Submitted to the Charles University by Jakub Podgorný on December 22nd, 2023.

Errata

This document contains errata for the dissertation "Polarisation properties of X-ray emission from accreting supermassive black holes" by Jakub Podgorný, defended on December 12^{th}, 2023. These are resulting from the points raised by the referees, committee members or supervisors in their reports or during the defense. The errata were compiled by the thesis author himself, integrating all incorrect information in the original manuscript submitted on October 26^{th}, 2023, and updating references from recent publications. The manuscript will be re-compiled, taking into account these errata, and re-submitted in its final version alongside the original (defended) version to the partner institution, the University of Strasbourg, within 1 month from the defense, as per rules of the partner institution.

Preface

pg. 11: ground research -> basic research

Chapter 1

pg. 18: latter -> later

pg. 18: A difference in intensities between directions at ... -> A difference in intensities between

pg. 26: slight -> light

pg. 28: Carter -> Brandon Carter (*1942)

pg. 35: order -> orders

pg. 41: build -> built

pg. 51: A reference to Williams [1984] and Williams et al. [1984] missing.

pg. 54: A reference to Tanimoto et al. [2023] missing.

pg. 55: Bremsstrahlung is only included in spectral lines in the `STOKES` code.

Chapter 2

pg. 61: The discussion of constant-density assumption is missing a reference to Done [2010] and the expected lower density, hence higher ionization effect on polarization.

pg. 62: Figure 2.1, middle: upper tail of the polarization degree increase near 100 keV can be explained by Compton down-scatterings.

pg. 66: differed -> differ

pg. 67: Figure 2.4, right: label contains wrong angle values (should be as in Podgorný et al. [2022]) and the curves should be discontinuous when passing through $\Phi_e = 180°$. The polarization angle computations were integrated in E, Γ and ξ; hence, the caption should be modified.

pg. 70: the absorption effects -> the absorption and scattering effects

pg. 81: A chapter summary and better explanation of the assumptions (optical depth limits, vertical temperature gradient and CIE vs. PIE) and down-scattering effects is missing. Compton down-scattering is still mixed with the absorption effects and causes energy dependent polarisation at higher energies too, depending on the blackbody temperature. It would be interesting to see how inverse Compton scattering changes the polarization profile.

Chapter 3

pg. 83: The introduction should mention more the applicability with respect to AGNs and XRBs.

pg. 93: primary flux -> total flux

pg. 97: on the order of -> of the order of

pg. 101: A discussion of the role of subsequent re-processing in the sandwich corona of the once reflected radiation is missing.

Chapter 4

pg. 104: More elaboration on the usage of free electron density as a proxy to partial ionization in this chapter is required. The term partial ionization is then perhaps misleading, as real (also inhomogenous) partially ionized (and partially transparent, as compared to Section 4.2) obscurers would provide lower polarization fraction in soft X-rays.

pg. 106: The discussion in Sections 4.1 and 4.2 should be unified and shortened. More illustrations would help, as well as imaging model results.

pg. 107: Figure 4.1 (bottom right) requires sign corrections in some lines.

pg. 109: A reference to Tanimoto et al. [2023] and Tomaru et al. [2023] missing.

pg. 112: A discussion of energy dependence of polarization should be added when explaining the effects of changing Γ.

pg. 114: Equation 4.3 should have $\Delta\Psi$ removed, as it is representing global system orientation here that is corrected for after the torus integration.

pg. 115: A free parameter of the upper integration limit in $\mu_{\rm i}$ for `xsstokes_disc` (representing the coronal physical size, large sizes being equivalent to the `KYNSTOKES` model in sandwich geometry with no kinetic and relativistic effects) would improve the discussion and results comparison with Chandrasekhar's formulae. These formulae could also be used for comparisons with the results of `xsstokes_torus`.

pg. 117: Figure 4.9 shows that there could still be an interpolation error at high inclinations and low half-opening angles. All Stokes parameters should be smooth functions of geometrical parameters. Thus, the model should be used for more restricted inclinations and half-opening angles than Table 4.1 is recommending.

pg. 122: More physical reasoning behind neutral polar winds usage would strengthen the results.

Chapter 5

pg. 132: assisst -> assist

pg. 134: observed -> caught

pg. 135: A reference to the `COMPPS` model missing.

pg. 135: for an any -> for any

pg. 134: Less confidence should be put in the current interpretation of *IXPE* results of 4U1957+115 [Marra et al., 2023], as other XRBs observed by *IXPE* in the soft state are difficult to explain with conventional models.

pg. 134: A note on the observed X-ray polarization variability observed in Cygnus X-3 should be added.

pg. 137: Compton down-scattering effects should be also mentioned alongside absorption, as they contribute to the polarization degree shape with energy to large extent inside the `KYNEBBRR` model.

pg. 143: The chemical composition changes could play much larger role, if true partial ionization was considered

pg. 143: Te -> The

Chapter 6

pg. 157: decreasing and high -> high and decreasing

pg. 157: by means of enhanced absorption effects and possibly by adding outflowing velocities to the absorbing medium -> by means of enhanced absorption and down-scattering effects and possibly by adding outflowing velocities to the absorbing and scattering medium

pg. 160: many new dimensions -> at least one new dimension

pg. 160: A reference to Tanimoto et al. [2023] missing.

Bibliography

Several publications cited as pre-prints on the day of submission have been recently published. We also note type-o in two names in the "List of publications" on pg. 3: L. Marra and F. Muleri, see "Bibliography".

Appendices

Figures A.27–A.29 and A.32 contain some polarization curves $p(H')$ with wrong plotted sign in part of the region of the parameter space, as is obvious from the discussion and comparison with their counterparts $p(\theta)$ in the main thesis body that are drawn from the same data and do not have this flaw.

pg. 263: Equation D.10 is missing a μ_i factor, which will slightly affect the results, once corrected, similarly to the abovementioned interpolation issues.

pg. 264: More standard CPU time units or references should be given.