I will study M31 GCs based on the LAMOST spectroscopic survey

National Astronomical Observatories, China

Jun Ma

Contents:

1. An introduction of my scientific interests.

2. How could my work benefit from LAMOST observations?

1. An introduction of my scientific interests:

My main field of scientific research includes:

(1) Structure and arm shape of spiral galaxies;

(2) Stellar populations of star clusters in extra-galaxies (mainly in M31, M33, and M81);

(3) Structural and dynamical parameters of star clusters in extra-galaxies (mainly in M31, M33, and M88).

1. An introduction of my scientific interests:

My main field of scientific research includes:

(1) Structure and arm shape of spiral galaxies;

A&A 388, 389–395 (2002)
DOI: 10.1051/0004-6361:20020414

Astronomy & Astrophysics

Properties of disks and spiral arms along the Hubble sequence

J. Ma*

National Astronomical Observatories, Chinese Academy of Sciences, Beijing 100012, P.R. China

Received 6 December 2001 / Accepted 13 March 2002

Abstract. This paper presents some new statistical correlations between the properties of disks and of spiral arms with some physical properties of galaxies. Our results show that the thickness of spiral disks tends to diminish along the Hubble sequence in the sense that disks of Sc galaxies are 40% thinner than disks of Sab-Sb galaxies. Moreover, the thinner disks tend also to be bluer. We also find that there exists a correlation between HI linewidths and arm pattern within each Hubble type, which suggests that the arm shape is partially determined by the mass of a galaxy. Total mass luminosity ratios and total mass surface densities also have correlations with pitch angles i.e., for disks with lower surface densities and lower total mass luminosity ratios, the pitch angles tend to be greater.

