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Virgo Filaments V: Disrupting the Baryon Cycle in the NGC 5364 Galaxy Group

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Общая постановка задачи: филаменты вокруг Virgo

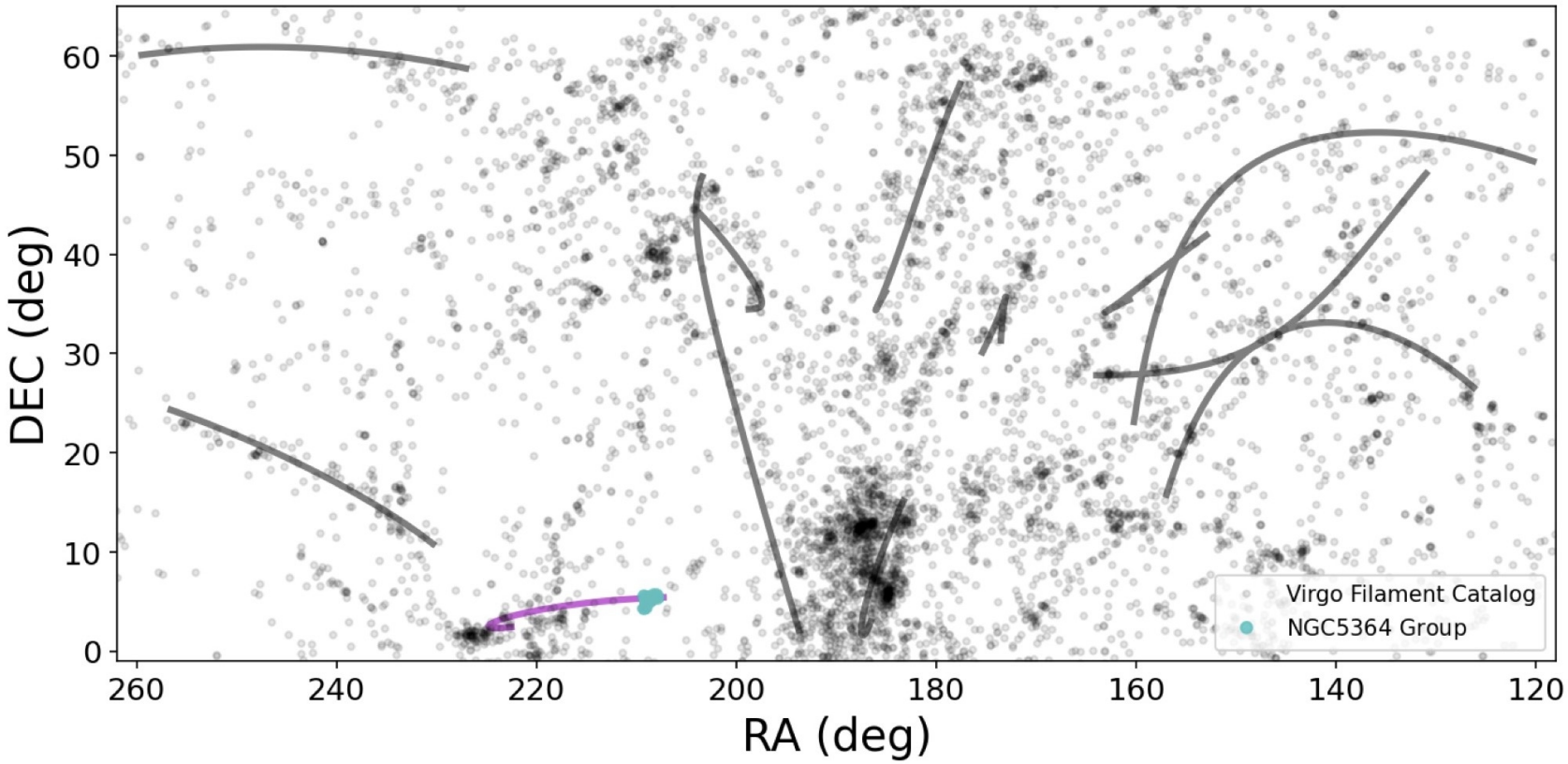

Figure 1. Location of the NGC 5364 Group on the plane of the sky relative to the Virgo Cluster and surrounding large-scale structure covered by the *Virgo Filament Survey*. The magenta line shows the Virgo III filament spine, and the gray lines show the spines of the other filaments identified by Castignani et al. (2022b). The NGC 5364 group galaxies are shown with the cyan circles. The group is located at the western end of the Virgo III Filament and approximately 6 Mpc from the center of Virgo. The Virgo cluster is the large overdensity near (R.A. = 185°, decl. = 10°).

