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Progress Report

VARIABILITY OF THE NEAR-INFRARED CORONAL EMISSION LINES IN THE ACTIVE GALAXY NGC 5548

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The spectra of active galactic nuclei (AGN) often contain forbidden emission lines from ions with very high ionisation potentials (> 100 eV). These lines are commonly named 'coronal lines' (CLs) after their presence in spectra of the Solar corona. CLs are important to study since they likely trace the AGN's ionising flux in the extreme-UV and soft X-ray bands, which are not directly visible. The precise nature of the CL emitting gas (its location, kinematics, and ionisation mechanism) in AGN is still not well understood. However, the fact that CLs are generally stronger in type 1 (unobscured) than in type 2 (obscured) AGN implies that there are two CL emitting regions: one compact (which is obscured by the dust torus in type 2 AGN) and a larger region which extends beyond the obscuring torus.

Time-resolved spectroscopy provides a means of probing the CL region, by revealing changes in the fluxes and profile shapes of the lines. In 2016–17, near-infrared spectroscopic monitoring was undertaken on the well-studied, nearby, type 1 AGN NGC 5548. I present ongoing work investigating the variability of the CLs [S VIII] λ9914, [S IX] λ12523, [Si X] λ14305 and [Si VI] λ19650 during this campaign. The CLs are found to be broader than the low-ionisation [S III] λ9532 line and blueshifted with respect to it by a few hundred km s^{-1}. These imply CL emission from an outflowing gas on more compact scales than the low-ionisation narrow line emitting region, consistent with previous studies. Prominent, broad and variable wings on [S VIII] and [Si VI] suggest an additional CL emitting region to that which produces the narrower line core. Differences in the emission line profiles and behaviours indicate the complexity of the CL emitting region.