

Moving Corona and the Line Profile of the Relativistic Broad Iron Emission Line

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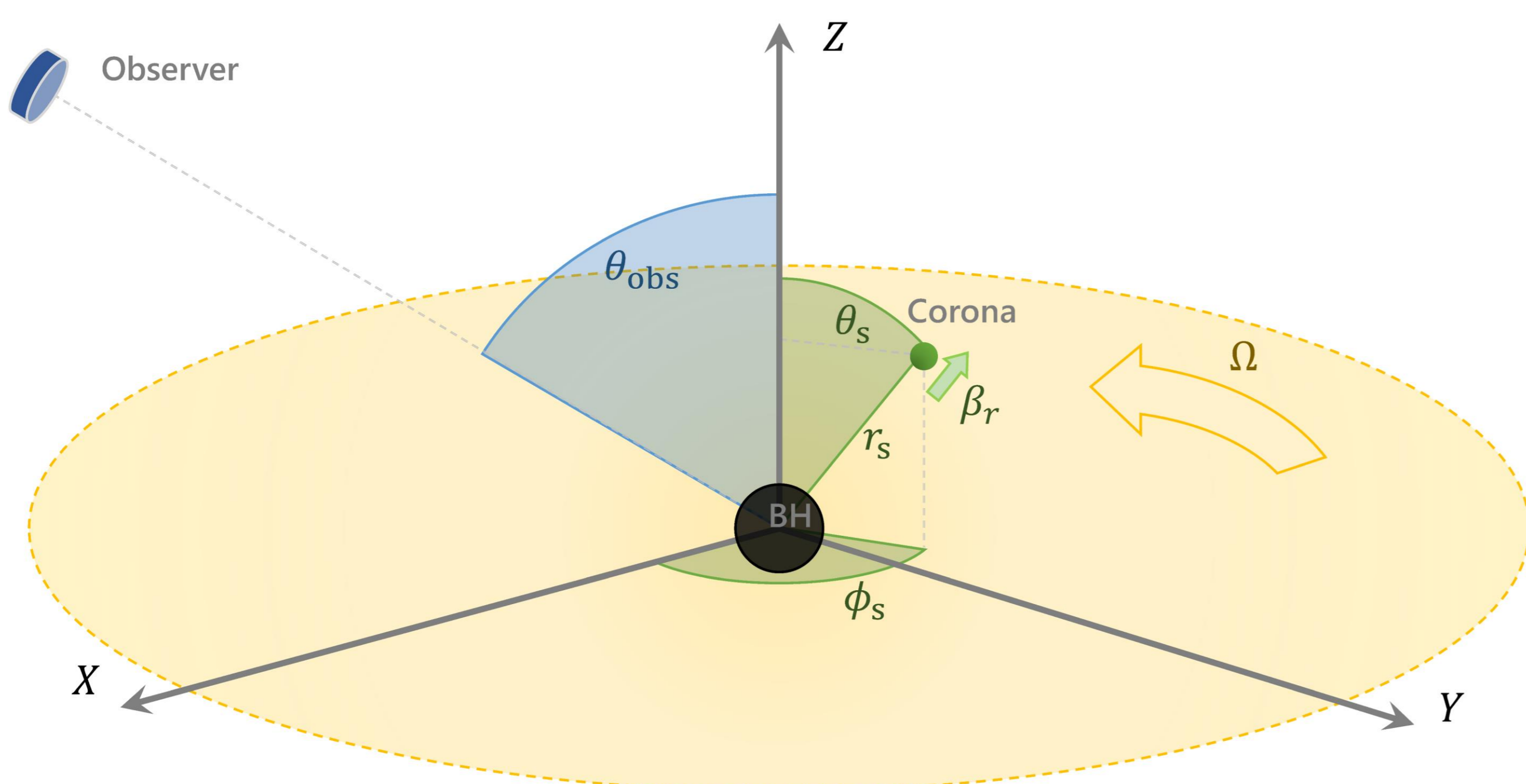
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Introduction

1. Relativistic broad iron line is generated by illumination of the accretion disk by a hot corona.
2. A widely used coronal geometry in studies is the lamppost geometry, where a point source on the spin axis above the black hole.
3. The observation of QPOs suggests that the corona has a asymmetric geometry and probably a velocity.
4. In this work, we investigate the effects of a corona offset the spin axis and moving with a relativistic velocity on the disk illumination and line profile.

