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Resumen:

We used the intrinsic algebra of synthesis models and explored how the SFR can be inferred from the integrated light without any assumption about the underlying star formation history (SFH). As result, We show that the constant SFR approximation is a simplified expression of deeper characteristics of synthesis models: It characterizes the evolution of single stellar populations (SSPs), from which the SSPs as a sensitivity curve over different measures of the SFH can be obtained. As results, we find that (1) the best age to calibrate SFR indices is the age of the observed system (i.e., about 13 Gyr for $z = 0$ systems); (2) constant SFR and steady-state luminosities are not required to calibrate the SFR; (3) it is not possible to define a single SFR timescale over which the recent SFH is averaged, and we suggest to use typical SFR indices (ionizing flux, UV fluxes) together with untypical ones (optical or IR fluxes) to correct the SFR for the contribution of the old component of the SFH. Particular values of SFR calibrations are (almost) unaffected by this work, but the meaning of results obtained by SFR inferences is affected. In our framework, results such as the correlation of SFR timescales with galaxy colors, or the sensitivity of different SFR indices to short- and long-scale variations in the SFH, fit naturally. In addition, the present framework provides a theoretical guide-line to optimize the available information from data and numerical experiments to improve the accuracy of SFR inferences.