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Stellar populations in the Sagittarius stream

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Abstract. On this poster we present preliminary results on the characterization of the Sagittarius stream main sequence based on CFHT-MegaCam data, and demonstrate the benefits of correcting instrumental PSF distortions for star/galaxy separation and Color-Magnitude Diagrams.

Key words. Galaxy: halo – Galaxy: structure – Local Group

1. Introduction

The Sagittarius (Sgr) stream (Mateo et al. 1996) is a prominent halo feature that has been mapped all around the sky both with 2MASS (Majewski et al. 2003) and SDSS (Koposov et al. 2012). It is the debris of the disrupting Sgr dwarf galaxy (Ibata et al. 1994), currently being accreted by the Milky Way (Velazquez & White 1995; Ibata et al. 1997).

An apparent bifurcation in the stream discovered by Belokurov et al. (2006), has led to a debate about the origin of this feature and its implications for the gravitational potential of the Galaxy (Law et al. 2009; Law & Majewski 2010). Different hypotheses involve wraps of different ages (Fellhauer et al. 2006), internal dynamical origin (Peñarrubia et al. 2010), and different progenitors (Koposov et al. 2012).

2. Data set and PSF-correction

We use deep photometric imaging from the CFHT-MegaCam in g' and r' band (limiting magnitudes are 26.0 and 26.3, respectively). Our pointings are $1deg^2$ and spread over the whole sky (Fig.2). The photometric depth of our data allows us to detect the Sagittarius stream down to several magnitudes below the Main Sequence turnoff (MSTO) with high S/N in each pointing. Its spatial distribution allows us to constrain distance and stellar population gradients along and between both branches.

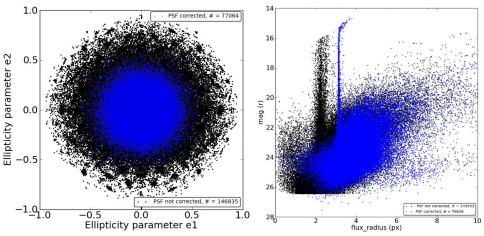

Fig. 1. Left: Ellipticity parameters for all the sources from image A119 (r band). Non-PSF corrected sources (black) show a larger and less homogeneous distribution. Right: Magnitude-size diagram for the same sources. The non-PSF corrected ones display a broader stellar locus.

PSF correction: Following standard data reduction procedures, we make use of a 'gaussianization' algorithm developed at Leiden Observatory (Kuijken et al., in prep.) to correct for the inhomogeneous PSF distor-

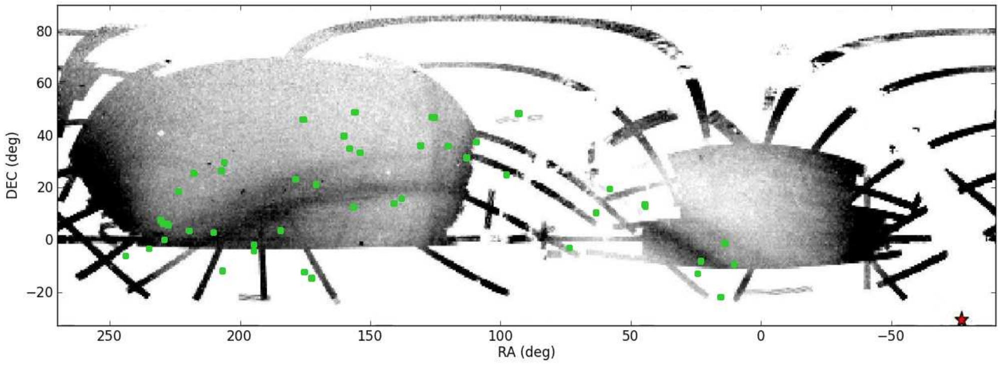

Fig. 2. Equatorial distribution of our fields upon SDSS-DR8 map (Koposov et al. 2012), where the Sgr stream is prominentely visible. The position of the Sgr dwarf is marked with a red star.

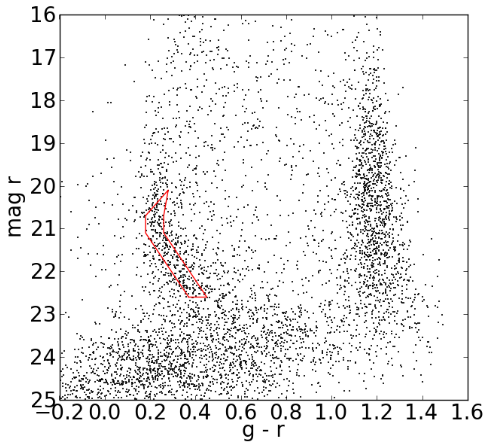

Fig. 3. Color-magnitude diagram (black dots) for pointing A119, showing the maximum of our provisional cross-correlation function (red box; 20.7mag, g-r=0.18) for the main sequence turn-off point.

tion that characterizes the MegaCam images. Measuring the shapes of stars, the algorithm calculates the PSF variations over throughout the image and uses that map to homogenize the PSF. To fully exploit this capability, we (van der Burg et al., in prep.) run the code on individual exposures and reject bad seeing cases.

Catalogue generation: Sources are detected on the original images (non-PSF corrected), but photometry is measured on the PSF corrected images. Stars are selected using a cut on ellipticity and size, based on the magnitude-dependent width of the stellar locus in the magnitude-size diagrams (Fig.1).

3. Preliminary results

We find that 13 fields fall upon the Sagittarius stream, either branch A or B, displaying prominent main sequence features (e.g. Fig.3). The PSF correction results in a much narrower stellar locus (Fig.1), decreasing the galaxy contamination by 75%, particularly at the faint end. Using cross-correlation techniques we determine the MSTO for each pointing, and preliminary results already show interesting field to field differences.

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