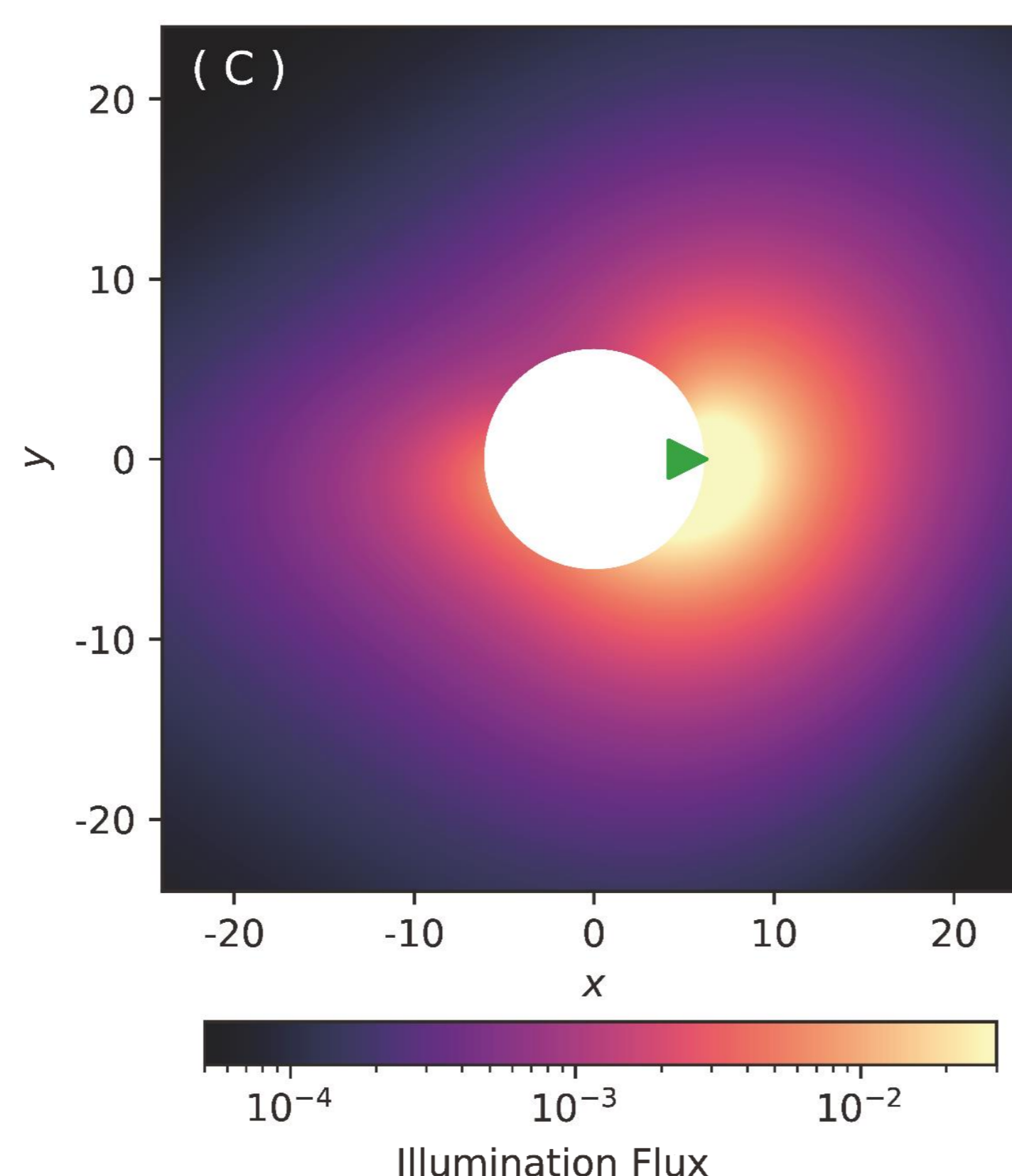
Moving Corona Model



Schematic of our model. The corona is assumed to be a point source offset from the spin axis and moving with a relativistic velocity, illuminating the accretion disk.

