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A Suzaku Observation of MCG-2-58-22: Constraining the Geometry of the Circumnuclear Material

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We have analyzed a Suzaku long-look of the active galactic nucleus MCG-2-58-22, a type 1.5 Seyfert with very little X-ray absorption in the line of sight and prominent features arising from reflection off circumnuclear material: the Fe line and Compton reflection hump. We place tight constraints on the power law photon index ($\Gamma=1.80\pm 0.02$), the Compton reflection strength ($R=0.69\pm 0.05$), and the Fe K emission line energy centroid and width ($E=6.40\pm 0.02$ keV, $v_{\text{FWHM}} < 7100$ km/s). We find no significant evidence for emission from strongly ionized Fe, nor for a strong, relativistically broadened Fe line, indicating that perhaps there is no radiatively efficient accretion disk very close in to the central black hole. In addition we test a new self-consistent physical model from Murphy & Yaqoob, the "MYTorus" model, consisting of a donut-shaped torus of material surrounding the central illuminating source and producing both the Compton hump and the Fe K line emission. From the application of this model we find that the observed spectrum is consistent with a Compton-thick torus of material (column density $N_{\text{H}}=3.6(+1.3/-0.8) \times 10^{24}$ cm⁻²) lying outside of the line of sight to the nucleus, leaving it bare of X-ray absorption in excess of the Galactic column. We calculate that this material is sufficient to produce all of the Fe line flux without the need for any flux contribution from additional Compton-thin circumnuclear material.

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