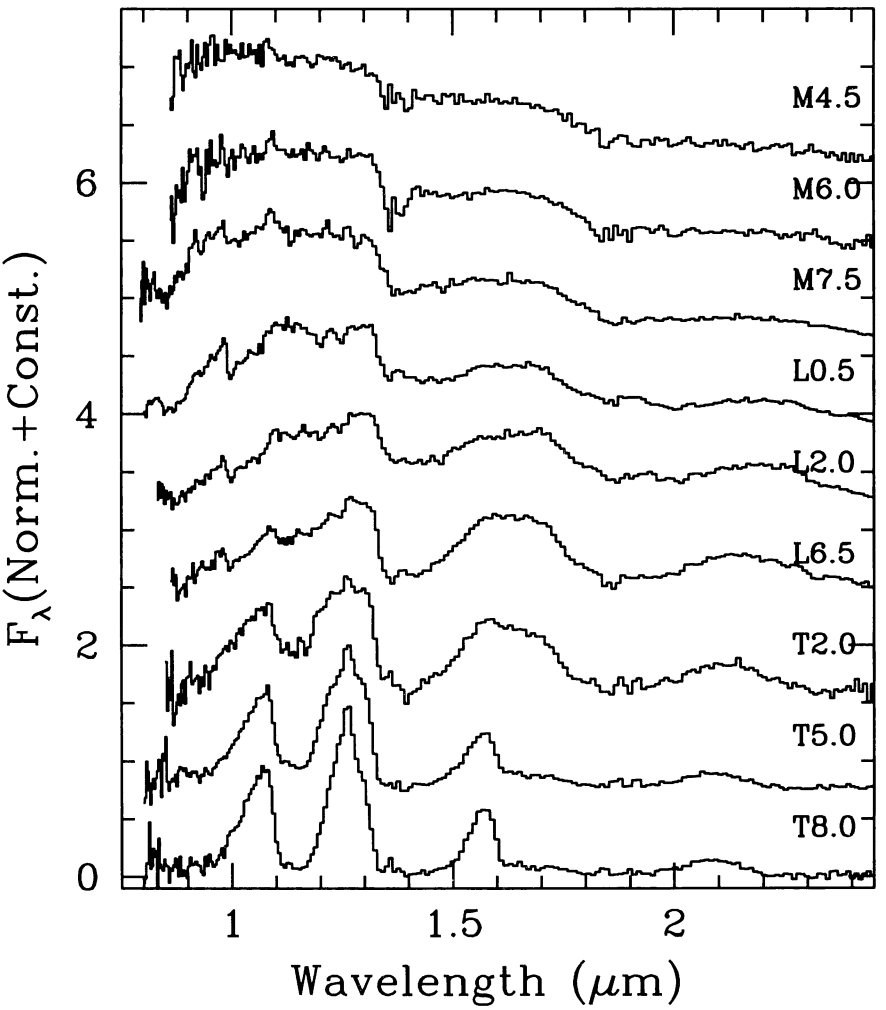

Figure 1. Shown in the figure are a sample of field dwarfs spectra obtained for our programme, from M4.5 through T8. the most conspicuous features in the spectra are the water absorption bands and for the T-dwarfs the methane absorption bands. Depending on signal to noise and spectral type, the spectra also show blended absorption features from CO, TiO, FeH and KI. The spectra show the evolution of the various features with the spectral type, as expected. Our proposed classification is mainly based on the strength and shape of the water and methane bands, which strongly affect the global appearance of the spectrum. Each spectrum requires 5 to 15 min of integration time at the TNG, depending on source brightness. The sample has been selected from Henry et al. (1994), Kirkpatrick et al. (1995; 1999; 2000), and Burgasser et al. (2002).

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