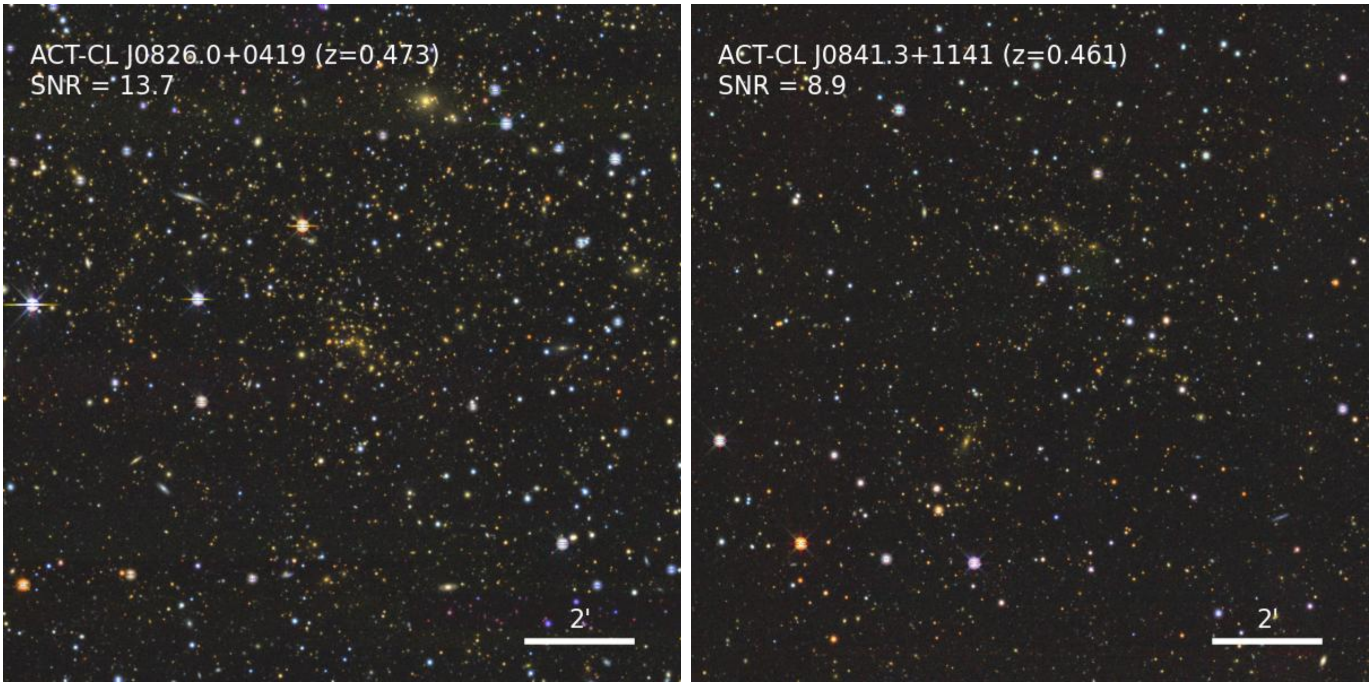

Figure 1: Optical images of two example clusters, highlighting the diversity of systems we propose to observe. Images are centered around the galaxy distribution rather than the SZ signal. **Other groupings near J0841 are not detected in SZ (2018d maps); what about photo-z?**

The maximum length of this file is **5 pages TOTAL** (7 for long-term + large programs) and it must include the following aspects: Anonymous scientific aim and rationale (3-page limit), anonymous technical description (1-page limit), anonymous justification for long-term status if applicable (1-page limit), non-anonymous work plan for large-programs (1-page limit), non-anonymous description of the current status of the project including publications and student thesis context if applicable(1-page limit). All these limits include table, figures, captions, references, etc. for each section. **This template must not be edited. This means no alteration of font size of main texts or margins. Please DO REMOVE this paragraph as it is intended as information only.**

SCIENTIFIC AIM AND RATIONALE

Galaxy clusters are the pinnacles of structure formation. They are also usually thought of as the end-of-life stage of galaxies

TECHNICAL DESCRIPTION

We will follow Khostovan et al. (2020) in the reduction and line measurements, including contamination corrections.

We will use the deep COSMOS observations to calculate the Hα excess (or deficit) in clusters

Radially-binned Ha luminosity function/SFR

We propose to observe XX SZ-selected clusters with *spectroscopic redshifts* in the range $0.46 \leq z \leq 0.48$, where the Hα line falls within the FWHM of the NB964 filter.

We set the required exposure time to achieve a specific star formation rate (sSFR) limit of $10^{-11}\,\mathrm{yr}^{-1}$, i.e., the typical limit used to differentiate passive and star-forming galaxies (e.g., XXXX), which for a typical galaxy of $M_\star = 10^{10}\,\mathrm{M}_\odot$ corresponds to a SFR of $\dot{M}_\star = 0.1\,\mathrm{M}_\odot\,\mathrm{yr}^{-1}$. Using the Kennicutt (1998) law as a benchmark and accounting for the typical contamination of the Hα flux by the [NII] emission line in the NB964 filter (Khostovan et al. 2020) requires an Hα luminosity of $9.3\times10^{39}\,\mathrm{erg\,s^{-1}}$, i.e., a flux of $4.9\times10^{-17}\,\mathrm{erg\,s^{-1}\,cm^{-2}}$. We scale the exposure time and limiting flux obtained in the NB964 survey of the COSMOS field by Khostovan et al. (2020), namely a 5σ limit of $8.2\times10^{18}\,\mathrm{erg\,cm^{-2}s^{-1}}$ with an exposure of 47.25 hr. The requested exposure time per cluster is therefore 90 minutes. Assuming typical exposures of 600 s to avoid severely saturated stars, the dominant read-out overhead is $< 5\%$; we conservatively assume a 10% overhead and therefore request total observing time of 100 min per cluster, i.e., $28\times100\approx47$ hr. Typical slew angles of 50 deg result in 2 min slew overhead for a total of one hour slew overhead. **We therefore request a total of 48 hr of observing time**. We anticipate requesting the same observing time for semester 2024B.

Our target list spans the entire RA range; we will select the final targets from the uploaded target list depending on when the observing runs are scheduled if this proposal is approved.

JUSTIFICATION OF LONG-TERM STATUS OR WORK PLAN FOR LARGE PROGRAMS (IF APPLICABLE). This paragraph can be deleted if it is not applicable to the proposal

CURRENT STATUS OF THE PROJECT