SED fitting of galaxies using BAGPIPES

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Abstract

It is proposed a study of galaxy properties observed by S-PLUS and J-PAS using simultaneous modeling of the stellar continuum and the emission lines produced by the stellar populations. For this, it is going to be used the spectral fitting code BAGPIPES to generate parametric models of star-formation histories and fit the photometry obtained by S-PLUS[3] and J-PAS[4]. The project will be made in two steps. First, it will be generated a grid of synthetic galaxies covering a wide range of properties. Then, the ability of BAGPIPES[1],[2] to recover these parameters in different redshift ranges will be evaluated. Lastly, we will apply it to observational data from S-PLUS and J-PAS, analyzing mainly the effect of narrow bands in determining the properties of galaxies.

BAGPIPES

BAGPIPES is a tool to generate galaxy spectral energy distributions (SEDs). It uses single stellar population models, parametric models of star-formation histories and other components to construct SEDs of differents parameters like redshift, dust, age and metallicity. Then, the code use these SEDs to fit the observed data using a Bayesian inference approach to calculate the parameters we want to fit for a galaxy.

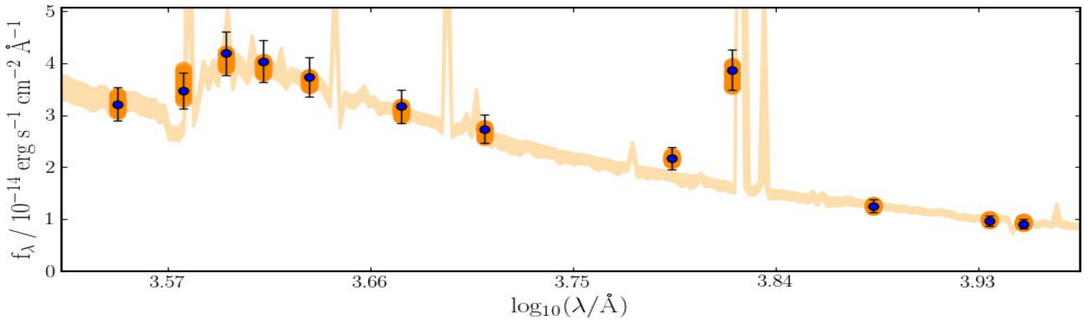

Figure 1: BAGPIPES example of fitting of a galaxy SED

Figures 2 and 3 on the right: Here we are trying to see the consistency of BAGPIPES fitting process, this plot shows 100 runs of the same galaxy. The first two panels are using S-PLUS filters, first is for a galaxy made by the models, second one is the same galaxy with noise. Same happens for the third and fourth panels. It is shown that the fitting is much more consistent when we have S-PLUS+WISE[5] bands: the spread of the median value obtained by the fit for each run (colorbar) is smaller when using WISE bands. When we apply noise we still obtain more consitent results, depiste the wrong value that is calculated

REFERENCES

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[3] Mendes de Oliveira C., et al., 2019, MNRAS, 489, 241
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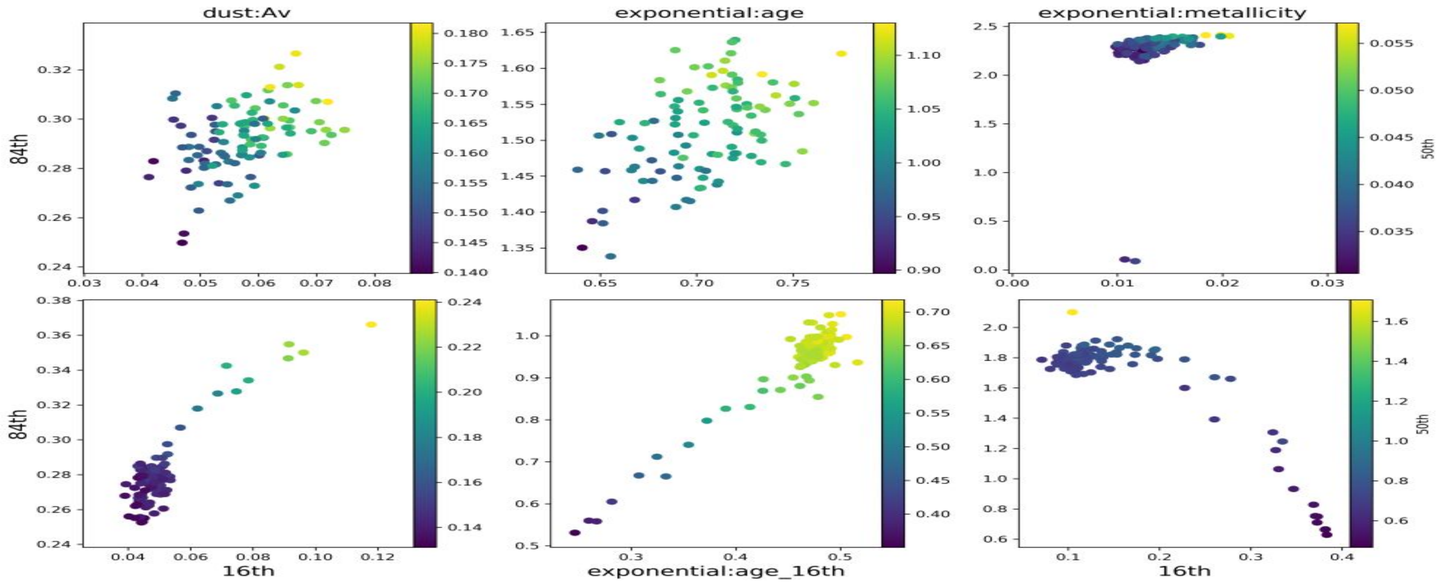
Galaxy of Av=0.2, Age=1, Z=0.02

S-PLUS (model fit top panel, synthetic fit bottom panel)



S-PLUS+WISE (model fit top panel, synthetic fit bottom panel)