Are There Faint Fuzzy Clusters Counterparts in the Magellanic Clouds

Peter Pessev
STScI

pessev@stsci.edu

Abstract

Faint Fuzzy Clusters were serendipitiously discovered during a study of the Globular Cluster system of the S0 galaxy NGC1023. They are a population of faint ($Mv>-7$), extended ($Reff \sim 7\text{-}15$ pc) clusters. Similar objects were also found around other S0 galaxies: NGC3384, NGC5195 and ~25% of the S0s in the Virgo Cluster. Numerical simulations suggest that the required conditions to form such clusters may occur during close galaxy-galaxy interactions, thus the Magellanic Clouds are the nearest galaxies that could harbor a population of local counterparts of the Faint Fuzzies. In the present poster I discuss the selection criteria, search strategy, and present some preliminary results.

What is known about the Faint Fuzzies

- First detected on HST/WFPC2 images of NGC1023 (d = 10 Mpc) along the normal bimodal system of compact GCs. Faint, extended star clusters, closely confined to the galaxy's isophotes (Larsen & Brodie 2000).

- Spectroscopic follow-up with Keck/LRIS revealed that the objects are metal-rich [Fe/H] ~ -0.5 and old (>8Gyr) (Brodie & Larsen 2002).

- Also found in S0 galaxy NGC3384 (Brodie & Larsen 2002) and NGC5195, a S0 interacting with M51 (Lee, Chandar & Whitmore 2005)

- About 25% from the S0s in Virgo Cluster showed presence of Faint Fuzzies (FFs) (Peng et al. 2006)

- So far there are no known analogs of these objects in the Milky Way or Magellanic Clouds.

Setting the foundation

- In most cases we first observe certain class of objects close to us - in our Galaxy or it's vicinity. FFs were initially discovered in a far-away galaxy and we know only their integrated light characteristics.

- Finding a local analogs of these objects will allow resolving their stellar populations with HST and large ground-based telescopes, leading to better understanding of properties, formation and evolution of these systems.

Where to search?

- Due to the complex gravitational interactions between LMC, SMC and the Galaxy, the two satellite galaxies are the perfect location to search for local counterparts of the FFs.

SMC

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LMC

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Search criteria

The initial search criteria are based on the integrated light properties of the FFs observed in the distant galaxies

- Mv > -7

- Reff ~ 7-15 pc

- (V-I) > 1.0

The best starting point is the SMC cluster catalog (Hill & Zaritsky 2004) from the Magellanic Clouds Photometric Survey (MCPS) (Zaritsky et al. 1997)

MCPS is producing a UBVI stellar catalog in the central 8x8 deg of the LMC and 4x4 deg of the SMC, with limiting magnitude (set primarily by crowding) V = 21.

Results

- Applying the search criteria, 5 SMC objects were selected. They are listed in the following table and the visual images from SIMBAD are shown along with the image of NGC121 (an 10 Gyr SMC Globular Cluster) to provide a better prospective.
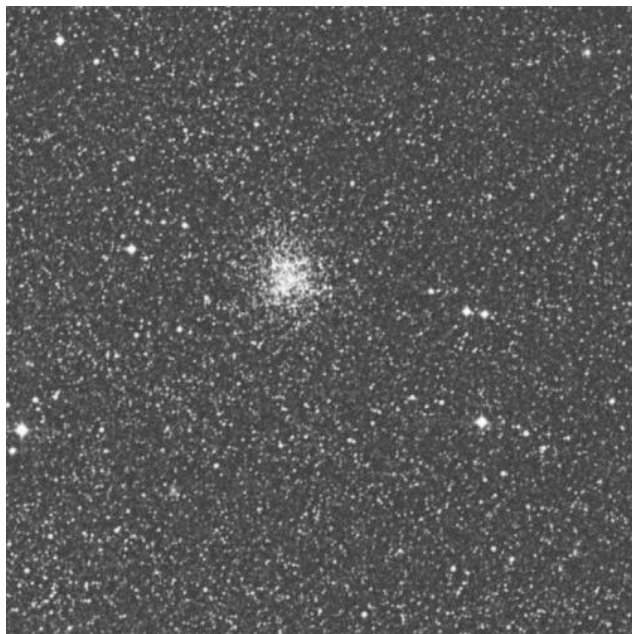
Composite image of the SMC from MCPS

Table1

N	R.A.	Dec.	V	V-I
4	0 27 45.17	-72 46 52.5	13.95	1.20
10	0 32 56.26	-73 06 56.6	12.26	1.13
104	0 57 48.90	-74 28 00.2	12.21	1.01
136	1 02 12.83	-71 36 16.2	11.77	1.07
164	1 07 14.93	-72 05 57.2	12.96	1.18

4

10

104

136

164

NGC121

Future work

- Analyze several heterogeneous data sets for the LMC and select FFs candidates in this galaxy (for example ESO121SC03 is a promising one).

- Gather CMD and spectroscopy information of the chosen sample.

- Study their multi-wavelength properties.

References:

- Brodie JP, Larsen SS, 2002, AJ, 124, 1410

- Hill & Zaritsky, 2006, AJ, 131, 414

- Larsen SS, Brodie JP, 2000, AJ, 120, 2938

- Lee, Chandar & Whitmore, 2005, AJ, 130, 2128

- Zaritsky et al., 1997, AJ, 114, 1002