Surface brightness profiles of Galactic star clusters imaged by SDSS

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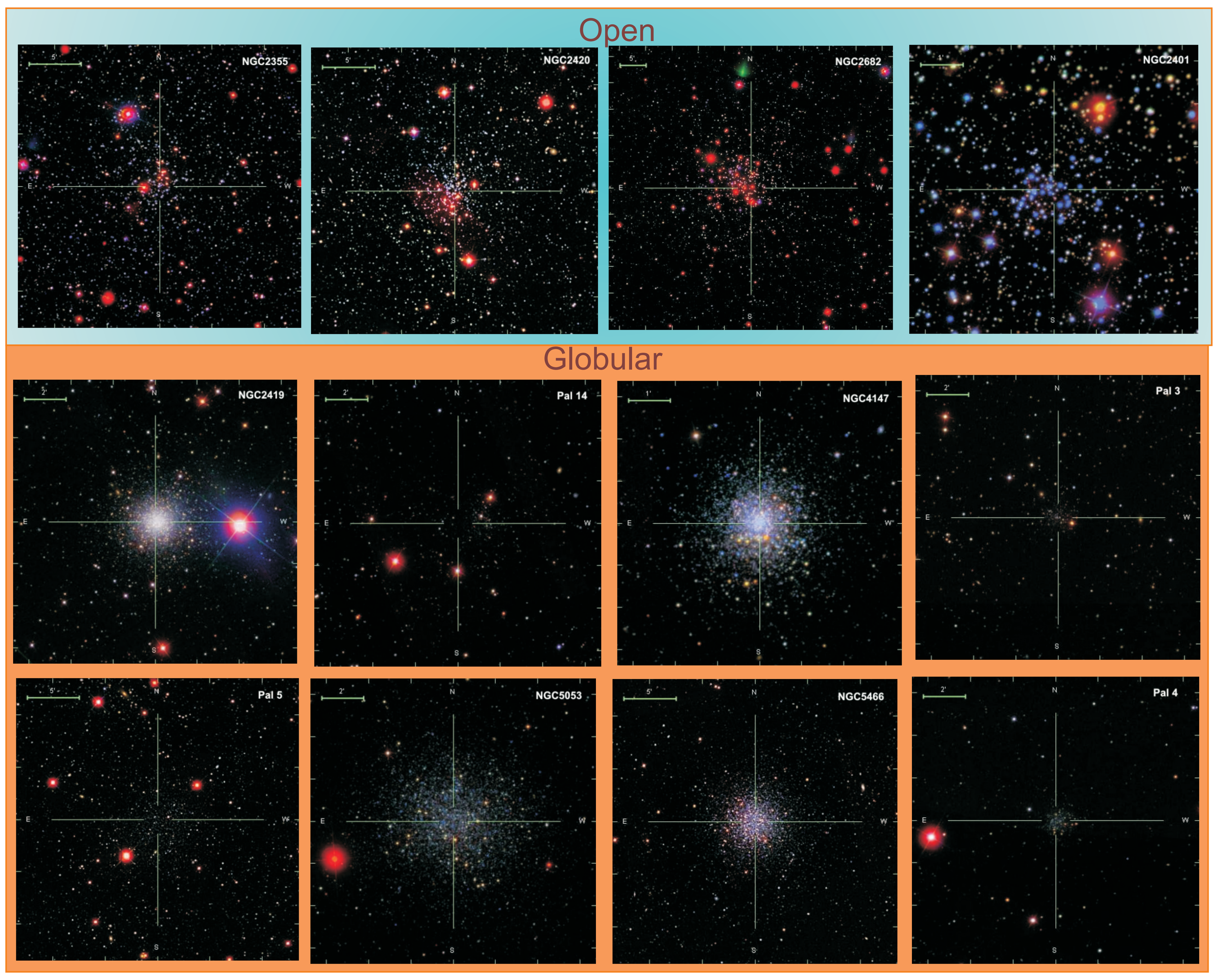
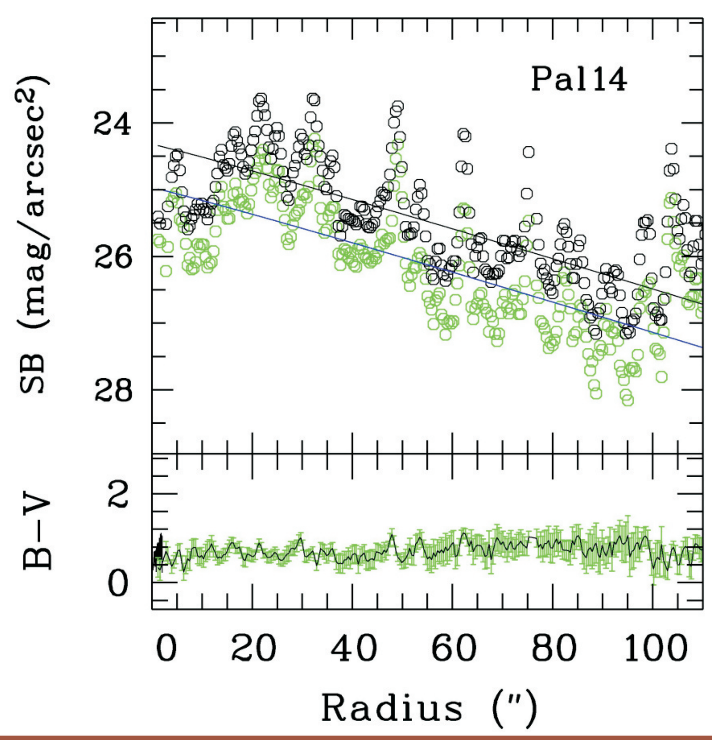
The determination of the structure and stellar content of extragalactic star clusters is important for studying assembly histories of galaxies. The working methods have been traditionally tested by comparing the properties (colors, luminosities, half-light radii) of remote stellar systems with those of better understood local templates. We present surface-brightness photometry of open and faint globular Galactic star clusters imaged by SDSS. We compared the integrated colors, central surface brightnesses, and half-light radii of the globular clusters with those in the catalogue of Harris (1996).

