Nuclear Activity in Galaxies Across Cosmic Time
Proceedings IAU Symposium No. 356, 2019
M. Pović, P. Marziani, J. Masegosa, H. Netzer, S. H. Negu & S. B. Tessema, eds.
doi:10.1017/S1743921320002975

Ionized AGN outflows are less powerful than assumed: A multi-wavelength census of outflows in type II AGN

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Abstract. In this talk I will show that multi-wavelength observations can provide novel constraints on the properties of ionized gas outflows in AGN. I will present evidence that the infrared emission in active galaxies includes a contribution from dust which is mixed with the outflow and is heated by the AGN. We detect this infrared component in thousands of AGN for the first time, and use it to constrain the outflow location. By combining this with optical emission lines, we constrain the mass outflow rates and energetics in a sample of 234 type II AGN, the largest such sample to date. The key ingredient of our new outflow measurements is a novel method to estimate the electron density using the ionization parameter and location of the flow. The inferred electron densities, $\sim 10^{4.5}$ cm^{-3}, are two orders of magnitude larger than found in most other cases of ionized outflows. We argue that the discrepancy is due to the fact that the commonly-used [SII]-based method underestimates the true density by a large factor. As a result, the inferred mass outflow rates and kinetic coupling efficiencies are 1–2 orders of magnitude lower than previous estimates, and 3–4 orders of magnitude lower than the typical requirement in hydrodynamic cosmological simulations. These results have significant implications for the relative importance of ionized outflows feedback in this population.

Keywords. galaxies: active, active: outflows, galaxies: properties