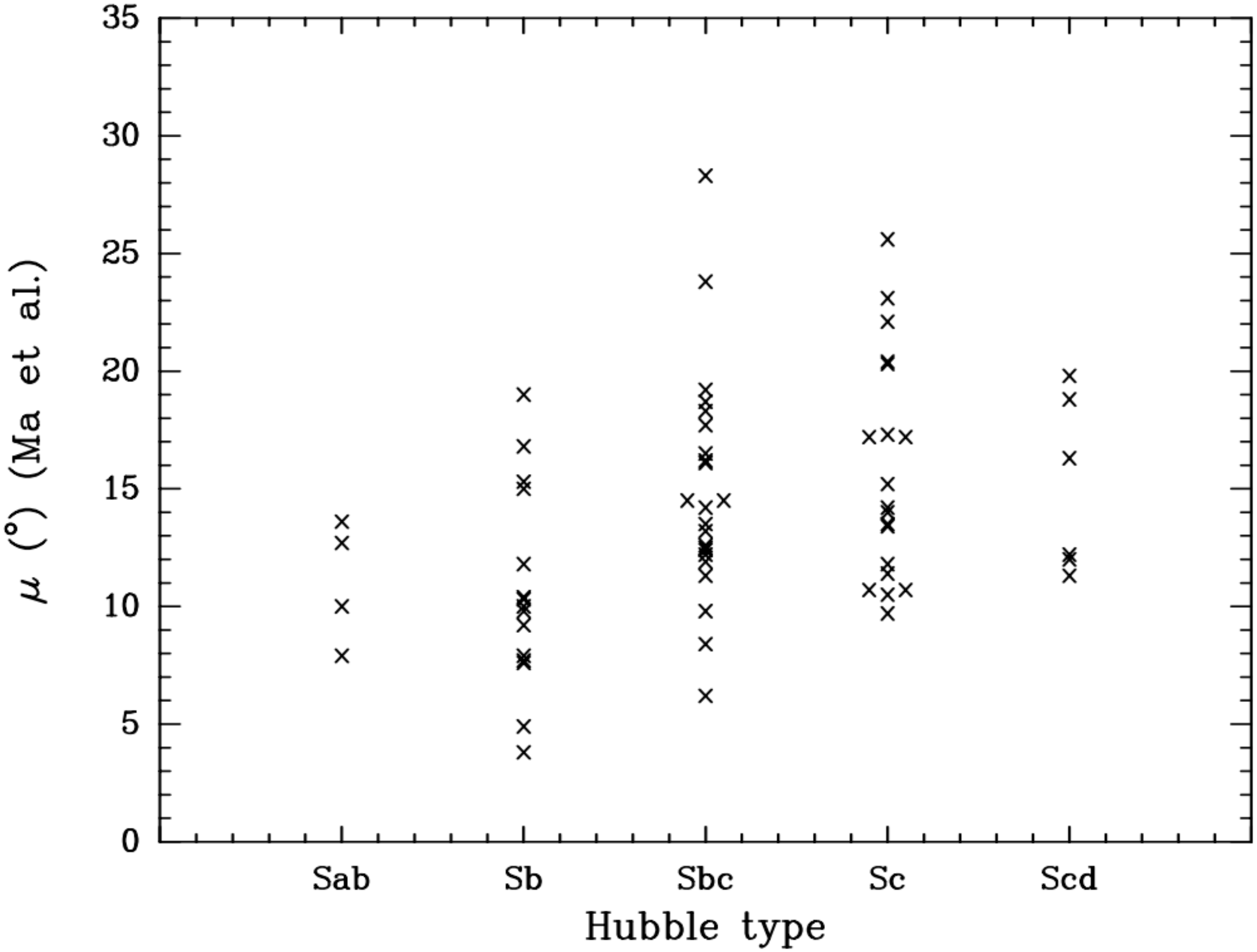


Fig. 5. Mean measured pitch angle plotted against different Hubble types in RC3.

A&A 388, 389–395 (2002)

There is an increase in the mean pitch angles along the Hubble sequence.

1. An introduction of my scientific interests:

My main field of scientific research includes:

(2) Stellar populations of star clusters in extra-galaxies (mainly in M31, M33, and M81);

THE ASTRONOMICAL JOURNAL, 137:4884–4896, 2009 June doi:10.1088/0004-6256/137/6/4884

SPECTRAL ENERGY DISTRIBUTIONS AND AGE ESTIMATES OF 39 GLOBULAR CLUSTERS IN M31

JUN MA[1], ZHOU FAN[1,2], RICHARD DE GRIJS[1,3], ZHENYU WU[1], XU ZHOU[1], JIANGHUA WU[1], ZHAOJI JIANG[1], AND JIANSHENG CHEN[1]
[1] National Astronomical Observatories, Chinese Academy of Sciences, Beijing 100012, China; majun@vega.bac.pku.edu.cn
[2] Graduate University, Chinese Academy of Sciences, Beijing 100039, China
[3] Department of Physics & Astronomy, The University of Sheffield, Hicks Building, Hounsfield Road, Sheffield S3 7RH, UK
Received 2008 October 31; accepted 2009 March 29; published 2009 April 29

ABSTRACT

This paper supplements Jiang et al., who studied 172 M31 globular clusters (GCs) and GC candidates from Battistini et al. on the basis of integrated photometric measurements in the Beijing–Arizona–Taiwan–Connecticut (BATC) photometric system. Here, we present multicolor photometric CCD data (in the BATC system) for the remaining 39 M31 GCs and candidates. In addition, the ages of 35 GCs are constrained by comparing our accurate photometry with updated theoretical stellar synthesis models. We use photometric measurements from the *Galaxy Evolution Explorer* in the far- and near-ultraviolet and Two Micron All Sky Survey infrared JHK_s data, in combination with optical photometry. Except for two clusters, the ages of the other sample GCs are all older than 1 Gyr. Their age distribution shows that most sample clusters are younger than 6 Gyr, with a peak at ∼3 Gyr, although the "usual" complement of well-known old GCs (i.e., GCs of similar age as the majority of the Galactic GCs) is present as well.