Images from SDSS



Original SDSS cleaned RGB images of Palomar 14

Corresponded surface brightness profile



The images in different filters were examined, cleaned simultaneously of foreground stars, background stars and galaxies, using the cluster's mean color, and photometrised in a regular manner, after approximating and subtracting galactic diffuse background around each object. The centre was chosen by eye, and then re-determined using the MIDAS SURPHOT context program FIT/ELL3. Photometry was made in circular apertures with radii growing from 1 pixel up to the limiting radius of the object (growth curve limit). The background was estimated in a circular area around the cluster. The photometric errors in each circular aperture were calculated taking into account its total flux (I) in ADU, and area in square arcseconds: $dI = SQRT(I/g + S \cdot RON^2)$, where g is gain in e/ADU, S is area in sq.arcsec., and RON is read-out-noise in electrons..

Table 1. Global clusters

Clusters	$M_{V0\,(3)}$	$M_{V0\,our}$	$SBv_{(3)}$	SBv_{our}	$B-V_{(3)}$	$B-V_{our}$	$r_{h\,(1)}$	$r_{h\,our}$	n
NGC2419	-9.58	-9.47	19.83	19.63	0.66	0.67±0.06	0.35'	0.60'	0.89
Pal 14	-4.73	-5.73	25.55	24.39		0.71±0.18	1.15'	1.55'	0.65
NGC4147	-6.16	-5.896	17.63	17.03	0.59	0.52±0.11	0.43'	0.48'	1.99
Pal 3	-5.70	-5.303	23.08	23.14		0.66±0.16	0.66'	1.00'	2.86
Pal 5	-5.17	-4.729	24.67	24.81		0.68±0.16	3.25'	5.00'	1.82
NGC5053	-6.72	-6.113	22.19	21.99	0.65	0.57±0.19	1.98'	2.30'	0.68
NGC5466	-6.96	-6.61	21.28	21.10	0.67	0.56±0.15	1.64'	2.30'	0.82
Pal 4	-6.02	-6.463	23.54	23.64		0.71±0.18	0.54'	0.57'	2.05

