Supernova-rates for different galaxy types

C. Weidner
Sternwarte der Universität Bonn

P. Kroupa
Sternwarte der Universität Bonn

The stellar initial mass function (IMF) integrated over an entire galaxy is an integral over all separate star-formation events. Since most stars form in star clusters with different masses the integrated IMF becomes an integral of the (universal or invariant) canonical stellar IMF over the star-cluster mass function. This integrated IMF is steeper (contains fewer massive stars per G-type star) than the canonical stellar IMF. Furthermore, observations indicate a relation between the star-formation rate of a galaxy and the most luminous stellar cluster in it. This empirical relation can be transformed into one between the star-formation rate of a galaxy and a maximum cluster mass. The assumption that this cluster mass marks the upper end of a young-cluster mass function leads to a connection of the star-formation rate and the slope of integrated IMF for massive stars. This integrated IMF varies with the star-formation history of a galaxy. Notably, large variations of the integrated IMF are evident for dwarf galaxies. One important result is that the supernova rate is suppressed relative to that expected for a Salpeter IMF, and that dwarf galaxies have a suppressed supernova rate relative to massive galaxies. For dwarf galaxies the supernova rate also varies substantially depending on the galaxy assembly history.