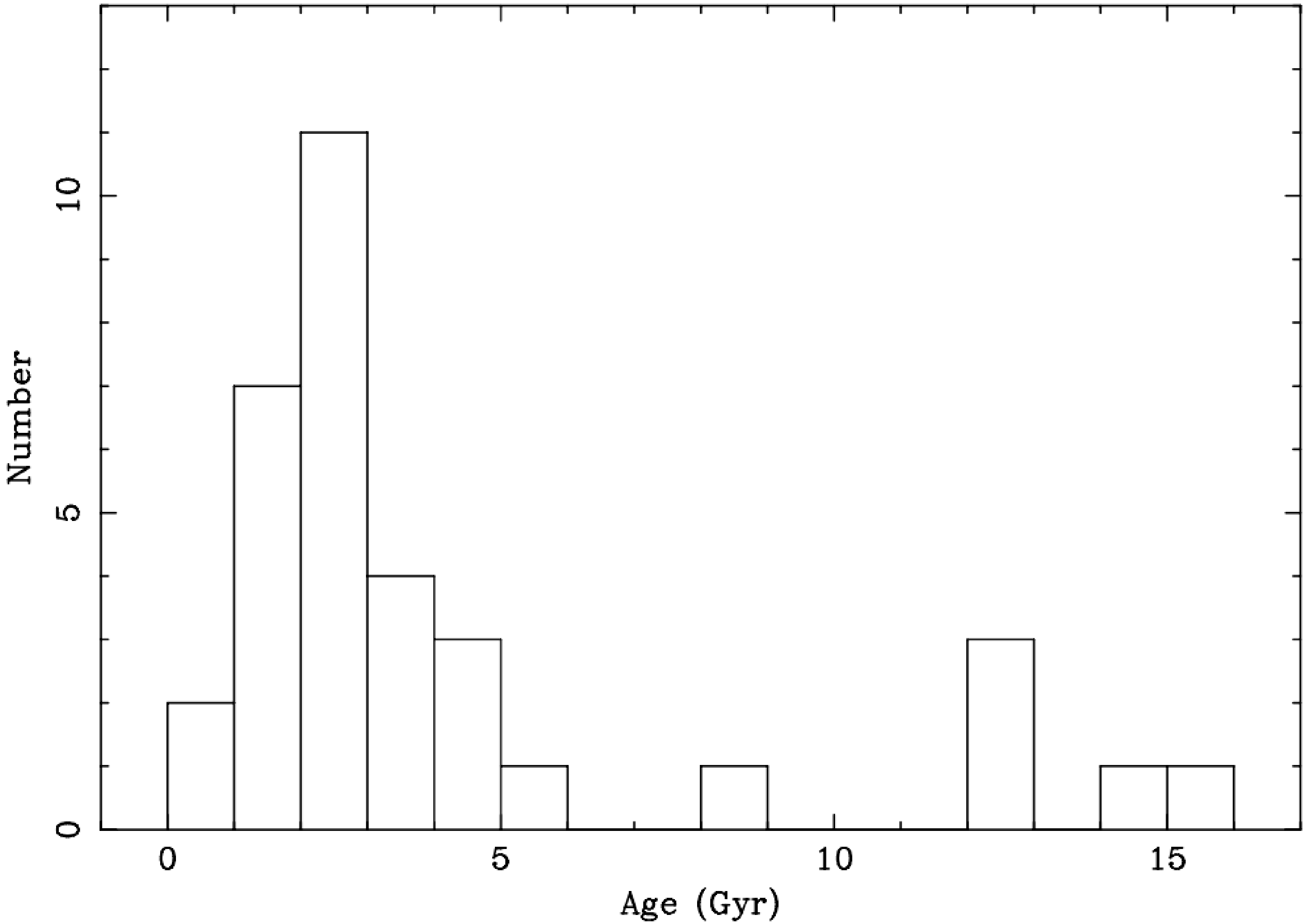


Figure 5. Age distribution of our sample GCs and GC candidates in M31.

THE ASTRONOMICAL JOURNAL, 137:4884–4896, 2009 June

M31 includes some star clusters whose ages are younger than 6 Gyr.

1. An introduction of my scientific interests:

My main field of scientific research includes:

(3) Structural and dynamical parameters of star clusters in extra-galaxies (mainly in M31, M33, and M88).

