

Common-denominator optical tracer census in SDSS: selection-aware SDSS optical proxy integration

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¹*Local reproducible integration run; public SDSS DR17 data only*

ABSTRACT

We integrate the active proposal ‘A multiphase, common-denominator census of AGN-driven outflows’ as a guarded SDSS DR17 optical denominator/proxy draft rather than as a completed physical-feedback paper. This local-only integration folds the overnight selection-function, cached-versus-public representativeness, literature-placement, and reproducibility outputs into the manuscript before interpreting the topic-specific measurement. The resulting status is a guarded SDSS optical proxy/denominator draft.

Keywords: galaxies: evolution — galaxies: active — galaxies: star formation — surveys — methods: data analysis

1. PURPOSE AND CLAIM CONTRACT

This draft preserves the active proposal title, ‘A multiphase, common-denominator census of AGN-driven outflows’, but narrows the supported claim to the cached SDSS optical measurement named in the results. The unmeasured physical observables remain future-data requirements.

The claim contract is intentionally conservative. Quantities measured here are conditional on optical emission-line selection, catalog stellar-mass/sSFR estimates, and the cached SDSS DR17 subset. Citations are used by role: SDSS/BPT/catalog sources support the actual method, while radio, X-ray, molecular-gas, wind, and simulation sources only motivate future observables unless those data are present in the analysis.

2. SHARED PARENT SAMPLE AND SELECTION FUNCTION

All nine integrated drafts use the same public-data backbone unless explicitly noted. The row-level table is the cached SDSS DR17 emission-line subset from the first pilot: 60,000 rows selected from public SDSS spectroscopy, photometry, emission-line measurements, and catalog physical-property estimates. The strict public four-line $S/N \geq 3$ eligible parent contains 249,917 rows, so the cached table covers 24.0% of that strict parent. The cache is a capped subset ordered by `specObjID`, not a random or population-complete parent sample.

The four-line requirement is strongly selection dependent. In the public counts, $S/N \geq 3$ keeps 33.6% of the $-12 < \log sSFR < -11$ parent bin but 94.9% of the $-10 < \log sSFR < -9.5$ bin. Therefore every incidence,

quenching, density, gas-denominator, or target-vector statement in this integration is conditional on the four-line emission-line selection.

Cached-versus-public marginal checks found no redshift, stellar-mass, or sSFR bin with a cached-minus-public fraction difference above 5 percentage points. The largest absolute differences were 2.03 percentage points in redshift, -1.63 percentage points in stellar mass, and -0.58 percentage points in sSFR. This is a representativeness diagnostic only; it does not make the capped cache random or complete.

3. MEASUREMENTS

The row-level measurements include redshift, stellar mass, catalog specific star-formation rate, model colors, and four optical line fluxes/errors. BPT labels and all derived denominators are recomputed locally from the cached table. Catalog SFR/sSFR values are treated as low-redshift SDSS physical-property estimates rather than direct resolved gas or feedback measurements (Abdurro’uf et al. 2022; Brinchmann et al. 2004; York et al. 2000).

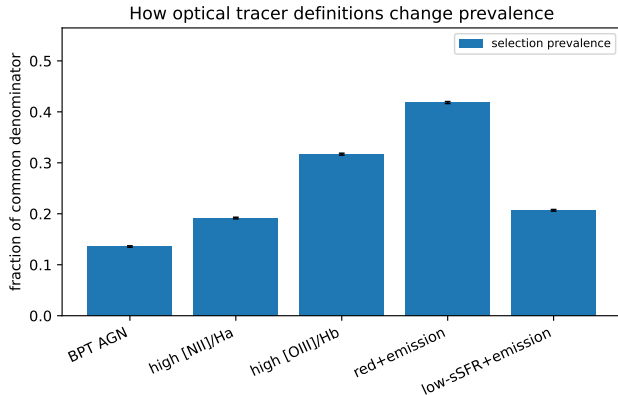
4. TOPIC-SPECIFIC OPTICAL DENOMINATOR OR PROXY RESULT

The consolidated proposal question is: How strongly do simple optical tracer definitions change the inferred AGN/feedback-candidate prevalence in one common SDSS denominator? The integrated manuscript deliberately demotes the claim to the directly measured SDSS quantity. It is not a full physical-feedback test.

