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The Nonisothermality and Extent of Galactic Diffuse Hot Gas toward Markarian 421

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Comments
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Abstract
Diffuse hot gas can be traced effectively by its X-ray absorption and emission. We present a joint analysis of these tracers to characterize the spatial and temperature distributions of the Galactic hot gas along the sight line toward the nearby bright active galactic nucleus Mrk 421. We also complement this analysis with far-UV O VI absorption observations. We find that the observed absorption line strengths of O VII and O VIII are *inconsistent* with the diffuse background emission-line ratio of the same ions, if the gas is assumed to be isothermal in a collisional ionization equilibrium state. But all these lines as well as the diffuse keV broadband background intensity in the field can be fitted with a plasma with a power-law temperature distribution. We show that this distribution can be derived from a hot gaseous disk model with the gas temperature and density decreasing exponentially with the vertical distance from the Galactic plane. The joint fit gives the exponential scale heights as ~1.0 and 1.6 kpc and the middle plane values as 2.8×10^{6} K and 2.4×10^{-3} cm^{-3} for the temperature and density, respectively. These values are consistent with those inferred from X-ray observations of nearby edge-on galaxies similar to our own.

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