MNRAS **468,** 4513–4528 (2017) doi:10.1093/mnras/stx761
Advance Access publication 2017 March 28

Ages and structural and dynamical parameters of two globular clusters in the M81 group

Jun Ma,[1,2★] Song Wang,[1★] Zhenyu Wu,[1,2] TianMeng Zhang,[1,2] Hu Zou,[1] Zhimin Zhou,[1] Jundan Nie,[1] Xu Zhou,[1] Xiyang Peng,[1] Jiali Wang,[1] Jianghua Wu,[3] Cuihua Du[4] and Qirong Yuan[5]

[1]*Key Laboratory of Optical Astronomy, National Astronomical Observatories, Chinese Academy of Sciences, Beijing 100012, China*
[2]*College of Astronomy and Space Sciences, University of Chinese Academy of Sciences, Beijing 100049, China*
[3]*Department of Astronomy, Beijing Normal University, Beijing 100875, China*
[4]*School of Physics Sciences, University of the Chinese Academy of Sciences, Beijing 100049, China*
[5]*Department of Physics, Nanjing Normal University, WenYuan Road 1, Nanjing 210046, China*

Accepted 2017 March 24. Received 2017 March 24; in original form 2017 February 23

ABSTRACT

GC-1 and GC-2 are two globular clusters (GCs) in the remote halo of M81 and M82 in the M81 group discovered by Jang et al. using the *Hubble Space Telescope* (*HST*) images. These two GCs were observed as part of the Beijing–Arizona–Taiwan–Connecticut (BATC) Multicolor Sky Survey using 14 intermediate-band filters covering a wavelength range of 4000–10 000 Å. We accurately determine these two clusters' ages and masses by comparing their spectral energy distributions (from 2267 to 20 000 Å, comprising photometric data in the near-ultraviolet of the *Galaxy Evolution Explorer*, 14 BATC intermediate-band and Two Micron All Sky Survey near-infrared JHK_s filters) with theoretical stellar population-synthesis models, resulting in ages of 15.50 ± 3.20 for GC-1 and 15.10 ± 2.70 Gyr for GC-2. The masses of GC-1 and GC-2 obtained here are 1.77–2.04 × 10^6 and 5.20–7.11 × 10^6 $M_\odot$, respectively. In addition, the deep observations with the Advanced Camera for Surveys and Wide Field Camera 3 on the *HST* are used to provide the surface brightness profiles of GC-1 and GC-2. The structural and dynamical parameters are derived from fitting the profiles to three different models; in particular, the internal velocity dispersions of GC-1 and GC-2 are derived, which can be compared with ones obtained based on spectral observations in the future. For the first time, in this paper, the r_h versus M_V diagram shows that GC-2 is an ultra-compact dwarf in the M81 group.

