[ST01] Keck LGS/AO Observations of the Arches Cluster

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We have analyzed H- and Ks-band images of the Arches cluster obtained using the NIRC2 instrument on Keck with the laser guide star adaptive optics (LGS AO) system. With the help of the LGS AO system, we were able to obtain the deepest ever photometry for this cluster and its neighborhood and derive the background-subtracted present-day mass function down to 1.3 Msun for the 5''-9'' annulus of the cluster. We find that the previously reported turnover at 6 Msolar is simply due to a local bump in the mass function (MF), and that the MF continues to increase down to our 50% completeness limit (1.3 Msun) with a power-law exponent of Γ= -0.91 for the mass range of 1.3<M/Msun<50. Our numerical calculations for the evolution of the Arches cluster show that the Γ-values for our annulus increase by 0.1-0.2 during the lifetime of the cluster and thus suggest that the Arches cluster initially had Γ of -1.0 to 1.1, which is only slightly shallower than the Salpeter value.

[ST02] Dynamical Evolution of the Mass Function of the Galactic Globular Cluster System

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The mass functions of many types of astronomical objects are often modeled as a single power law. In contrast, the mass function of the globular cluster system (GCMF) for our galaxy is generally modeled as a lognormal function with a dispersion of only ~ 0.5 and a peak at $\sim 2\times 10^5 M_\odot$. This preferred mass scale of the globular cluster may be an important clue in understanding the formation and evolution of globular clusters. Our goal is to explore the evolution of GCMF with the implementation of a two-dimensional Fokker-Planck method. Our models include two-body relaxation, binary heating, bulge/disk shocks, dynamical friction, and stellar evolution. We perform Fokker-Planck simulations for a large number of virtual globular clusters and synthesize these results to study the relation between the initial and present GCMFs. We identify important factors in determining the evolution of the GCMF and estimate the most probable initial GCMF by comparing our calculations with current observations.