Группа NGC 5364 – 6 Мпк от центра скопления

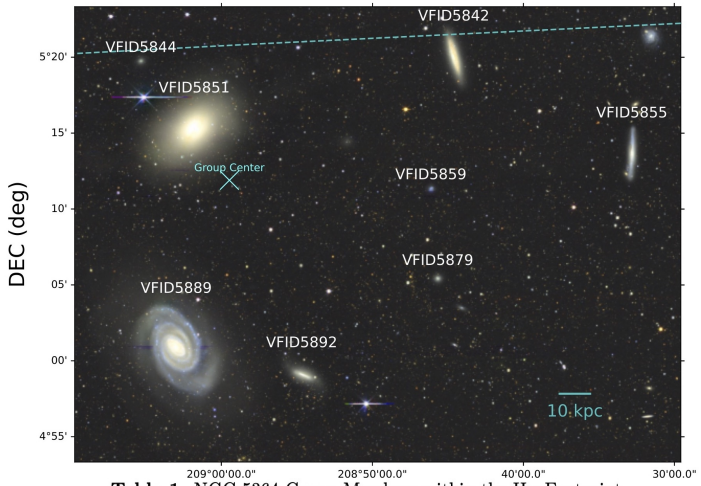

Table 1. NGC 5364 Group Members within the Hα Footprint

VFID	NED Name	T^a	v_r^b	Virgo d_{3d}^c	$1/T(z)^d$	$\log(M_\star)^e$	$\log(SFR)^f$	$\log(sSFR)^g$	H2 def^h
			km s^{-1}	Mpc		$M_\odot$	$M_\odot$ yr^{-1}	yr^{-1}	
VFID5842	NGC 5356	3.8	1370	9.7	1.07	9.96	-0.96	-10.85	-0.29
VFID5844	SDSS J135621.31+051944.2	-2.9	1402	8.9	1.08	7.79	-4.43	-12.22	···
VFID5851	NGC 5363	0.1	1134	6.3	1.04	10.84	-1.83	-12.60	-0.19
VFID5855	NGC 5348	3.8	1450	5.5	1.08	9.52	-0.74	-10.07	0.19
VFID5859	WISEA J135504.45+051121.7	10.0	1405	4.0	1.08	7.68	-1.62	-9.03	···
VFID5879	SDSS J135502.70+050525.1	-5.0	1397	8.8	1.07	8.40	-4.60	-12.90	···
VFID5889	NGC 5364	4.0	1240	5.1	1.06	10.42	-0.37	-10.30	1.06
VFID5892	NGC 5360	0.1	1175	7.9	1.05	9.09	-1.57	-10.56	0.51

NOTE—[a] Hubble T-type from Hyperleda (Makarov et al. 2014).
[b] Heliocentric recession velocity.
[d] Flow-corrected, 3D distance from the center of the Virgo Cluster from Castignani et al. (2022a)
[d] Hα flux correction, equal to the inverse of the filter transmission at the redshift of galaxy.
[e] Stellar mass from MAGPHYS SED fitting presented in Conger et al. (2025).
[f] SFR from MAGPHYS SED fitting presented in Conger et al. (2025).
[g] sSFR from MAGPHYS SED fitting presented in Conger et al. (2025).
[h] H_2 deficiency from Castignani et al. (2022a).

- Фотометрия в узком фильтре H-alpha (95 A) на 2-м телескопе INT (Канары)
- Картирование в 21 см на MeerKAT

