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SDSS high-excitation AGN denominator for outflow escape tests: selection-aware SDSS optical proxy integration

NEBULAMIND RESEARCH AUTOPILOT[1]

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

ABSTRACT

We integrate the active proposal 'Escape versus recycling: the fate of AGN-driven multiphase 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, 'Escape versus recycling: the fate of AGN-driven multiphase 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 $-12 < \log \mathrm{sSFR} < -11$ parent bin but 94.9% of the $-10 < \log \mathrm{sSFR} < -9.5$ 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 large is the SDSS high-excitation optical-AGN denominator that would need resolved kinematics to test escape versus recycling? The integrated manuscript deliberately

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≥3	249,917	60,000	0.499
four BPT lines S/N≥5	176,523	42,446	0.352
four BPT lines S/N≥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.

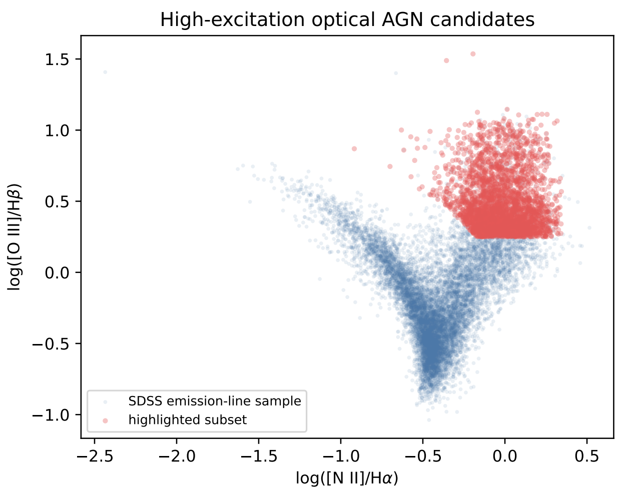

Figure 1. Topic-specific SDSS DR17 optical denominator/proxy diagnostic for source-first-paper-adjudication p1. The caption is intentionally narrow: this figure summarizes the cached optical result used for target definition or denominator design, not the unmeasured multi-survey physical claim.

demotes the claim to the directly measured SDSS quantity. It is not a full physical-feedback test.

- High-excitation optical AGN candidates number 4,440 of 60,000 emission-line galaxies (0.074).
- Their median log sSFR is -11.53, compared with -10.14 for the full denominator.
- SDSS does not measure escape velocity or multiphase outflow velocities here; the pilot supplies a denominator for resolved follow-up rather than an escape/recycling result.

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: resolved outflow velocities, halo potentials, molecular/ionized/neutral gas phases, and CGM recycling tracers.

Wind and outflow literature specifies the missing kinematic, geometric, molecular, and multiphase measurements; these sources motivate follow-up and do not turn line-ratio selection into an escape/recycling measurement (Veilleux et al. 2005; Cicone et al. 2014; Fiore et al. 2017; Carniani et al. 2017; Fabian 2012).

6. DEEP RESEARCH LITERATURE INTEGRATION: RESOLVED AND MULTIPHASE ESCAPE TESTS

Ionized-gas disturbances and reduced star formation need not be causally coupled. In a low-redshift type-2 quasar sample, resolved line-profile analysis found widespread warm-ionized outflow signatures without a corresponding correlation between the measured gas kinematics and star-formation rate on the scales probed (Bessiere et al. 2024). That comparison reinforces the present draft's existing restriction: a high-excitation SDSS denominator cannot establish that an outflow caused the catalog-sSFR difference.

Escape and recycling require measurements that the single fibre does not contain. Resolved kinematics can compare an outflow with a host potential (Zheng et al. 2023), while subarcsecond CO observations show that even a compact radio jet can alter molecular-gas excitation and turbulence (Audibert et al. 2023). The present single-fibre optical data provide neither spatial outflow extent nor multiphase velocity coverage, so they cannot distinguish escape from recycling for this sample. These are methodological examples for future follow-up, not measurements of the 4,440 candidates here; the current result remains an optical target list.

7. 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.

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

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