Selection functions of strong lens finding neural networks

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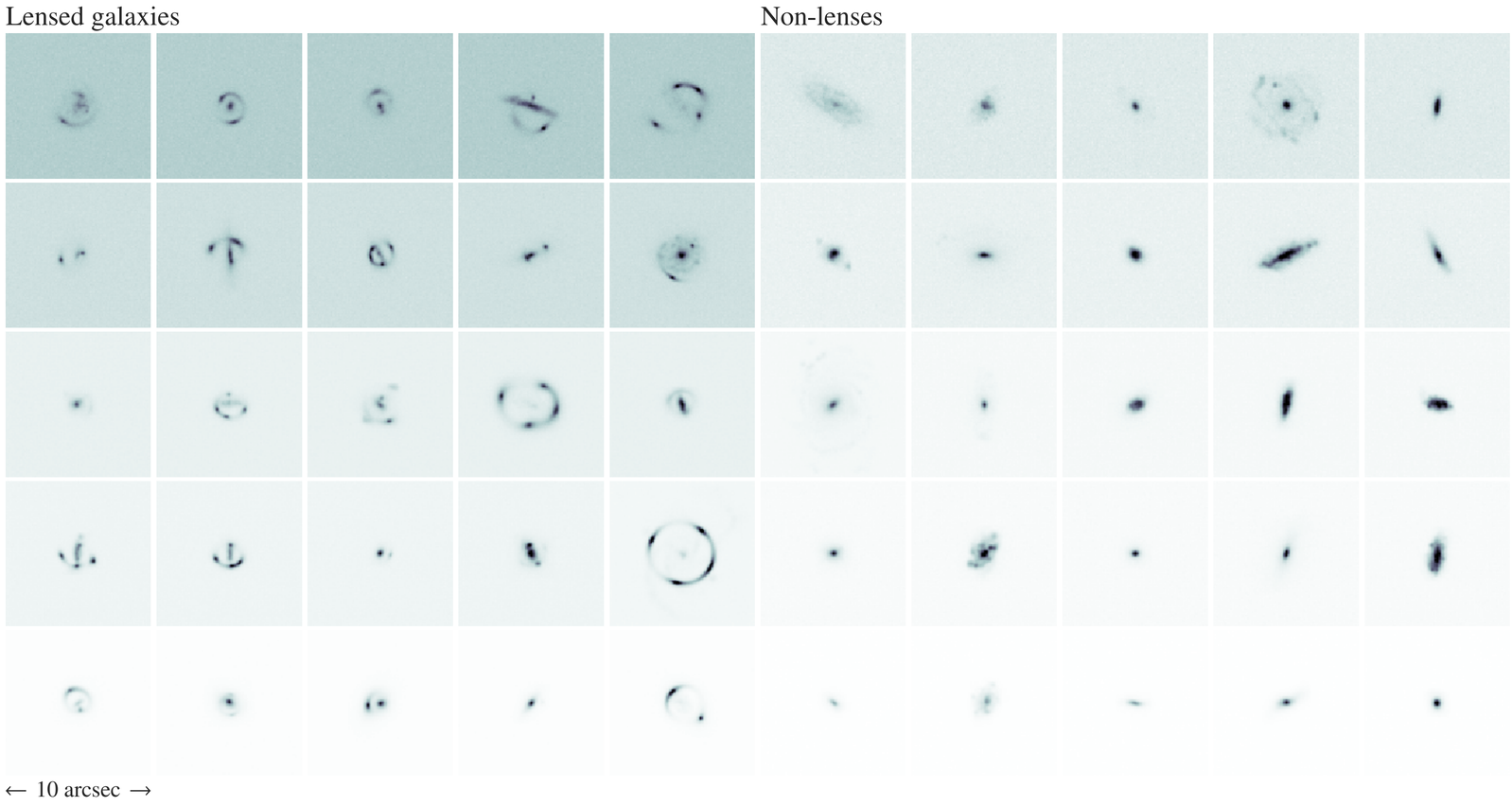
Context

- Strong gravitational lenses have many important applications: study of dark matter, time delay cosmography, high redshift galaxy science, constraining feedback models
- 10^5 strong lenses will be found in Euclid data
- CNNs will be used for lens finding



Are the lenses found by CNNs a biased sample?

- 3 training datasets of 10^6 images each

Dataset A	**Dataset B**	**Dataset C**
Galaxy-galaxy lenses	Galaxy-galaxy lenses	Galaxy-quasar lenses
Simple lens light model	Complex lens light model	Complex lens light model

- Differences in parameter distributions between the testing dataset and the sample of lenses found by the NN - Selection bias

Selection biases of lens finder NNs

Parameter	ResNet bias
Einstein radius	Larger Einstein radii are preferred
Source profile	Larger sources with concentrated light profiles are preferred
Slope of density profiles	Unbiased
Lens ellipticity	Lensed quasar finders prefer more elliptical lenses

Thank you!

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Paper: Selection functions of strong lens finding neural networks, https://arxiv.org/abs/2307.10355