

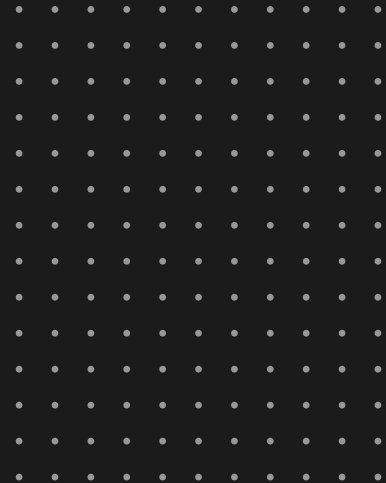


Age determination of 3 star clusters belonging to the Magellanic Clouds

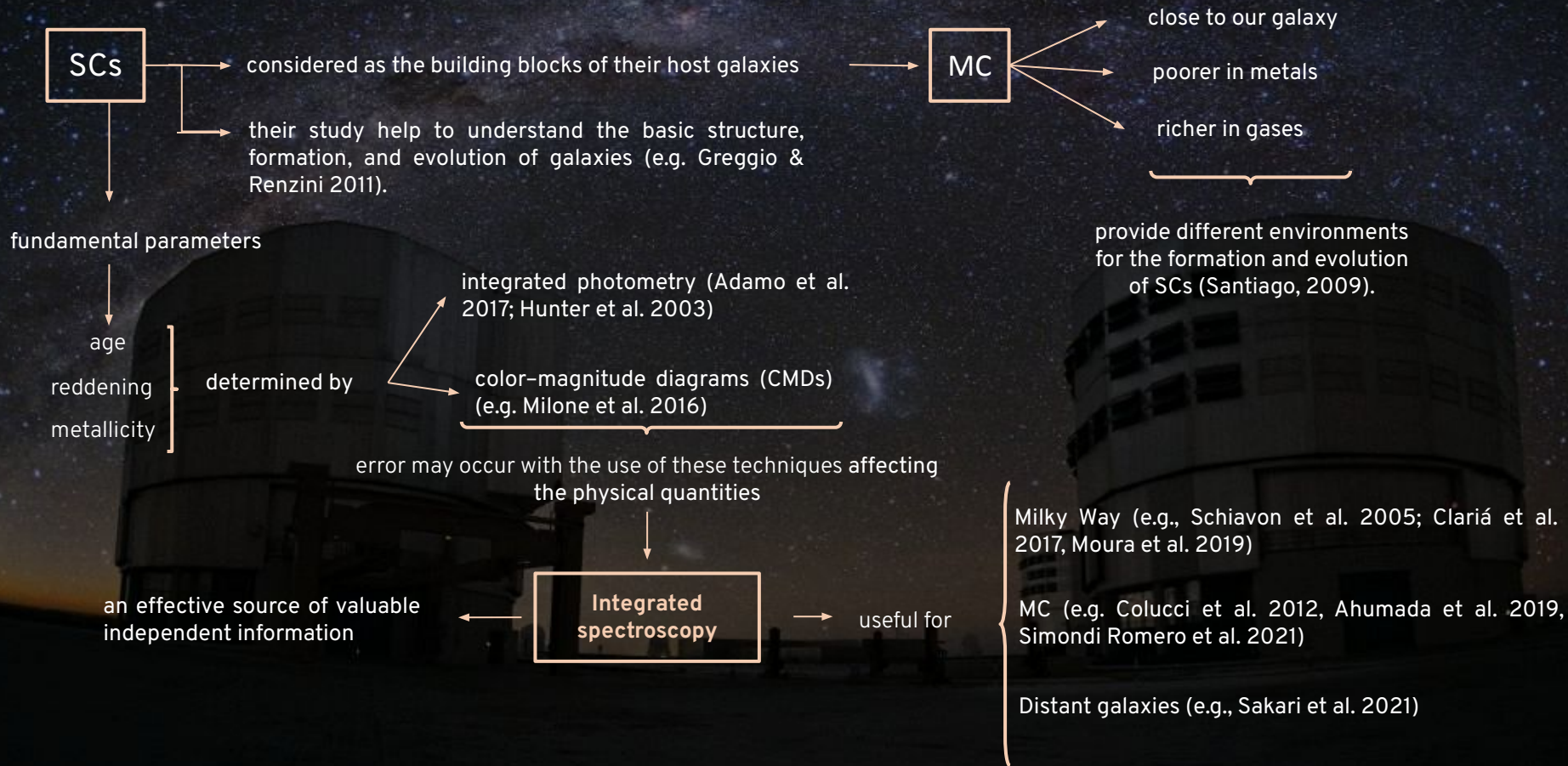
M.I. Tapia Reina^(1, 2,*), F.O. Simondi Romero^(1,2), A.V. Ahumada^(2,3)

