

# OCAAT

(Open Cluster Automated Analysis Tool)

**Manual v1.0.0 (July 22, 2014)**

# 1 Introduction

This is the manual of operation for the `OCAAT` code.

## 2 Synthetic clusters

### 2.1 IMF sampling

The initial mass function (IMF) is the distribution of initial masses for a population of stars. For a population of  $N$  stars with masses  $m_i$  and a total mass of  $M_T$ :

$$IMF \rightarrow \xi(m) = \frac{dn}{dm} \rightarrow dn = \xi(m)dm$$

$$M_T = \sum_{i=1}^N m_i \rightarrow M_T = C \int_{m_l}^{m_h} m(n)dn =$$

$$= C \int_{m_l}^{m_h} m\xi(m)dm$$

where  $m_l$  and  $m_h$  are the mass limits for the IMF ( $m_h$  is fixed to  $100M_\odot$  in the code) and  $C$  is a normalization constant. Setting the total mass to unity,  $M_T = 1M_\odot$ , allows us to obtain the normalization constant  $C_1$  and treat the normalized IMF as a PDF:

$$M_T = 1M_\odot \rightarrow C_1 = \frac{1}{\int_{m_l}^{m_h} m\xi(m)dm}$$

and thus the normalized IMF can be written as:

$$PDF(m) = \xi(m)_{norm} = C_1\xi(m)$$

This is the first step, performed by the `get-IMF-PDF` function for a given selected IMF (Chabrier 2001, Kroupa et al. 1993, Kroupa 2002)