

The Quasar 3C 47: Extreme Population B Jetted Source with Double-Peaked Profile

Authors : Shimeles Terefe Mengistue, Paola Marziani, Ascensióndel Olmo, Jaime Perea, Mirjana Pović

Abstract : The theory that rotating accretion disks are responsible for the broad emission-line profiles in quasars is frequently put forth; however, the presence of accretion disk (AD) in active galactic nuclei (AGN) had limited and indirect observational support. In order to evaluate the extent to which the AD is a source of the broad Balmer lines and high ionization UV lines in radio-loud (RL) AGN, we focused on an extremely jetted RL quasar, 3C 47 that clearly shows a double peaked profile. This work presents its optical spectra and UV observations from the HST/FOS covering the rest-frame spectral range from 2000 to 7000 Å. The fit of the low ionization lines, H β , H α and MgII2800 show profiles that are in very good agreement with a relativistic Keplerian AD model. The profile of the prototypical high ionization lines can also be modeled by the contribution of the AD, with additional components due to outflows and emissions from the innermost part of the narrow line regions (NLRs). A prominent fit of the resulting double peaked profiles were found and very important disk parameters of the disk have been determined using the H β , H α and MgII2800 lines: the inner and outer radii (both in units of G/m_{bh} , where m_{bh} is the supermassive black hole), an inclination to the line of sight, the emissivity index and the local broadening parameter. In addition, the accretion parameters, \dot{m}_{bh} and l/l_{edd} are also determined. This work indicates that the line profile of 3C 47 shows the most convincing direct evidence for the presence of a rotating AD in AGN and the broad, double-peaked profiles originate from this AD that surrounds an m_{bh} .

Keywords : active galactic nuclei, quasars, emission lines, Double-peaked, supermassive black hole

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