

# China-CONICYT Joint Postdoctoral Program 2017

## Proposed Joint Research Topic

Title: Galaxy and Star Cluster Evolution in the Nearby Universe

Hosts and Host Institutions:

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### Abstract

For decades, the nearest galaxy clusters, the Virgo and Fornax Clusters, have been the pillars underlying our understanding of galaxy structure and evolution. These are the nearest systems in which we can study the full range of galaxy properties. With the advent of wide-field optical and infrared imaging cameras over the last decade, our team is bringing our understanding of these fundamental clusters into the modern age with two large surveys: The Next Generation Virgo Cluster Survey (NGVS) and the Next Generation Fornax Cluster Survey (NGFS).

The NGVS is a now-completed Large Program (164 nights) on the Canada-France-Hawaii Telescope in which we have obtained deep ( $g' \sim 26$ ),  $u^*g'i'z'$  imaging survey of  $104 \text{ deg}^2$ , from the Virgo core to its virial radius. We have discovered thousands new dwarf galaxies, and tens of thousands of individual globular clusters. The NGFS is a complementary program to image the Fornax Cluster in the south with the Dark Energy Camera (DECam) on the CTIO 4m, and has already taken exquisite data.

The NGVS and NGFS are the definitive study of baryonic substructures in a low-redshift cluster environment, and is providing the benchmark observational database against which the next generation of galaxy formation models will be tested. One crucial piece that is still missing from these data, however, is a measure of star formation across the clusters. We have purchased an  $H\alpha$  filter for the DECam, and will survey the Virgo and Fornax clusters, and nearby galaxy groups, producing the first deep, high-resolution maps of star formation and ionized gas over the entirety of these landmark galaxy overdensities. Adding an  $H\alpha$  filter to DECam will immediately make DECam the most powerful survey machine for ionized gas in the local Universe. This new capability will complement our ongoing work on older stellar populations, and will give a new postdoctoral fellow a wealth of science opportunities, particularly in the search for stripped gas, star formation in the outer halos of galaxies, and extragalactic planetary nebulae.

The proposed joint postdoctoral fellow will have full access to the NGVS and NGFS data, and will have leeway to lead projects of mutual interest in the areas of galaxy and/or star cluster evolution with hosts Peng, Puzia, and the rest of their team in China, Chile, and internationally. The fellow will be joining one of the most established scientific collaborations between China and Chile to date.