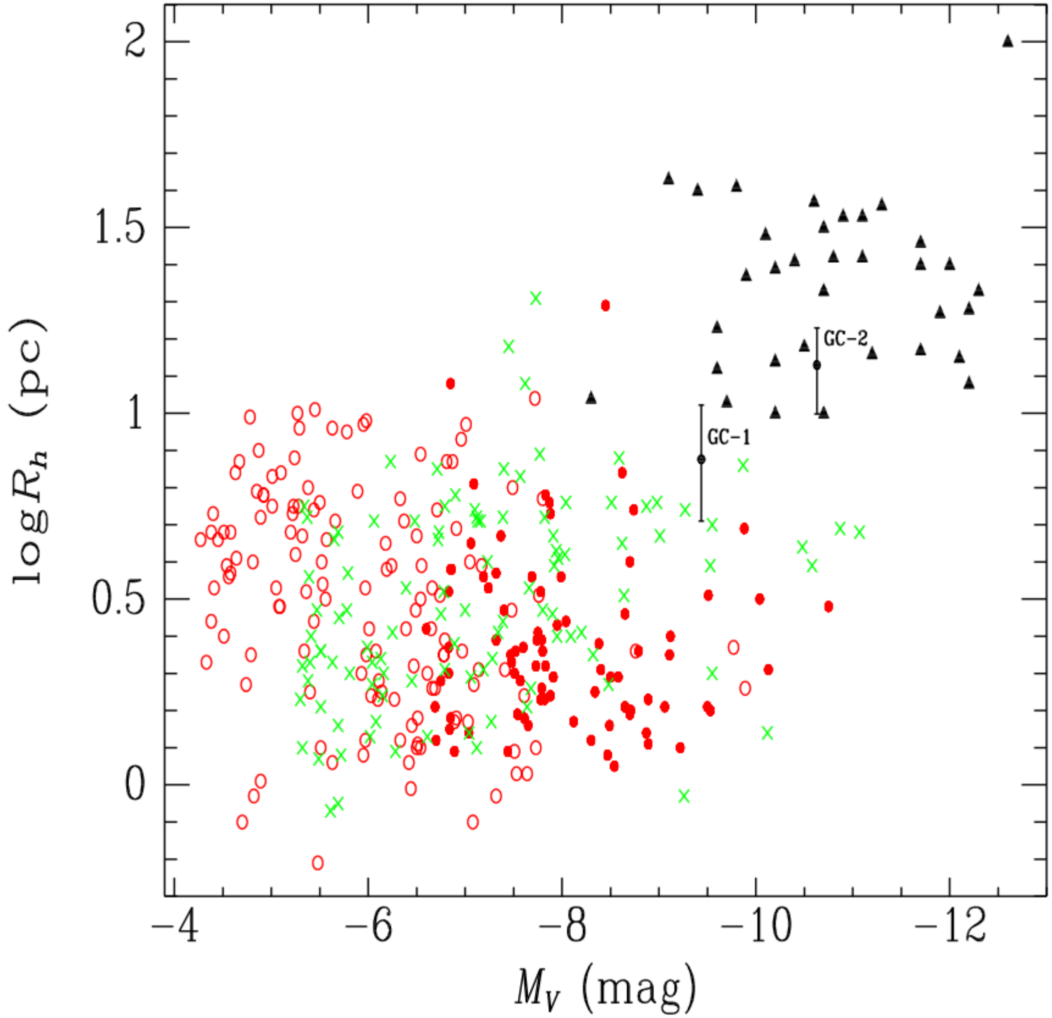


Figure 9. Half-light radii versus M_V for GC-1 and GC-2 (black dots with error bars) in comparison with GCs (red dots) and GC candidates (red circles) in M81 and star clusters (green crosses) in M82. The black filled triangles are the confirmed UCDs from Brodie et al. (2011).

MNRAS **468,** 4513–4528 (2017)

In this paper, we found that one of objects, which was considered to be a GC, is not an ordinary GC, but an ultra-compact dwarf (UCD).

