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Progress Report

REVEALING DIFFICULTIES FOR OBTAINING THE DUST COVERING FACTOR OF AGNs FROM IRON K_α LINE AND THE RATIO OF L_{IR}/L_{AGN} LUMINOSITIES

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The ratio of re-processed infrared emission (L_{IR}) to intrinsic nuclear bolometric luminosity of active galactic nucleus (L_{AGN}) has been commonly used as a proxy of the covering factor of the dust surrounding the central engine. The dust covering factors obtained in such way are often used to infer fraction of obscured AGNs as a function of luminosity and redshift and thus have an important role in studying AGN evolution. The narrow component of the iron K_α line, an ubiquitous feature in the X-ray spectra of AGNs, is believed to originate in the same dusty torus, implying a connection between the Fe K_α equivalent width (EW) and the physical properties of the torus. In a sample of 24 type 1 AGNs we have found such a correlation between Fe K_α EW and the dust covering factor derived from IR SEDs with a slope consistent with the expected value, but of a low statistical significance. In an effort to better constrain the dust covering factor, we used Monte Carlo radiative transfer simulations to calculate a grid of the dusty tori SEDs for a range of bolometric luminosities, opening angles and other torus parameters. We compared the true covering factors with the ones obtained from the model luminosity ratios. From our analysis we found that the relation between the covering factor and the L_{IR}/L_{AGN} ratio is far from simple, due to the anisotropic emission of both the disk and the torus. Apart from well know difficulties for obtaining the correct L_{AGN}, the biggest obstacle is the fact that the deviation of the L_{IR}/L_{AGN} from the true value depends strongly and non-linearly on the covering factor itself. However, our results offer a way to correct L_{IR}/L_{AGN} ratio so that it more closely corresponds to the true covering factor.