

Polarization of Thomson-Scattered Radiation from an Aspherical Disk

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We compute the polarization of the emergent radiation from an aspherical disk, which is expected, for example, in an advection dominated accretion flow. We adopt a simplified density distribution given by $n \propto r^{-3/2}(a_0 + a_2 \cos^2 \theta)^2$, and investigate the dependence of the polarization of the Thomson-scattered radiation on the anisotropy of the density distribution and the scattering optical depth. Assuming that the photons are generated inside the disk with the dependence of n^2 , we find that the emergent radiation is polarized with a degree of 0.1 per cent in the direction parallel to the disk normal axis in the case of $\tau=0.1$ and $a_0 = 0$, and that the degree of polarization increases to 1 per cent when τ approaches 1. We extend our computation to disks with moderate optical depths up to $\tau \sim 10$ and find that the degree of polarization approaches the limit of 5 per cent. A brief discussion of our results is presented.