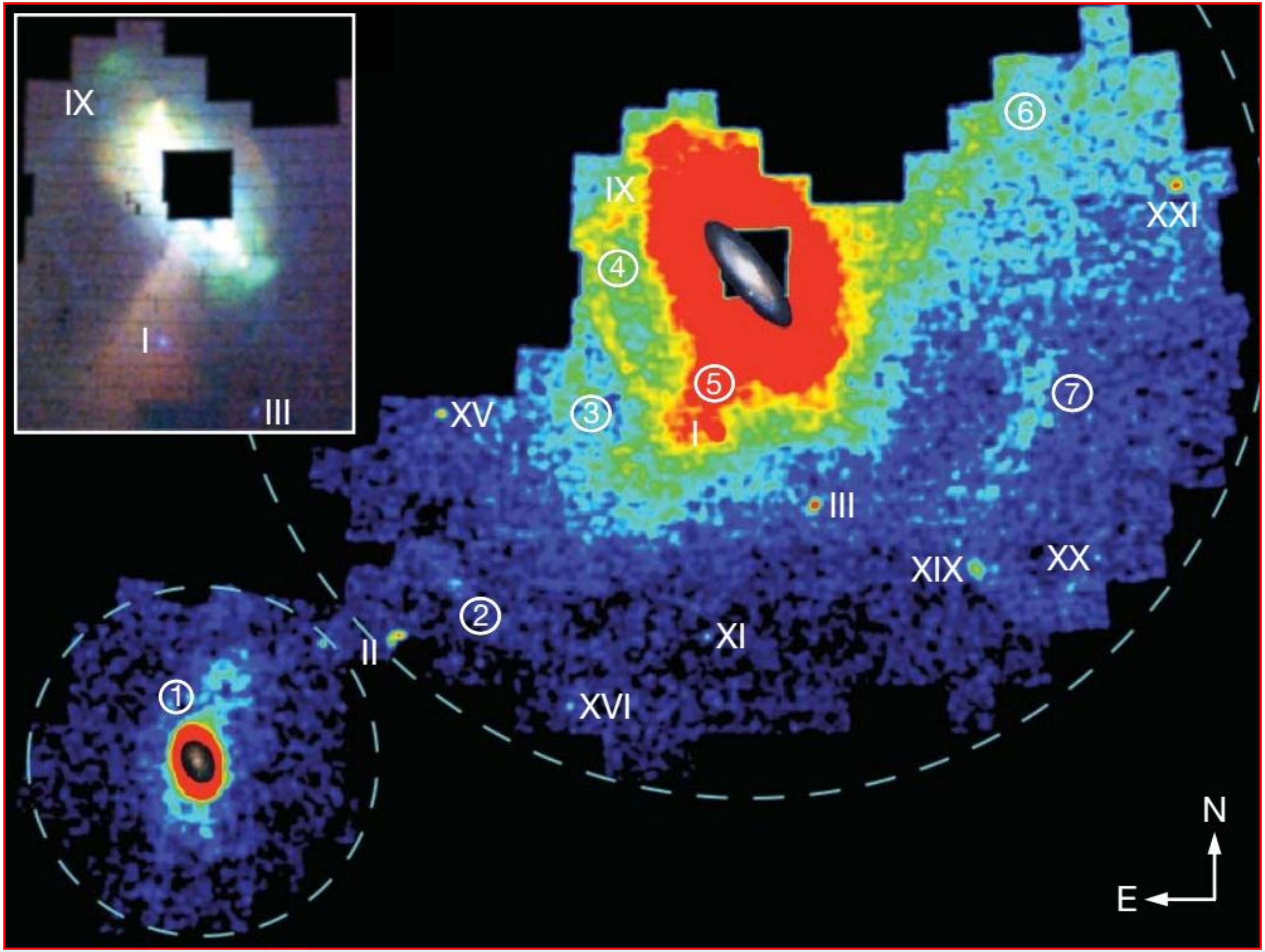
1. An introduction of my scientific interests:

My main field of scientific research includes:

