

mailto: echen@das.uchile.cl

Project title:

Star cluster populations in circumnuclear starburst rings and their mass functions.

Host names and institutions:

Chile:

Michael Fellhauer

Universidad de Concepción

China:

Richard de Grijs

Peking University

Keywords indicating research areas:

Star clusters, star cluster populations, circumnuclear starburst rings, mass functions.

Project abstract:

All known mass distributions of recently formed star cluster populations seem to follow a “universal” power-law function. However, recent work on NGC 7742 (de Grijs & Anders 2012, ApJL 758, 22), NGC 2328 (Vaisanen et al. 2014, ApJL, 797, 16), NGC 6951 (de Grijs et al., submitted to AJ) and NGC 1512 to ApJ (Ma et al., submitted to ApJ) have found that the cluster mass functions at all ages are represented by distributions that resemble those commonly found only for old, evolved globular cluster systems in the local Universe.

This implies that the conditions in circumnuclear starburst rings significantly accelerates the disruption of star clusters to time scales of only a few Myr, and that star clusters born in these environments do not survive to become old globular clusters. While there are two possibilities for the rapidly accelerated destruction of these clusters, namely cluster-cluster and cluster-molecular cloud collisions and the high density formation environment, it is unclear what is actually causing this destruction.

This project will address this problem from both observational and theoretical perspectives. In addition to analysis of a large sample of existing Hubble Space Telescope-based imaging observations, we will aim to obtain spectroscopic confirmation of the dynamical state of circumnuclear starburst ring environments. N-body simulations focusing on the specific conditions in starburst rings, particularly of collisions between clusters and the high-shear conditions in such rings, will be performed to address the problem of destruction time scale mechanisms.