(1) Facultad de Matemática, Astronomía, Física y Computación, UNC, Argentina, (2) Observatorio Astronómico de Córdoba, UNC, Argentina, (3) Consejo Nacional de Investigaciones Científicas y Técnicas, CONICET, Argentina, (*) martina.tapia@mi.unc.edu.ar

Ages of 3 star clusters (SCs) of Magellanic Clouds whose spectra were obtained at the Complejo Astronómico El Leoncito (CASLEO, Argentina) are presented. Those spectra have been obtained by an integrated spectroscopy technique, a powerful tool for SCs study. Ages were derived using the correlations between the equivalent width (EW) of Balmer absorption lines and the age as well as diagnostic diagrams (DD) which involve the sum of the EWs of selected spectral lines. The results presented herein and those found by other authors are also presented for SCs from the sample.



Introduction



The MC Cluster Sample and Spectroscopic Observations

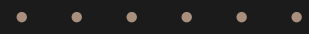


Table 1: Cluster sample

Cluster ^a	α_{2000} (h m s)	δ_{2000} (° ' ")	Total exposure time (min)	S/N (5500-5700) Å
L 41, OGLE-CL SMC 67, [RZ2005] 67	00 50 55	-72 43 38	120	20
NGC 1826, ESO 85-43, SL 221, KMHK 524	05 05 34	-66 13 45	110	46
SL 573, ESO 86-11, ESO 86-1, LW 240	05 33 44	-64 56 06	50	29

Note.

^aCluster identifications are from: (L): Lindsay (1958); (OGLE): Pietrzynski et al. (1998); (RZ 2005): Rafelski & Zaritsky (2005); (NGC): Dreyer (1888); (ESO): Lauberts (1982); (KMHK): Kontizas et al. (1990); (SL): Shapley & Lindsay (1963); (LW): Lynga & Westerlund (1963).

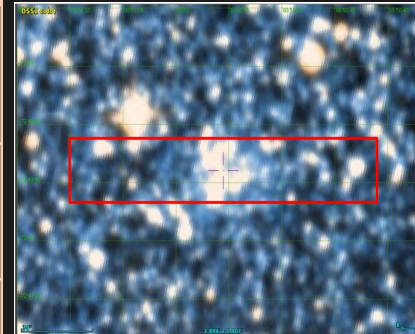
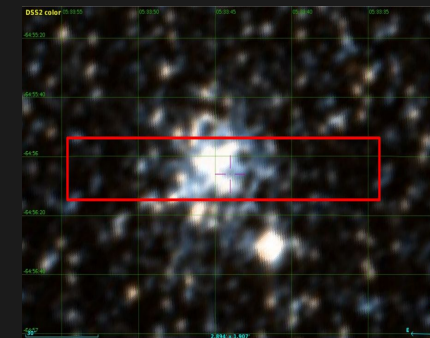
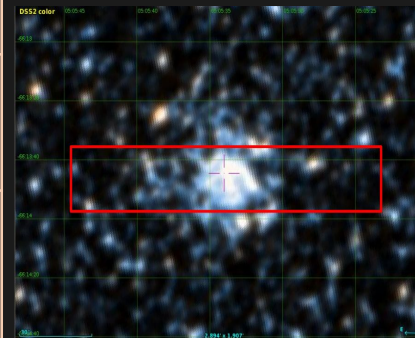


Figure 1: DSS images from the cluster sample ($\approx 3' \times 2'$). Observed region is in red. Upper left L41, below NGC 1826 to the left and SL 573 to the right. North is up, and east is left.



Determination of Cluster Parameters

Figure 2: Observed integrated spectra of the selected cluster sample. Spectra are in relative flux (F_λ) units, normalized at 5600 Å. Constants have been added to the spectra so as to improve its visualization.

