Fall 2016 Astro 250: Stellar Populations
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Problem Set 6 − Galaxy Evolution Over Cosmic Time
Assigned: 11/21/16
Due: 12/5/16

Please complete the problems using your github repository.

Problem 1. G-Dwarf Problem

In one concise paragraph, summarize the so-called "G-Dwarf problem" and indicate possible solutions and/or implications.

Problem 2. UV Luminosity Functions

Bouwens et al. (2015, *ApJ*, **803**, 24), report rest-frame UV luminosity functions from $z \sim 4 - 8$ in Table 5. Using `emcee`, fit a Schechter function to the data at $z = 4, 6, 8$. How do your constraints (i.e., joint and marginalized distributions) on the three Schechter function parameters (ϕ_*, M_*, α) compare to what is reported in the Bouwens et al. paper? If the results do not agree, comment on the possible source(s) of the discrepancies.

Problem 3. Cosmic SFH

(a) Using UV luminosity function determinations (i.e., a Schechter function with M_*, ϕ_*, α) from the literature and your calibration of the FUV SFR indicator from Problem Set 5, measure the Cosmic SFH (i.e., redshift vs. SFR density) from $z \sim 0 - 8$. You may find §5.1 of Madau & Dickinson (2014, *AR&AA*, **52**, 415) and/or §8 of Finkelstein et al. (2015, *ApJ*, **810**, 71) to be useful in this exercise. Clearly indicate references for your UV luminosity function parameters. How does your determination compare to that of Madau & Dickinson (2014) and/or Finkelstein et al (2015)? What might account for any differences?

(b) Using your results of part (a) and `emcee`, fit Equation 7 from Finkelstein et al. (2015) to your cosmic SFH data. Generate the usual plots for model fitting (i.e., convergence and triangle plots). How do your results compare to those presented in Madau & Dickinson (2014) and/or Finkelstein et al. (2015)? What might be the source of any differences?