Invited Lecture

LINE SHAPES IN NARROW-LINE SEYFERT 1 GALAXIES: A TRACER OF PHYSICAL PROPERTIES?

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Narrow-line Seyfert 1 galaxies (NLS1s) are a class of active galactic nuclei (AGN) known for their intriguing physical properties. Characterized by low mass black holes (typically below 10^8 $M_\odot$) and high Eddington ratios, they are usually believed to be younger counterparts of classical Seyfert 1 galaxies. The definition of NLS1s is based exclusively on the properties of their emission lines. In particular, the full width at half maximum of Hβ must be lower than 2000 km s^{-1}, and the flux ratio [O III]/Hβ < 3. Furthermore, Fe II multiplets are often, but not always, present. Another striking characteristic is that their permitted line profile, in particular that of Hβ, is well described by a Lorentzian function. However, this is not always the case since in a minority of NLS1s the Hβ line has a Gaussian profile instead. Does this disparity within the NLS1 class correspond to a physical difference between the sources? A preliminary investigation carried out on the largest to date sample of NLS1s from the SDSS suggests that the different line profiles reflect into all of the main physical properties of NLS1s. Black hole mass, Eddington ratio, Fe II strength, [O III] luminosity, and broad-line region geometry seem all to follow different distributions in the Lorentzian and Gaussian samples. In my talk I will present these new interesting results, and put it into the context of our general understanding of this fascinating class of AGN.