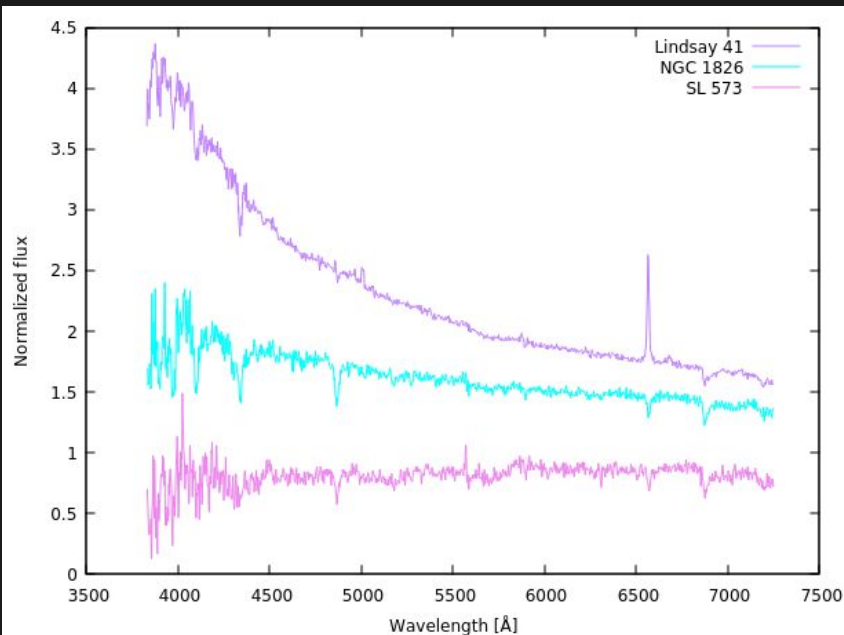


Table 2: Measurements of EWs (Å).

Cluster	K Call ¹	H δ ²	G band (CH) ³	H γ ⁴	H β ⁵	Mg I ⁶	H α ⁷	S _H ^a	S _M ^b
<i>L 41</i>	1.5	4.0	0.5	3.8	1.0	0.6	-16	8.8	2.6
<i>NGC 1826</i>	7.4	9.7	4.8	9.7	6.1	1.5	2.9	25.5	13.6
<i>SL 573</i>	8.7	7.3	4.8	7.0	3.5	2.2	2.6	17.7	15.7

Note. Spectral windows were taken from BA86a: ¹(3908 – 3952)Å, ²(4082 – 4134)Å, ³(4284 – 4318)Å, ⁴(4318 – 4364)Å, ⁵(4846 – 4884)Å, ⁶(5156 – 5196)Å, ⁷(6540 – 6586) Å. The superscript ^a refers to the sum of H β , H γ and H δ windows, and the superscript ^b refers to the sum of K Call, G band (CH) and MgI windows (SP04).

Results

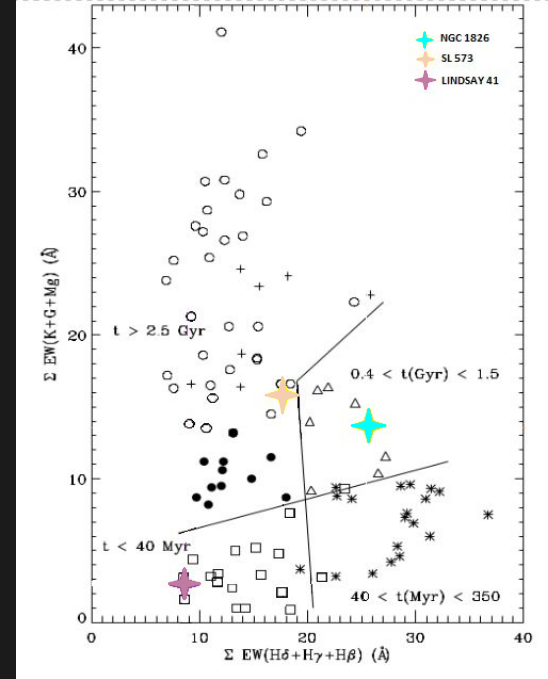
In Fig.3 is presented the age ranges according to the SCs position in the DD. Table 3 shows ages derived in this work and the ones derived by others where the adopted ages are remarked.

Table 3: Cluster Ages from EWs*

Cluster	Balmer Age (BA86b)	DD Age (SP04)	Age	References
<i>L 41</i>	< 10	< 40	< 10	a
			140	b
			158	c
<i>NGC 1826</i>	500-3000	400-1500	1000	a
			400-800	d
<i>SL 573</i>	> 1000	> 2500	3000	a
			2000-5000	d

Notes. *Age unit is Myr, ^aAdopted age in this study, ^bAccording to Nayak et al. (2018), ^c According to Glatt et al. (2010), ^dAccording to Bica et al. (1996).

Figure 3: DD (SPO4) shows the age of SCs.



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