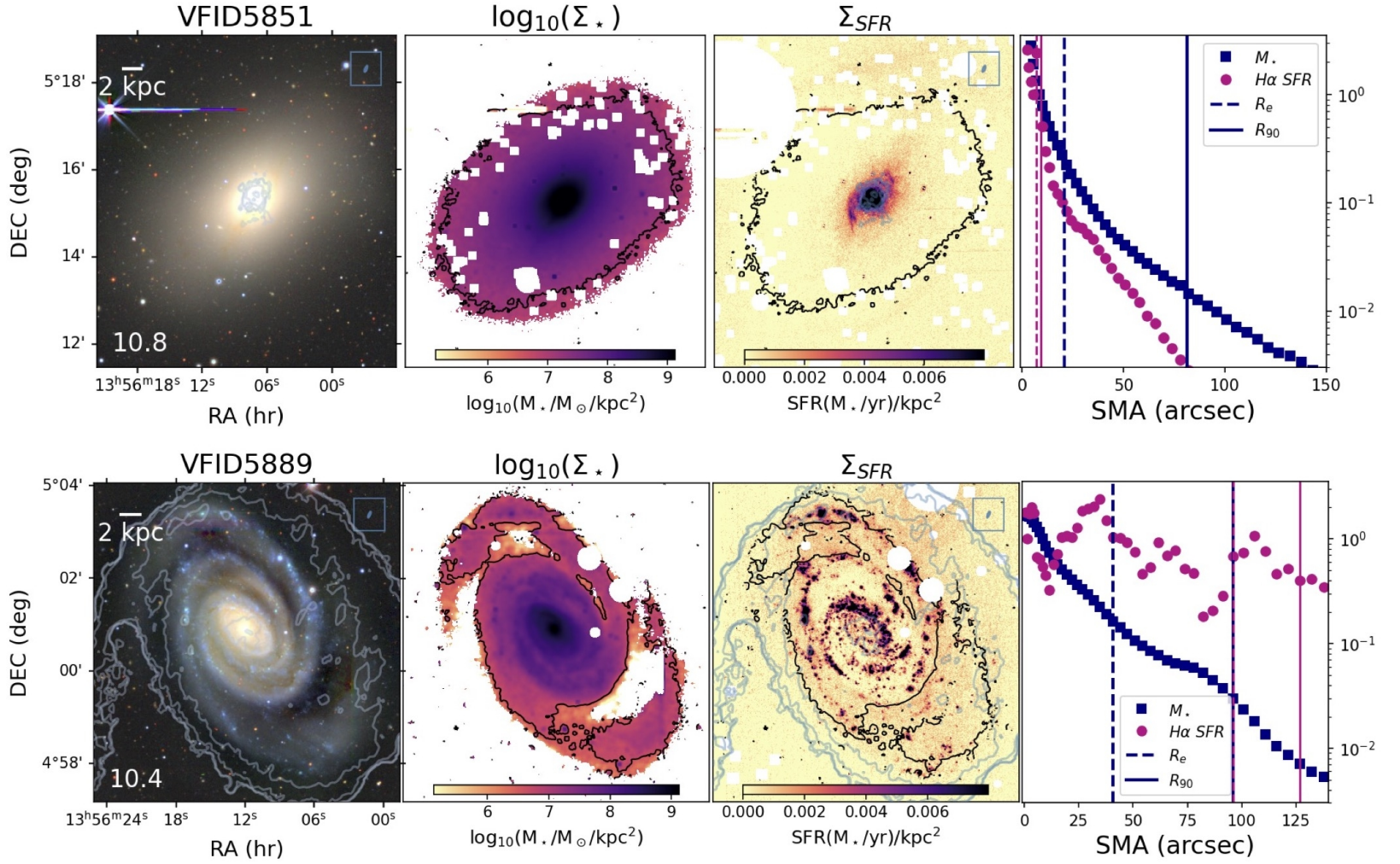

Figure 4. Results for the two most massive ($\log_{10}(M_\star/M_\odot) > 10$) galaxies in the group. (Top) VFID5851, the most massive galaxy and central elliptical. The left panel shows the Legacy *grz* color image, with $\log(M_\star/M_\odot)$ written in the lower left and a scale bar in the top left. The second panel shows the stellar mass map, with the color bar showing $\log_{10}(M_\star/M_\odot/kpc^2)$. White regions correspond to foreground stars or background galaxies that are masked for the image analysis. The third panel shows the Hα SFR map, with the color bar showing $\log_{10}(M_\star/M_\odot\ yr^{-1})/kpc^2$. The fourth panel shows the radial profiles of the stellar mass and SFR, normalized to unity in the central 5″. The MeerKAT H I contours are shown in gray in the first and third panels, and the beam size is shown with the blue ellipse in the top right of the first and third panels. The black contours in the two middle panels show where $\log_{10}(M_\star/M_\odot/kpc^2) \approx 6.6$, and this is included to aid in comparing the spatial extent of the stellar mass and Hα SFR. (Bottom) Same as above, showing results for VFID5889, a large spiral with normal Hα emission.

