Review Article *JST Vol. 7, August, 2008*

Star Clusters

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Abstract. Star clusters form a useful check on theories of star formation and stellar evolution. The author reviews some of the properties of star clusters and suggests some observations that might be extended to more distant clusters.

1. Formation

A review of recent data on star formation shows that in a typical galaxy material is incorporated into stars at a total rate of about $3M_{\odot}$ yr^{-1}. Typically these stars are produced in clusters of 10^5 stars with a distribution of mass of the form

$$\frac{dN}{dm} \propto m^{-2.35}$$

where $dN(m) = (dN/dM)dm$ is the number of stars with mass m in the range m to m+dm and $0.4M_{\odot} < m < 50M_{\odot}$. Since massive stars are the source of heavy elements measured abundances can be used to constrain formation rates.

2. Lifetime

The main- sequence lifetime for stars is $\tau_{ms} = 10^{10}\, m^{-2.5}$ years where m is in solar units and a star passes through the red giant phase in 10% of its main-sequence lifetime.

3. Old stellar clusters

3.1 Ages

The age of a stellar cluster can be determined from the main sequence turn-off

3.2 Supernovae

By making assumptions on the progenitors of supernovae it is possible to predict the rate of type II supernova in a galaxy.