[구GC-08] Yonsei Evolutionary Population Synthesis (YEPS) Model. III. Spectrophotometric Evolutions of Simple Stellar Population Models based on Empirical Spectra

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We present the Yonsei evolutionary population synthesis (YEPS) models based on the high-resolution empirical spectral energy distributions (SEDs). We have adopted the MILES library in the optical wavelength, and our new models based on the MILES library show good agreements with our previous models presented in the YEPS I. The effect of hot horizontal-branch (HB) stars on the integrated properties of simple stellar populations (SSPs) is again confirmed by our models based on empirical SEDs. In addition, we have extended our empirical models to the near-IR wavelength and predicted the strengths of the calcium II triplet (CaT) and the Paschen triplet (PaT) based on the INDO-US and the Cenarro library. We find that the effect of HB stars and the age of SSPs on the CaT is almost negligible. On the other hands, the PaT models are very sensitive to the existence of hot stars, e.g., HB stars and young turn-off stars, and show very similar results with Balmer lines. Interestingly, the CaT distribution of GCs in NGC 1407, which is at odds with the optical (B-I) color distribution, can be explained by the unique feature of the CaT-[Fe/H] relations that show almost the same equivalent widths in the metal-rich regime. We will also discuss the impact of the second-generation populations on the strength of the CaT.

[구GC-09] ON THE NATURE OF SODIUM EXCESS OBJECTS

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Several studies have reported the presence of sodium excess objects having neutral atomic absorption lines at 5895Å (NaD) and 8190Å that are deeper than expected based on stellar population models that match the stellar continuum. The origin of these lines is therefore hotly debated. van Dokkum & Conroy proposed that low-mass

stars (0.3M) are more prevalent in massive early-type galaxies, which may lead to a strong NaI 8190 line strength. It is necessary to test this prediction, however, against other prominent optical line indices such as NaD, Mgb, and Fe5270, which can be measured with a significantly higher signal-to-noise ratio than NaI 8190. We identified a new sample of roughly one thousand NaD excess objects (NEOs; ~8% of galaxies in the sample) based on NaD line strength in the redshift range $0.00<z<0.08$ from the Sloan Digital Sky Survey (SDSS) DR7 through detailed analysis of galaxy spectra. The novelty of this work is that the galaxies were carefully identified through direct visual inspection of SDSS images, and we systematically compared the properties of NEOs and those of a control sample of galaxies with normal NaD line strengths. By comparing the observed NaD, Mgb, and Fe5270 line strengths with those of the models, we identify a plausible range of parameters that reproduce the observed values. In these models, the majority of early-type NEOs are "α-enhanced" ([α/Fe] ~ 0.3), "metal-rich" ([Z/H] ~ 0.3), and, especially, "Na-enhanced" ([Na/Fe] ~ 0.3).