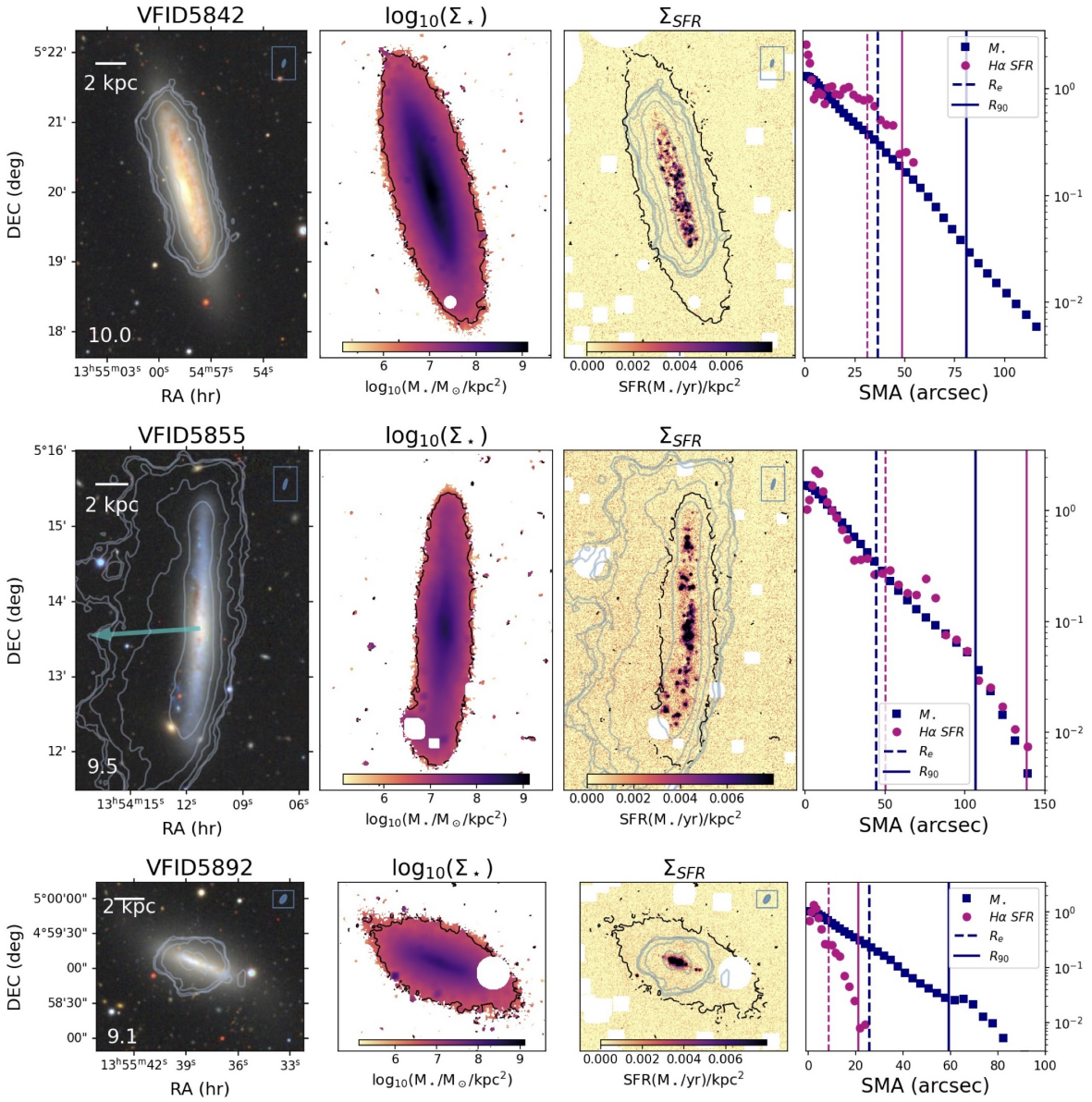

Figure 5. Results for the three $9 < \log_{10}(M_\star/M_\odot) \leq 10$ group galaxies: VFID5842 (top), VFID5855 (middle), and VFID5892 (bottom). The left panel shows the Legacy *grz* color image, with $\log(M_\star/M_\odot)$ noted in the lower left and a scale bar in the top left. The second panel shows the stellar mass map, with the color bar showing $\log_{10}(\mathrm{M}_\star/\mathrm{M}_\odot/\mathrm{kpc}^2)$. The third panel shows the Hα SFR map, with the color bar showing $\log_{10}(\mathrm{M}_\star/\mathrm{M}_\odot\ \mathrm{yr}^{-1})/\mathrm{kpc}^2$. The fourth panel shows the radial profiles of the stellar mass and SFR, normalized to unity in the central 5″. The MeerKAT H I contours are shown in gray in the first and third panels, and the beam size is shown with the blue ellipse in the top right of the first and third panels. The black contours in the two middle panels show where $\log_{10}(\mathrm{M}_\star/\mathrm{M}_\odot/\mathrm{kpc}^2) \approx 6.6$, and this is included to aid in comparing the spatial extent of the stellar mass and Hα SFR.

