

THE ORIGIN OF THE CORONAL LINES IN SEYFERT GALAXIES

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Photoionization model calculations suggest the possibility that the coronal line region in Seyfert galaxies may be the result of an interstellar medium exposed to and subsequently photoionized by a "bare" Seyfert nucleus. A series of models are presented in which a "generic" AGN continuum illuminates the low-density phase of the ISM of a spiral galaxy (Korista and Ferland 1988).

If the coronal lines are indeed formed in the low-density phase of the ISM and excited by a nearly "bare" nucleus, then this might also explain why high-excitation extended narrow-line emission clouds are observed out to 1-2 kpc from the nucleus of some Seyfert galaxies (Heckman and Balick 1988; Schulz 1988; Unger et al. 1987). Harder nuclear continuum X-rays Compton scattering off this same ISM can also produce the extended soft X-ray emission observed in NGC 4151 (Elvis, Briel and Henry 1983) and perhaps in NGC 1068. The results of our calculations show a basic insensitivity to density, which might explain why we observe coronal lines in many Seyferts of varying physical environments ($U \propto Q/r^2 N_e$). Our model also offers the most natural explanation for the origin of the coronal lines: simply the photoionization of the low-density phase ISM by the Seyfert nucleus, both of which are known to exist.

References

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