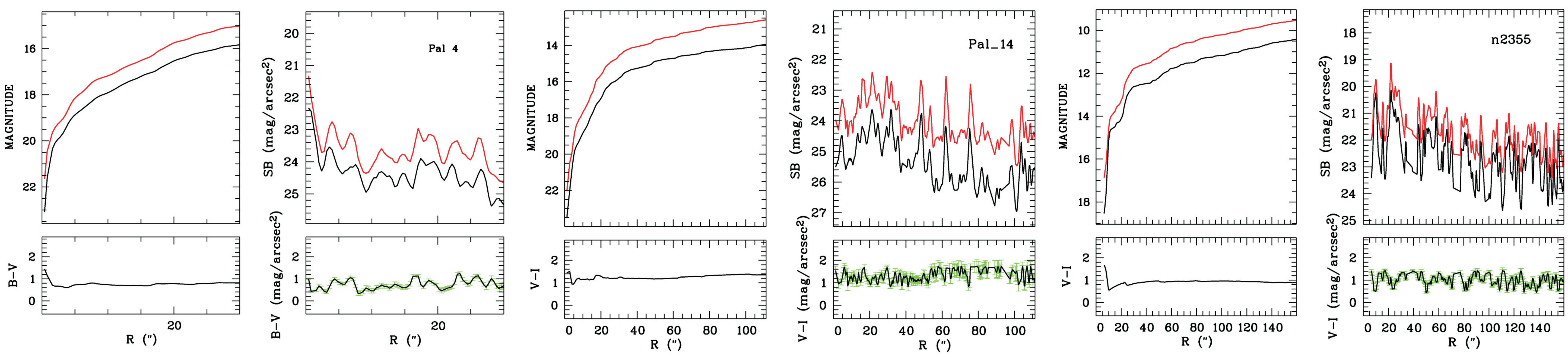
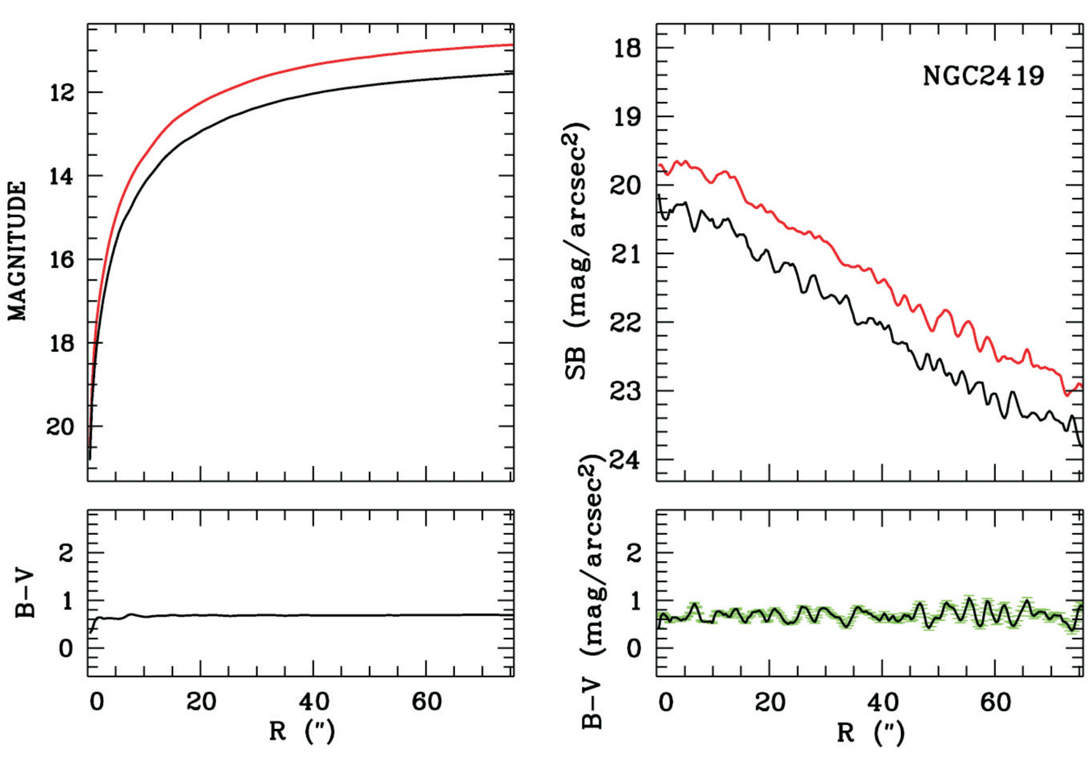


Table 2. Open clusters



Clusters	$M_{v0\,our}$	$SBv_{0\,our}$	$B-V_{our}$	$r_{h\,our}$	$d_{(2)}$	$E(B-V)_{(2)}$	$Age_{(2)}$	$Fe/H_{(2)}$
NGC2355	-2.02	22.18	0.50±0.22	0.402	7.0	0.12	8.85	
NGC2420	-2.89	20.26	0.43±0.16	1.341	5.0	0.04	9.30	-0.380
NGC2682	-1.97	21.74	0.24±0.25	10.647	25.0	0.05	9.41	-0.150
NGC2401	-3.90	20.70	0.38±0.20	0.537	2.0	0.35	9.10	

(1) van den Bergh, S., Astron.J.,112, 2634 (1996)
(2) Dias W.S., Alessi B.S., Moitinho A., Lepine J.R.D. Astron. Astrophys. 389, 871 (2002)
(3) Harris, W.E., Astron. J., 112, 1487 (1996)