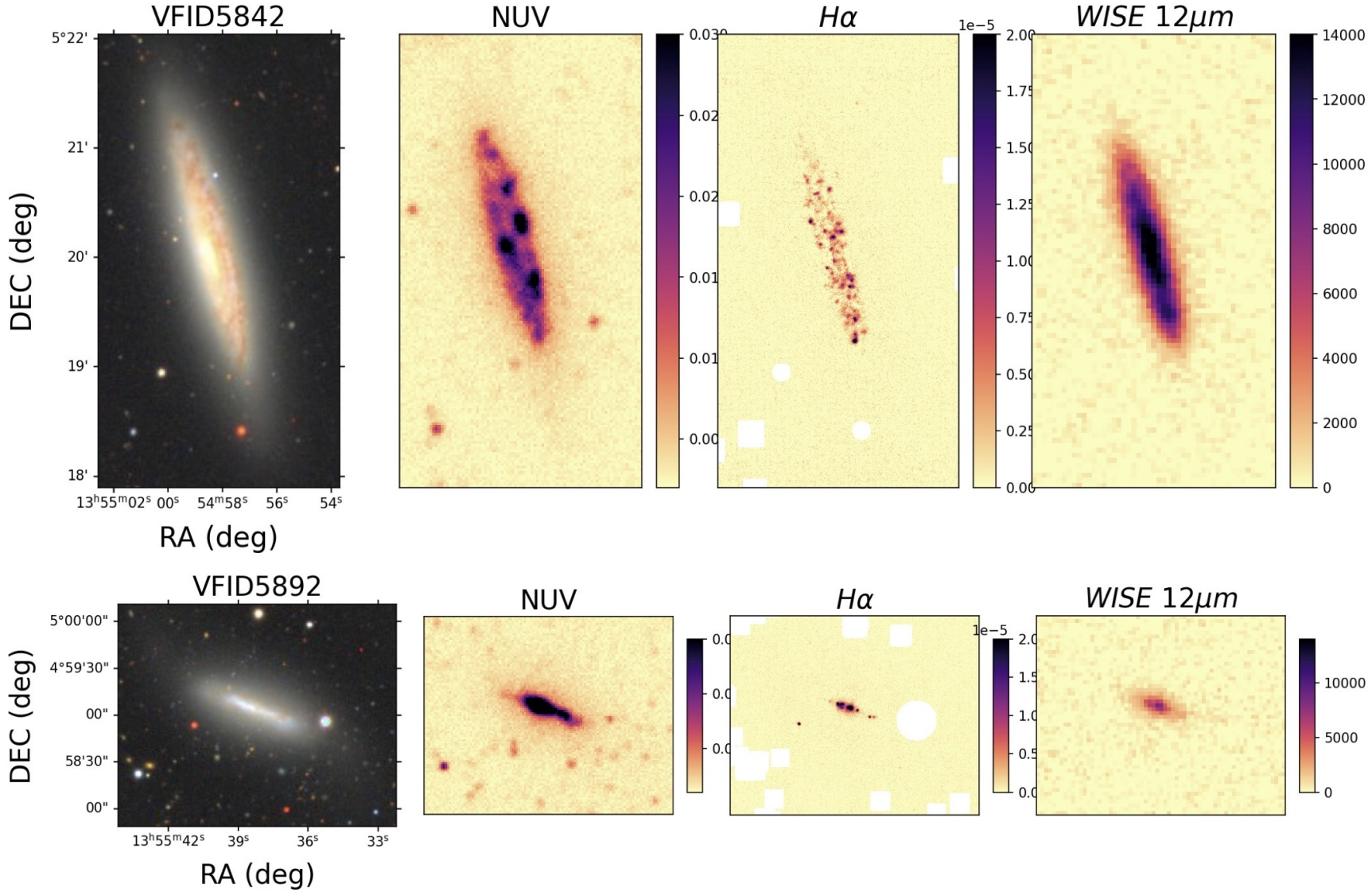

Figure 6. Multiwavelength SFR indicators NUV, Hα, and Wide-field Infrared Survey Explorer (WISE) 12μm for (top) VFID5842 and (bottom) VFID5892. Both galaxies show truncated Hα emission, and the NUV and IR show a similar extent to Hα. This indicates that dust is not causing the truncated Hα disks.

