HOLISMOKES

IV. Efficient mass modeling of strong lenses through deep learning

(Corrigendum)

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In this erratum, we would like to correct a typographical mistake in Eq. (5) from Schuldt et al. (2021) that converts the complex ellipticity of an ellipse into its axis ratio \( q \) and position angle \( \theta \). Eq. (4) from Schuldt et al. (2021) gives the definition of the complex ellipticity as

\[
\begin{align*}
e_x &= \frac{1 - q^2}{1 + q^2} \cos(2\theta), \\
e_y &= \frac{1 - q^2}{1 + q^2} \sin(2\theta),
\end{align*}
\]

which was used throughout the published article. For completeness, we gave a back transformation of the complex ellipticity into the axis ratio \( q \) and the position angle \( \theta \) in Eq. (5). The expression for the axis ratio \( q \in (0, 1] \) is correct,

\[
q = \sqrt{1 - \sqrt{e_x^2 + e_y^2} / 1 + \sqrt{e_x^2 + e_y^2}}.
\]

The error concerns the second part, the position angle \( \theta \in [0, \pi) \), defined counter-clockwise with respect to the positive x-axis. According to Eq. (1) of this erratum, the cosine function corresponds to \( e_x \) and the sine function corresponds to \( e_y \), which was unfortunately switched for the back transformation. A clearer and correct transformation is given by

\[
\theta = \begin{cases} 
  f & \text{if } e_x \geq 0 \text{ and } e_y \geq 0 \\
  f + \pi & \text{if } e_x \geq 0 \text{ and } e_y < 0 \\
  \frac{\pi}{2} - f & \text{if } e_x < 0 
\end{cases}
\]

with

\[
f = \frac{1}{2} \arcsin \left( \frac{1 + q^2}{1 - q^2} \right)
\]

and

\[
f \in [-\pi/4, +\pi/4].
\]

Since we only used Eq. (1) (i.e., Eq. (4) from Schuldt et al. 2021) to transform the axis ratio \( q \) and position angle \( \theta \) of our mock lenses into the complex parameterization for training the networks, and as we worked from then on in complex notation, we never used the back transformation. Therefore, this mistake does not affect any results in Schuldt et al. (2021).

References

Schuldt, S., Suyu, S. H., Meinhardt, T., et al. 2021, A&A, 646, A126

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