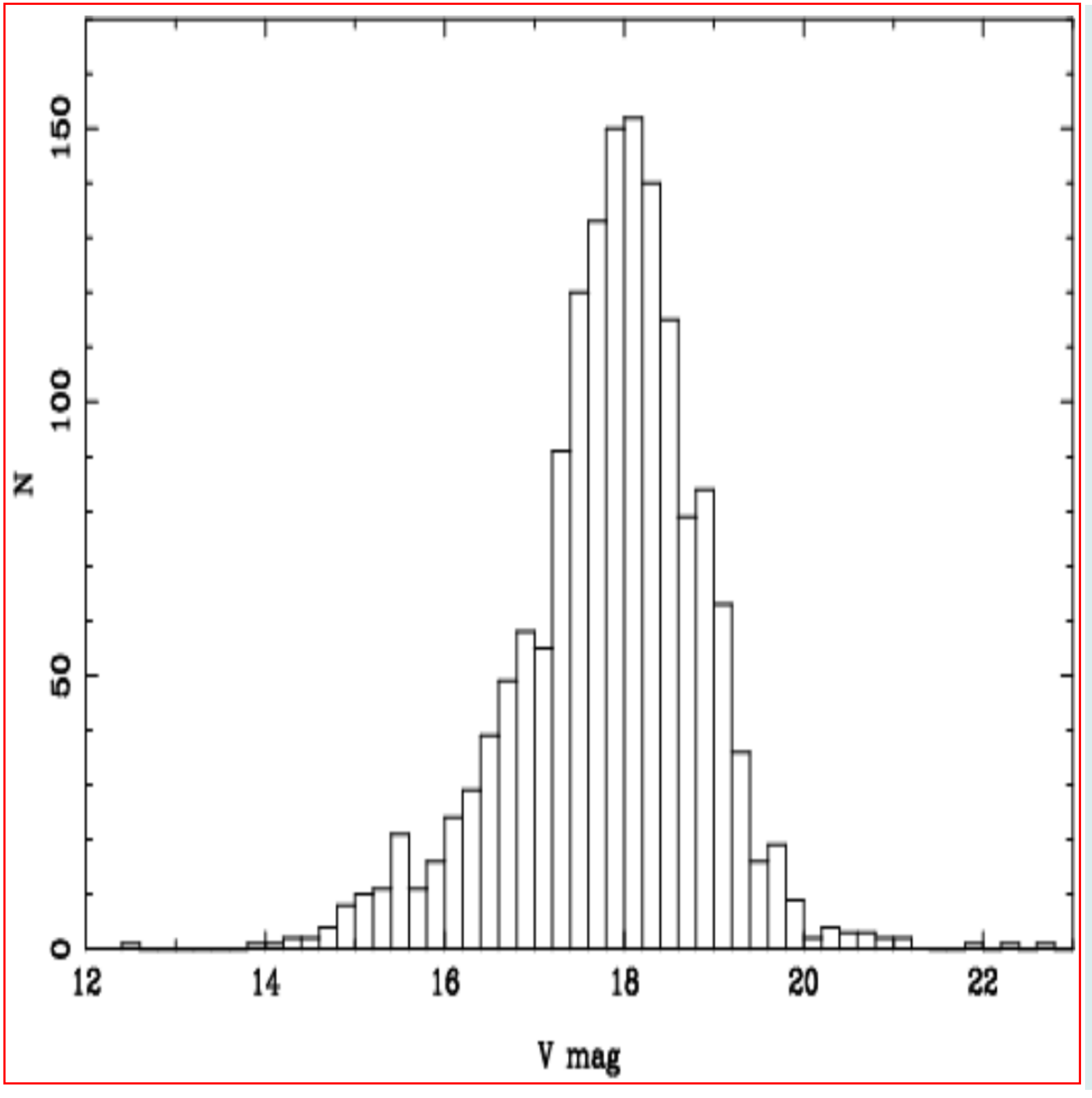
My personal web page: http://batc.bao.ac.cn/~majun/

