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Does the obscured AGN fraction really depend on luminosity?

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We have utilized a local AGN sample from the INTEGRAL all-sky hard X-ray survey to investigate if the well-known declining trend of the fraction of obscured AGN with increasing luminosity is mostly an intrinsic or selection effect. We show that in addition to negative bias, due to absorption in the torus, in finding obscured AGN, there is positive bias in finding unobscured AGN, due to Compton reflection in the torus. These biases lead to a decreasing observed fraction of obscured AGN with increasing luminosity even if this fraction has no intrinsic luminosity dependence, this effect being stronger if there is intrinsic collimation of hard X-ray emission along the axis of the torus. We conclude that if the central AGN source is isotropic, the intrinsic obscured AGN fraction does decrease with increasing luminosity, although this fraction is higher than thought before: $>85\%$ at $L < 10^{42.5}$ erg/s and $<60\%$ at $L > 10^{44}$ erg/s (17-60 keV), which implies that the torus half-opening angle is <30 deg and >45 deg, respectively. If, however, the emission from the central SMBH is moderately collimated, the intrinsic obscured AGN fraction is consistent with a luminosity-independent torus half-opening angle of ~ 30 deg.

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