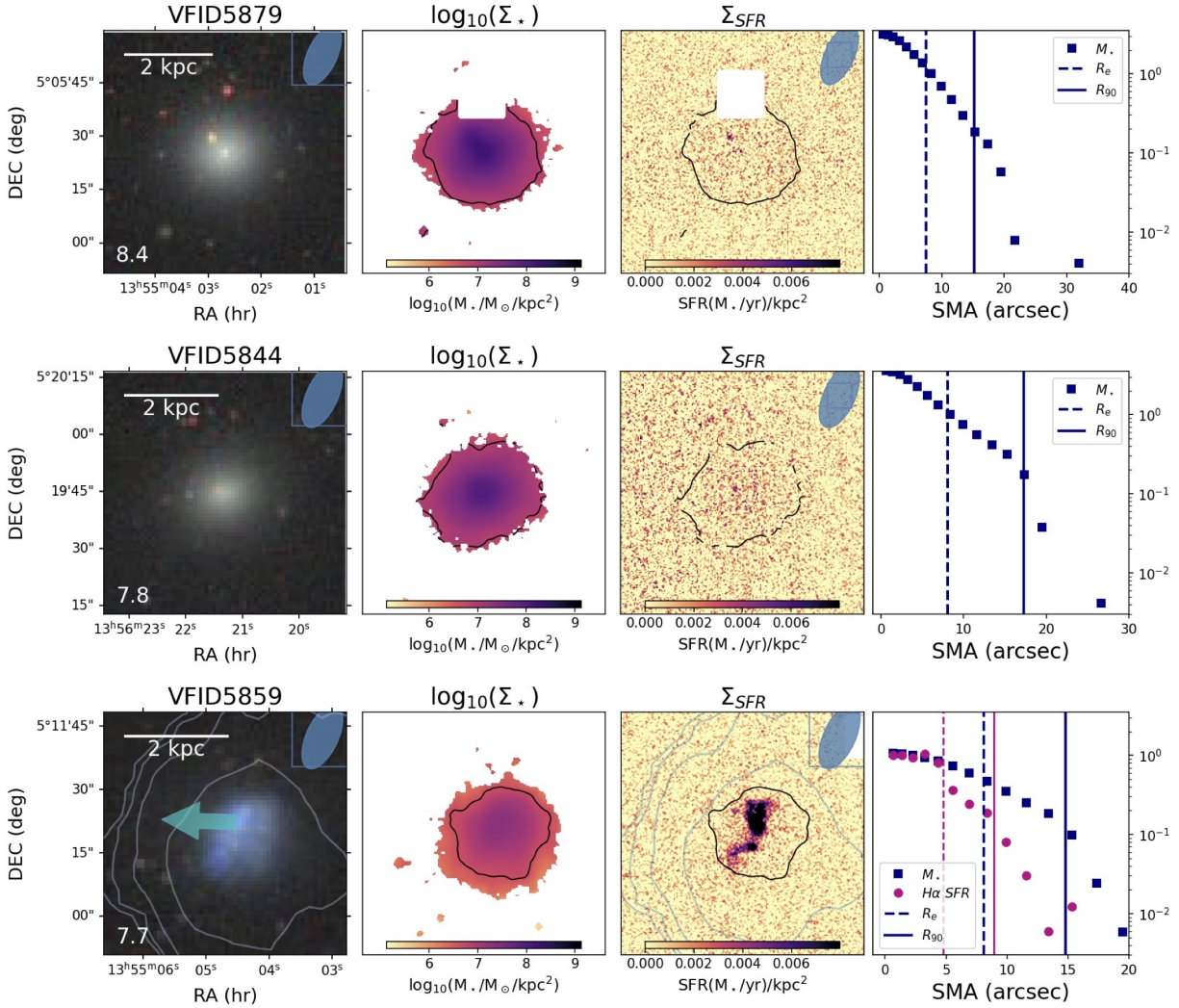

Figure 7. Results for $7.5 < \log_{10}(M_\star/M_\odot) < 8.5$ group galaxies, with galaxies ordered from top to bottom by decreasing stellar mass. The left panel shows the Legacy *grz* color image, with $\log(M_\star/M_\odot)$ written in the lower left and a scale bar in the top left. The second panel shows the stellar mass map, with the color bar showing $\log_{10}(\mathrm{M}_\star/\mathrm{M}_\odot/\mathrm{kpc}^2)$. The third panel shows the Hα SFR map, with the color bar showing $\log_{10}(\mathrm{M}_\star/\mathrm{M}_\odot\ \mathrm{yr}^{-1})/\mathrm{kpc}^2$. The fourth panel shows the radial profiles of the stellar mass and SFR, normalized to unity in the central 5″. The black contours in the two middle panels show where $\log_{10}(\mathrm{M}_\star/\mathrm{M}_\odot/\mathrm{kpc}^2) \approx 6.6$, and this is included to aid in comparing the spatial extent of the stellar mass and Hα SFR. (Top and Middle) VFID5879 and VFID5844, two dwarf galaxies that show little to no Hα emission and no H I. The right panels for these two galaxies show the stellar mass profiles only because they do not have a significant amount of the Hα emission. (Bottom) VFID5859, a star-forming dwarf galaxy. The MeerKAT H I contours are shown in gray in the first and third panels, and the beam size is shown with the blue ellipse in the top right of the first and third panels. The cyan arrow points to the group center.

У последнего карлика – газовый хвост – ram pressure?