Table 1. Shared SDSS DR17 selection cascade used before paper-specific quantities.

Selection stage	Public DR17 rows	Cached rows	Retention vs. spectro-z parent
SpecObj GALAXY, $0.02 < z < 0.12$	501,060	–	1.000
plus galSpecInfo/PhotoObj/galSpecExtra and mass/sSFR bounds	416,554	–	0.831
plus galSpecLine join	416,554	–	0.831
four BPT lines positive with positive errors	373,445	60,000	0.745
four BPT lines $S/N \geq 3$	249,917	60,000	0.499
four BPT lines $S/N \geq 5$	176,523	42,446	0.352
four BPT lines $S/N \geq 10$	91,768	22,311	0.183

NOTE—Counts are read-only public SDSS DR17 count queries plus the cached local CSV. Cached rows are shown only where the cache applies.

**Figure 1.** Topic-specific SDSS DR17 optical denominator/proxy diagnostic for debate-map-to-wiki-rebuild p1. The caption is intentionally narrow: this figure summarizes the cached optical result used for target definition or denominator design, not the unmeasured multi-survey physical claim.

- Within the same 60,000-galaxy denominator, simple optical tracer definitions produce prevalence from 0.136 to 0.418.
- The widest-to-narrowest prevalence ratio is 3.1, before adding molecular, neutral, or X-ray/radio phases.
- This demonstrates why a common-denominator multiphase census is required; it does not measure molecular or neutral outflow rates.

5. INTERPRETATION AND MISSING OBSERVABLES

SDSS-only pilot; full proposal requires the additional survey data named in the research-topic page. The full proposal requires: ionized, molecular, neutral, and X-ray/radio tracers measured over the same parent denominator and aperture model.

A real multiphase census needs independent ionized, neutral, molecular, and energetic outflow observables;

the present SDSS thresholds are an optical denominator only (Veilleux et al. 2005; Rupke 2018; Cicone et al. 2014; Fiore et al. 2017; Feruglio et al. 2015; Woo et al. 2016; Bae & Woo 2018).

5.1. Literature Context and Missing Observables

An optical ionized-gas census is tracer- and definition-dependent and cannot recover neutral/molecular mass loading (Veilleux et al. 2005; Cicone et al. 2014; Rupke 2018). Radio detection can change observed ionized-outflow incidence, motivating radio follow-up without changing this optical prevalence (Escott et al. 2025). JWST observations at cosmic noon found neutral-gas outflow rates that can match or exceed ionized-gas rates, motivating a separate neutral tracer in any future common-denominator census (Davies et al. 2024). Beam smearing and unresolved rotation block galaxy-wide outflow claims from a single aperture (Holden & Tadhunter 2024).

6. REPRODUCIBILITY AND SAFETY

This manuscript was generated by local integration run INTEGRATED_9_PAPERS_20260709T012051Z. Inputs are the original RP-1 SDSS query/run directory, the eight-topic SDSS remaining-topic manifest, the overnight shared selection-function packet, the cached-versus-public representativeness packet, Goru robustness outputs, and literature/source placement packets. The output is a local draft PDF and manifest entry only. No public-linked PDF was replaced.

7. CONCLUSION

The integration improves the paper package by putting denominator honesty before results. For RP-1, the strongest outcome is a plausible short-paper association draft: broad optical BPT AGN hosts in this capped SDSS emission-line subset have lower catalog sSFR than mass-redshift matched star-forming controls, with robustness caveats. For the other active topics, the cor-

rect packaging is a guarded denominator/proxy suite,
not eight independent causal feedback papers.

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