2. How could my work benefit from LAMOST observations?

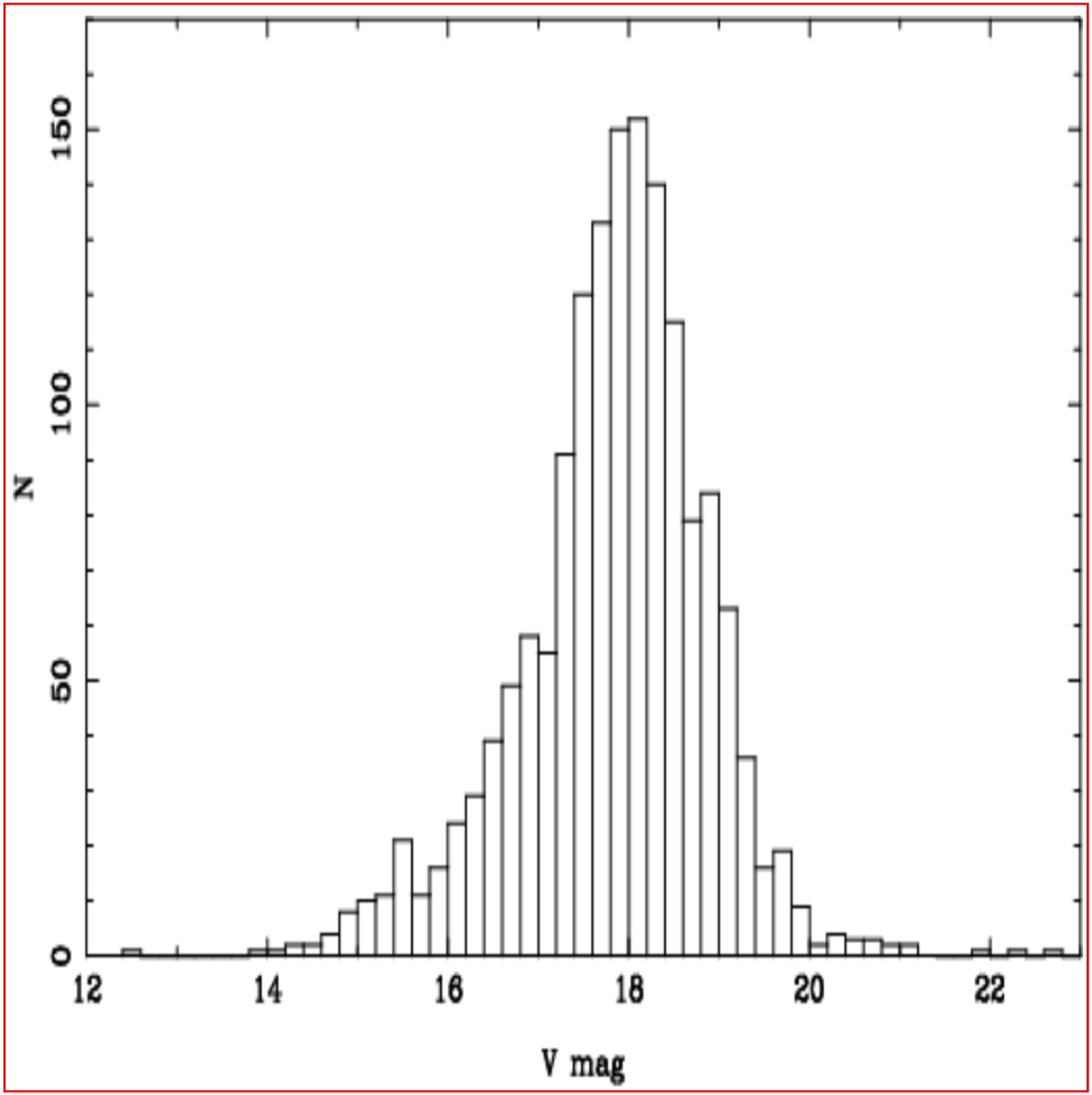
I will study M31 GCs based on the LAMOST spectroscopic survey.



M31 is the largest galaxy in the Local Group.



This figure shows the distribution of M31 GCs and candidates. Of them, for about 700 objects, their magnitudes are smaller than 18 mag in the *V* band. We will observe these luminous objects with the LAMOST.



Especially, these luminous objects includes 50 GCs in the outer halo of M31 (R_{proj}>30 kpc), and most of these outer halo GCs have not any spectroscopic data till now. They are mainly detected based on the Hubble images and CHFT.

What will we do based on the LAMOST data mentioned above?

(1) We will provide a sample of spectral data (the LAMOST) for M31 star clusters, which includes the outer halo GCs for the first time.

(2) We will derive the radial velocities, metallicities, and ages in the same system (the LAMOST) based on the full spectral fitting technique.

What will we do based on the LAMOST data mentioned above?

(3) For the first time, we will divide the star clusters into three groups: young (< 1 Gyr), medium (between 1 Gyr and 8 Gyr), and old (> 8Gyr), and study each of three groups in detail, such as a distribution of metallcity and kinematic properties, and so on.

What will we do based on the LAMOST data mentioned above?

(4) We will compare the properties of the star clusters in the outer, inner haloes and in the disk in detail, and understand the history of formation and evolution of M31, especially the interacting history of between M31 and its dwarf galaxies and M33.

What will we do based on the LAMOST data mentioned above?

(5) For old star clusters in M31, we will study their distribution of metallicity in detail, and present the statistical results of their rotational velocities. And we will derive a definite birth of metal-poor GCs in M31, and compare them with the Milky Way counterparts.

This is my preliminary idea that how to study M31 star clusters based on the LAMOST.

Thank you for listening.