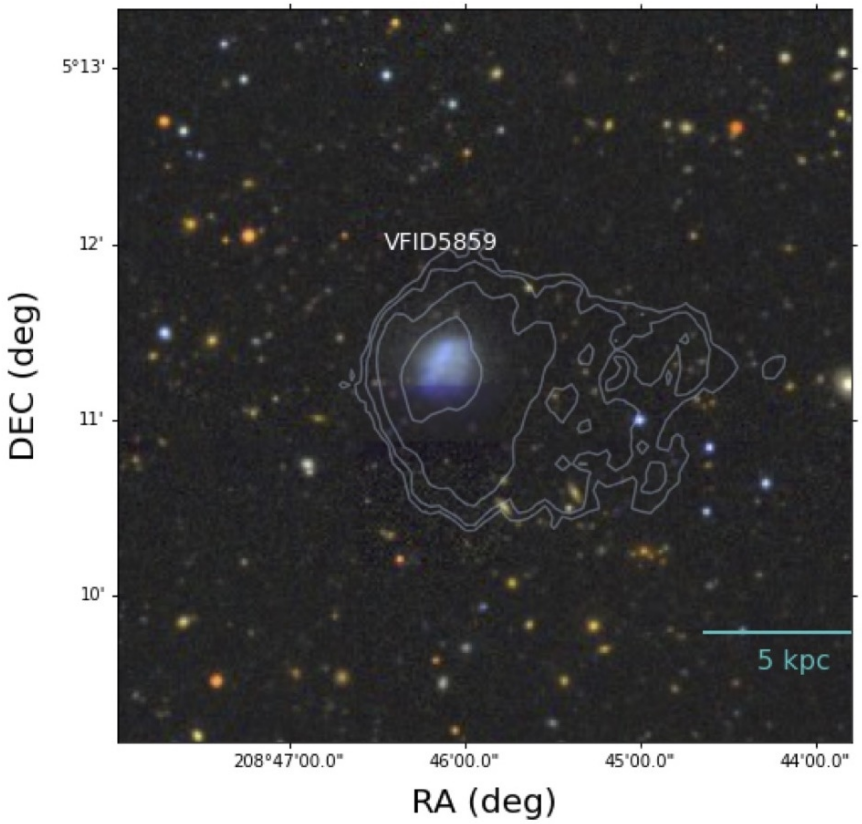

Figure 8. Legacy *grz* color image of VFID5859 with MeerKAT H I contours shown in gray. This figure provides a zoomed-out image that includes the full H I tail that is not captured in Fig. 7.