Non-Axisymmetric Illumination

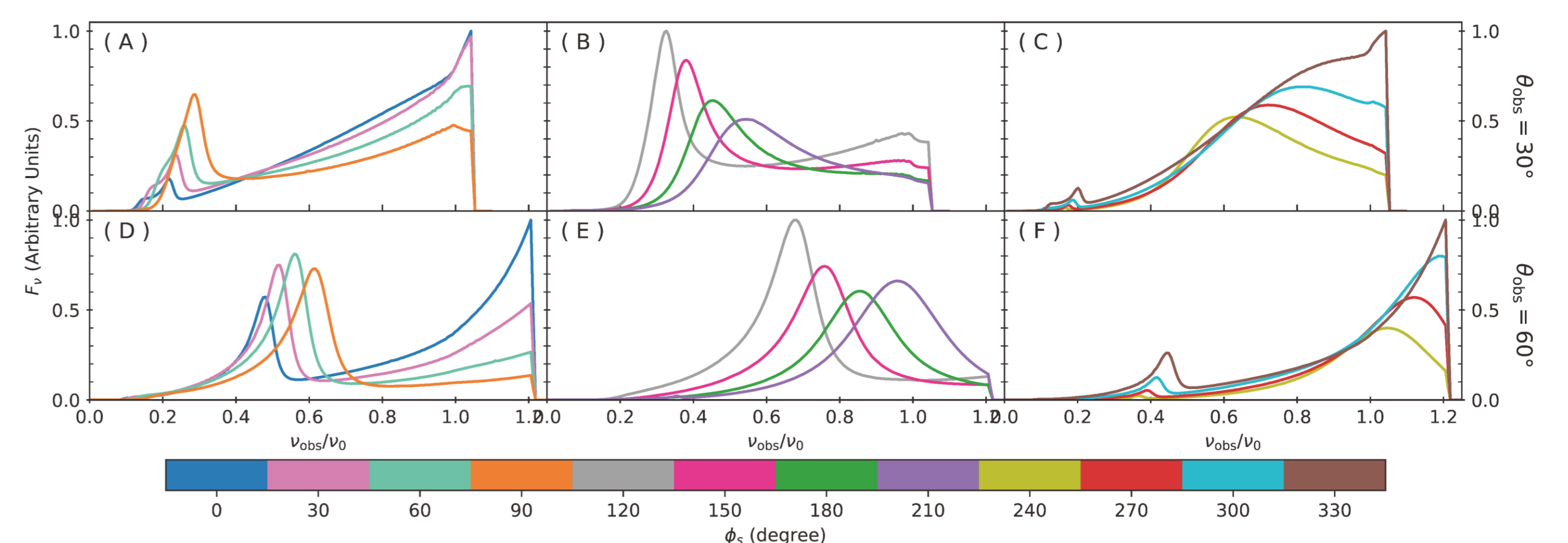
The illumination flux on the accretion disk by the moving corona. Due to the off-axis location and the radial velocity of the corona, the disk region below the corona receives more flux.



Reference

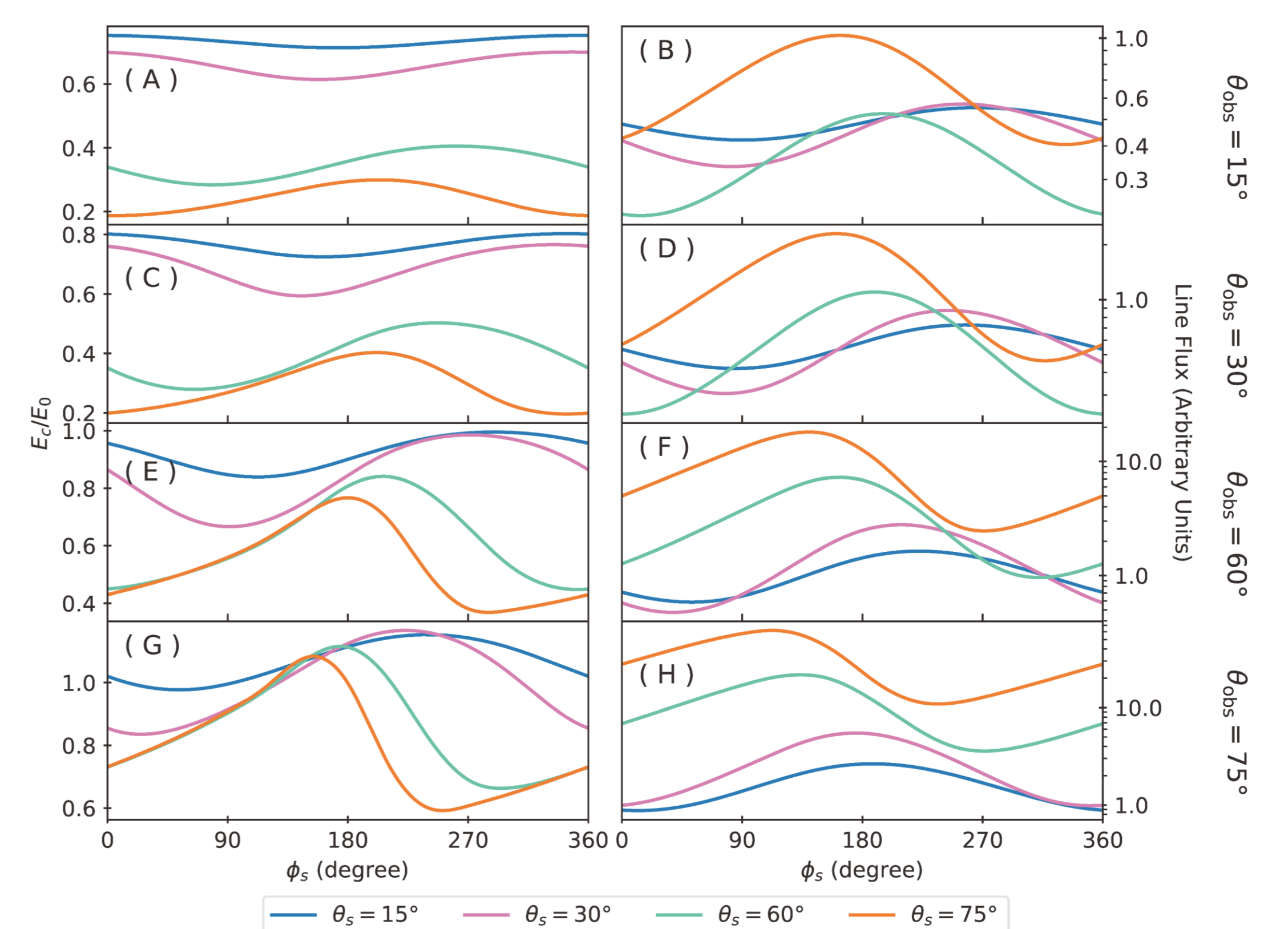
[1] Feng Y., Yuan Y.-F., Zhang S.-N., 2023, ApJ, 955, 53

