Star and Structure Formation: From First Light to the Milky Way
Astrophysics Conference, August 18 – 22, 2003, ETH Zurich, Switzerland

Star Formation and Metal-enrichment History in Clusters and in the Field from SNe

Dan Maoz, Tel Aviv University, Israel

Abstract Being closed boxes, galaxy clusters are excellent laboratories for studying the source of metals. The iron mass in clusters is about 5 times larger than could have been produced by core-collapse SNe, assuming the stars in cluster galaxies formed with a standard IMF. Type-Ia SNe have been proposed as the alternative dominant iron source. We use our HST measurements of the cluster SN-Ia rate at high redshift to study the cluster iron enrichment scenario. The measurements can constrain the star-formation epoch and the SN-Ia progenitor models via the mean delay time between the formation of a stellar population and the explosion of some of its members as SNe-Ia. The low observed rate of cluster SNe-Ia at $z\sim 1$ pushes back the star-formation epoch in clusters to z>2 and argues for a short delay time. Analysis of the redshift distribution of ***field*** SNe-Ia points to ***long*** delay times, unless the cosmic star formation history is more constant than many recent determinations. Thus, cluster enrichment by core-collapse SNe from a top-heavy IMF may remain the only viable option.