У кого – quenched, а у кого нет

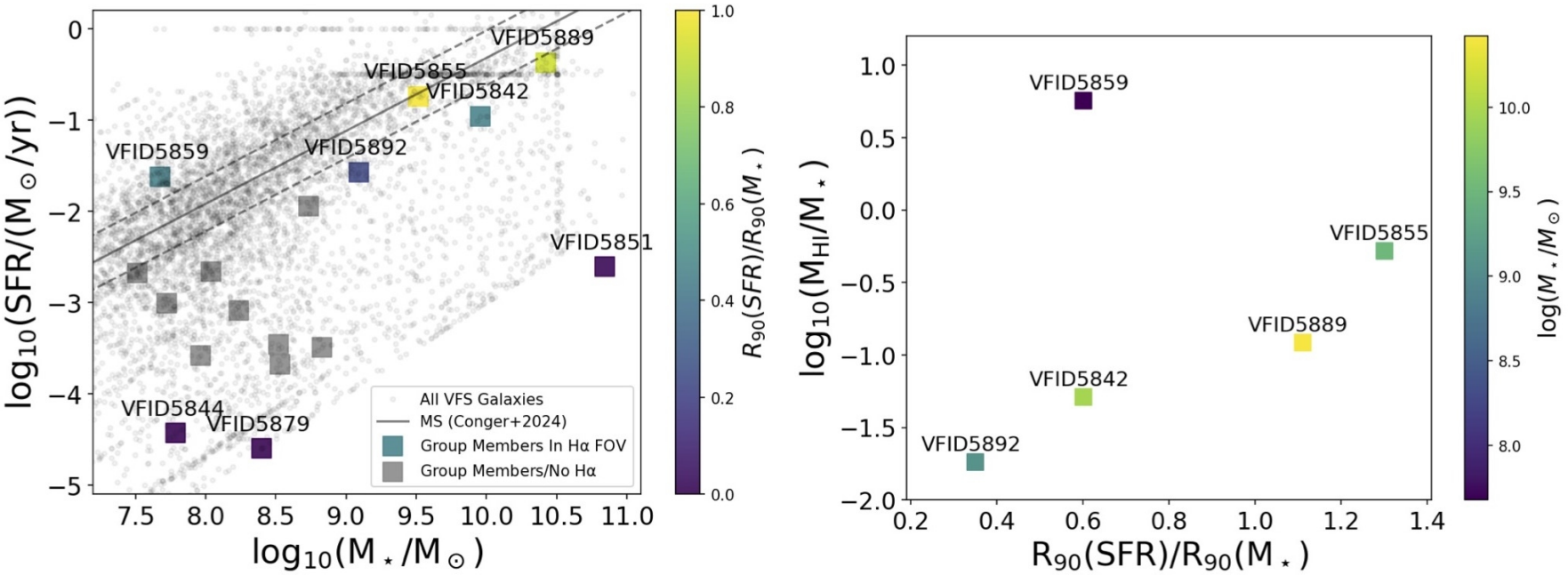

Figure 9. (Left) SFR vs. stellar mass for the full Virgo Filament Survey sample (gray) and the group members (squares). For group members on the Hα image, the squares are color coded by the ratio of R_{90}(SFR)/$R_{90}(M_\star)$. The remaining group members are shown with the gray squares. The solid line shows main-sequence fit from Conger et al. (2025), and the dashed line shows the 0.3 dex scatter in the main sequence. (Right) Ratio of H I mass to stellar mass vs. the size ratio of the Hα SFR profile to the stellar mass profile for the group galaxies with H I detections from MeerKAT.

Это не влияние скопления, это именно группа – или филамент?

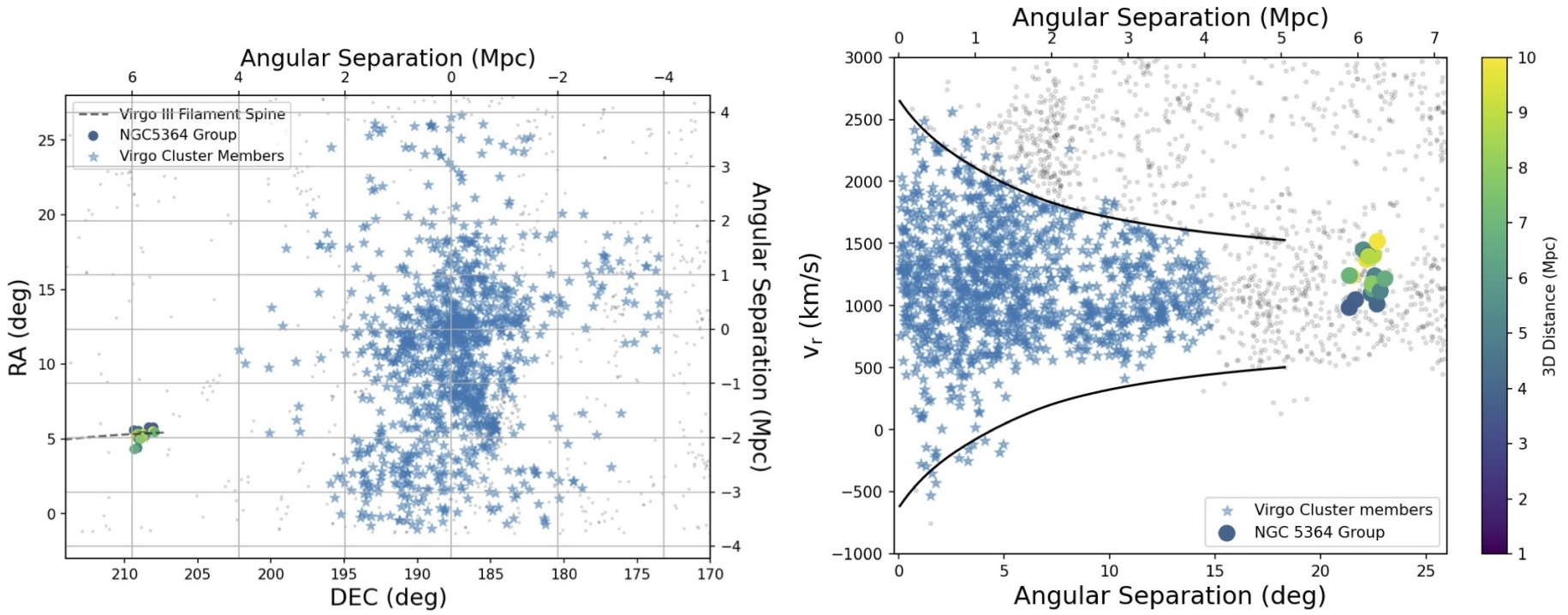

Figure 10. (Left) decl. vs. R.A. of NGC 5364 group members compared to Virgo Cluster members. (Right) Recession velocity vs. projected angular separation from the center of Virgo. Black lines show the model for the escape velocity from Castignani et al. (2022b).

Выводы:

- Полное разнообразие физических процессов окружения в группе небольшой массы (log M(gr) = 12.7)