Line Profile



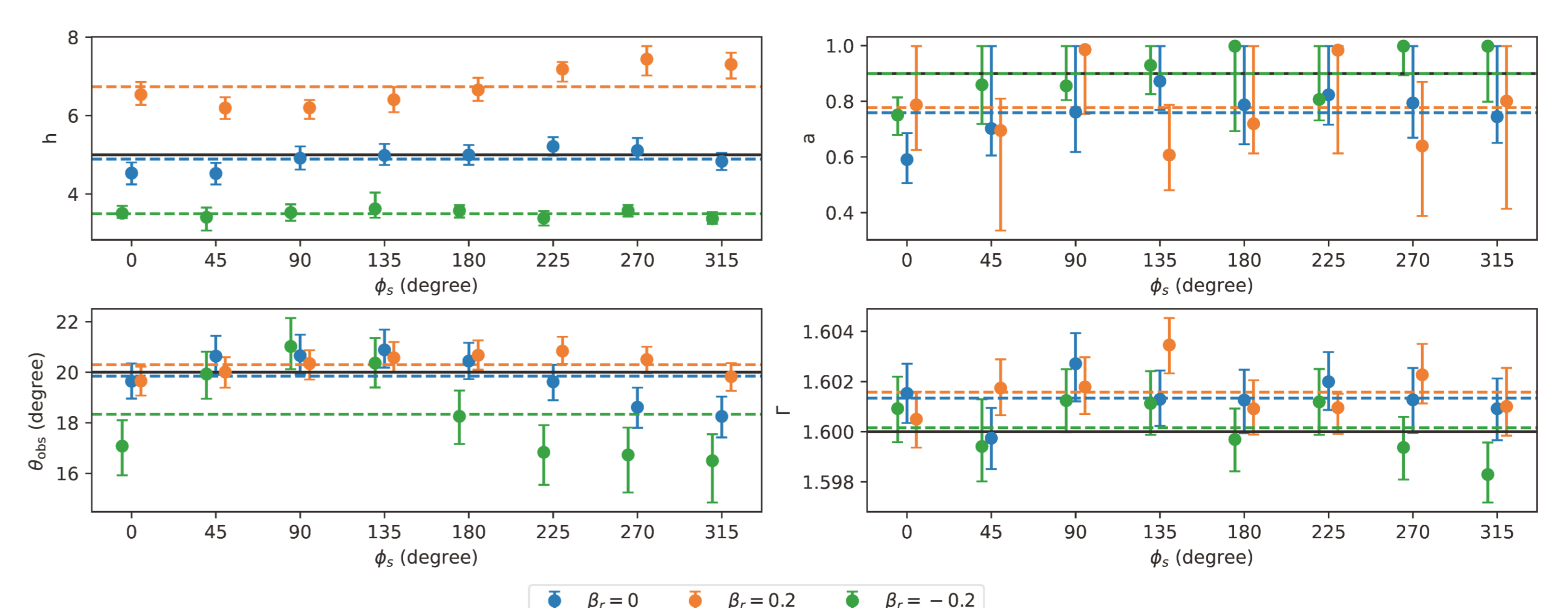
Line profiles of the relativistic emission line for the corona located at different azimuthal angles. If the corona is close to the receding part of the accretion disk, the red peak is enhanced, while the blue peak is weakened in the line profile. Conversely, if the corona is close to the approaching part, the blue peak is enhanced and the red peak weakened in the line profile.

Central Energy and Flux



The central energy and total flux of the emission line. The inclination of the corona and the inclination of the observer have important effects on the variation.

Simulated Observation



The moving corona has an obvious effect on the measured values of the model parameters, especially the height of the corona.