Title: Testing the Universality of the IMF with Bayesian statistics

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Abstract: The universality of the stellar initial mass function (IMF) is tested using Bayesian statistics with a sample of eight young stellar clusters (IC 348, ONC, NGC 2024, NGC 6611, NGC 2264, ρ Ophiuchi, Chameleon I, and Taurus). We infer the posterior probability distribution functions (pPDF) of the IMF parameters when the likelihood function is described by a tapered power law function, a lognormal distribution at low masses coupled to a power law at higher masses, and a multi-component power law function. The inter-cluster comparison of the pPDFs of the IMF parameters for each likelihood function shows that these distributions do not overlap within the 1σ uncertainty level. Furthermore, the most probable values of the IMF parameters for most of the clusters deviate substantially from their values for the Galactic field stellar IMF. We also quantify the effects of taking into account the completeness correction as well as the uncertainties on the measured masses. The inclusion of the former affects the inferred pPDFs of the slope of the IMF at the low mass end while considering the latter affects the pPDFs of the slope of the IMF in the intermediate- to high mass regime. As variations are observed in all of the IMF parameters at once and for each of the considered likelihood functions, even for completeness corrected samples, we argue that the observed variations are real and significant, at least for the sample of eight clusters considered in this work. The results presented here clearly show that the concept of a universal IMF is far from being established.