

China-CONICYT Joint Postdoctoral Fellowship 2015

Proposed Research Topic

Title: Galaxy and Star Cluster Evolution in the Nearby Universe

Hosts and Host Institutions:

Prof. Eric Peng (Peking University; peng@pku.edu.cn)

Prof. Thomas Puzia (PUC; tpuzia@gmail.com)

Prof. Andrés Jordán (PUC; ajordan@astro.puc.cl)

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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 deg², from the Virgo core to its virial radius. We have discovered thousands new dwarf galaxies, and tens of thousands of individual globular clusters. Additional wide-field observations with the new VISTA infrared telescope in Chile (PI: Puzia) have added deep J and Ks imaging to provide unique leverage for stellar populations studies. Much of the spectroscopic follow-up of Virgo globular clusters has been done through both Chinese (MMT) and Chilean (VLT, PI: Puzia, and Magellan, PI: Jordán) telescope time. The NGFS is a complementary program to image the Fornax Cluster in the south with DECam on the CTIO 4m, and has already taken exquisite data.

The NGVS and NGFS will be 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. These surveys have unique leverage on the “**star cluster—dwarf galaxy connection**”. With the ability to characterize every stellar system from star clusters to the most massive galaxies, we are exploring the increasingly blurred distinction between galaxies and star clusters. The proposed joint postdoctoral fellow will have full access to the NGVS and NGFS data, and will work on projects of mutual interest in the areas of galaxy and/or star cluster evolution with hosts Peng, Puzia, Jordán, and the rest of their team, which includes Dr. Roberto Muñoz (PUC), and Dr. Chengze Liu (SJTU). The fellow will be joining one of the most established scientific collaborations between China and Chile to date.

China-Chile Connection (for CASSACA)

This proposed joint postdoctoral fellow will be working with a well-established collaboration on both sides of the Pacific. The advisors for this fellow (Peng, Puzia, and Jordán), have been working together for over ten years, and have been co-authors on 49 papers. Of these, *19 papers have one of us, or one of our students or postdocs, as first author*. Both Profs. Jordán and Puzia have demonstrated success in applying for Chilean telescope time, and both are experts in star clusters, stellar populations, galactic structure, and galactic dynamics. Peng, Jordán, and Puzia are three of the world's leading researchers on extragalactic globular cluster systems: together, 18 of their first author papers on this topic have over 50 citations, and 5 first author papers have over 100 citations (Peng et al. 2006, ApJ; Peng et al. 2008; Jordán et al. 2005, ApJ, Puzia et al. 2002, A&A, Jordán et al. 2007). Both sides have active groups who would provide strong intellectual support for the joint fellow, and would help ensure that the fellow got a quick start to doing research. The joint fellow would provide a solid foundation for future China-Chile initiatives in nearby galaxy research.

In addition, we now have a strong track record with China-CONICYT fellows. One current China-CONICYT fellow, Dr. Hongxin Zhang, started in October, 2014, spent 6 months at PKU, and is now a fellow at PUC. He has already published 3 papers as a China-CONICYT fellow, one as first author. A second fellow, Karla Alamo-Martínez,, spent 9 months at PKU as a China-CONICYT fellow (July, 2014-March 2015) before starting a FONDECYT fellowship at PUC. Both are productive scientists and are the main links in our China-Chile collaboration.