Period Review Meeting II
StrongGravity-312789

WP10
Modelling Thermal X-ray Continuum of Accretion Discs

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WP10 Objectives

To accurately model thermal spectra of black-hole accretion discs in soft state over a range of luminosities.

WP10 tries to improve on:

- detailedness of the underlying physical models of thermal emission of stellar-mass black-hole accretion disks
- accuracy of the modelling with respect to observational evidence
- usability of thermal models over a range of luminosities

In the second period, while waiting for WP4 to finish, we worked in the direction of the fourth objective, trying to come up with a model for thermal radiation that would be suitable for ULX sources.

WP10 Deliverables

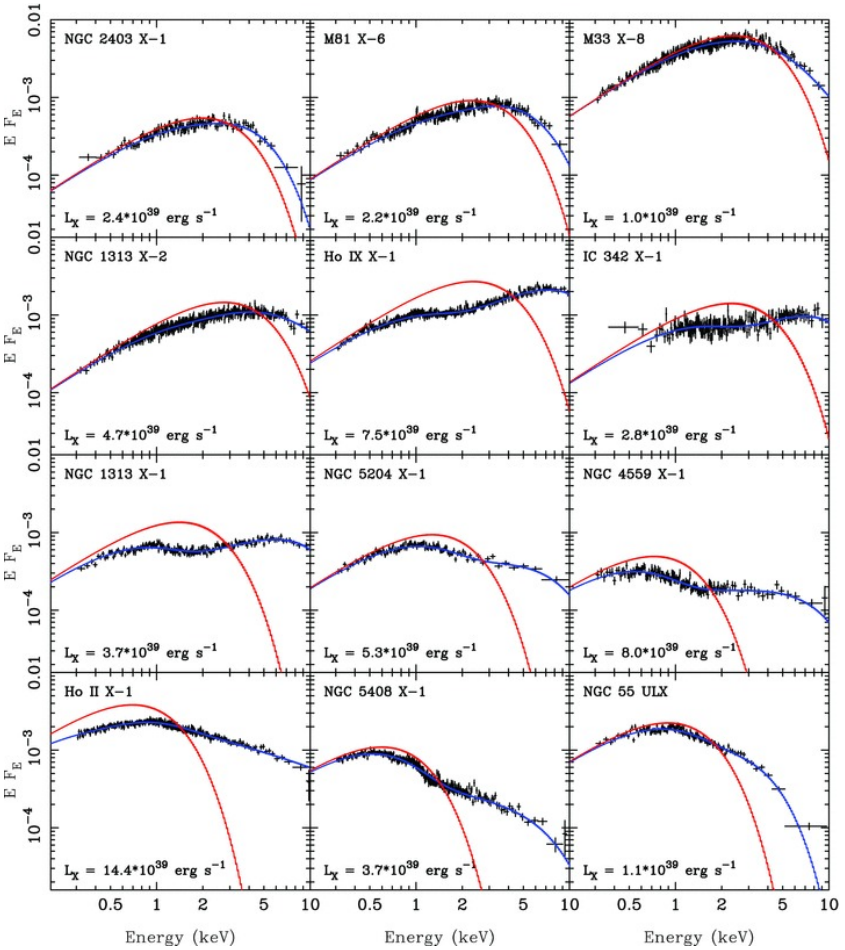
Deliverables for the second reporting period:

(none)

Motivation: ULXs

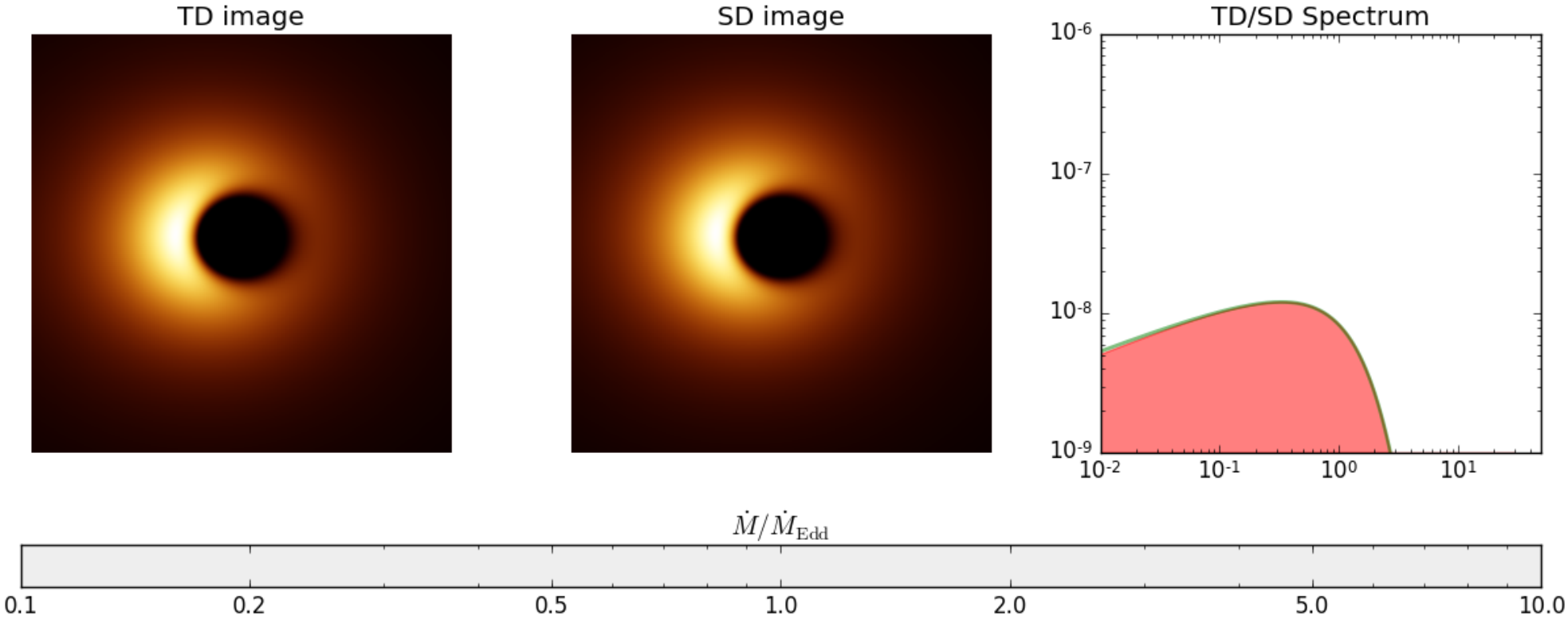
Spectral modeling of ULXs:

- most often a model with disk+pl or disk+th_comp is used
- in place of a disk model we can see DISKBB, DISKPN, KERRBB, BHSPEC, GRAD, etc
- all of the listed disk models are based on thin disk model, which is inapplicable for L> 0,5 L_{Edd}
- such a modelling gives wrong values for BH mass and for accretion rate (luminosity)
- how much wrong? we are trying to assess!



(Gladstone et al. 2009)

ULX spectra (a=0.00, i=30°)



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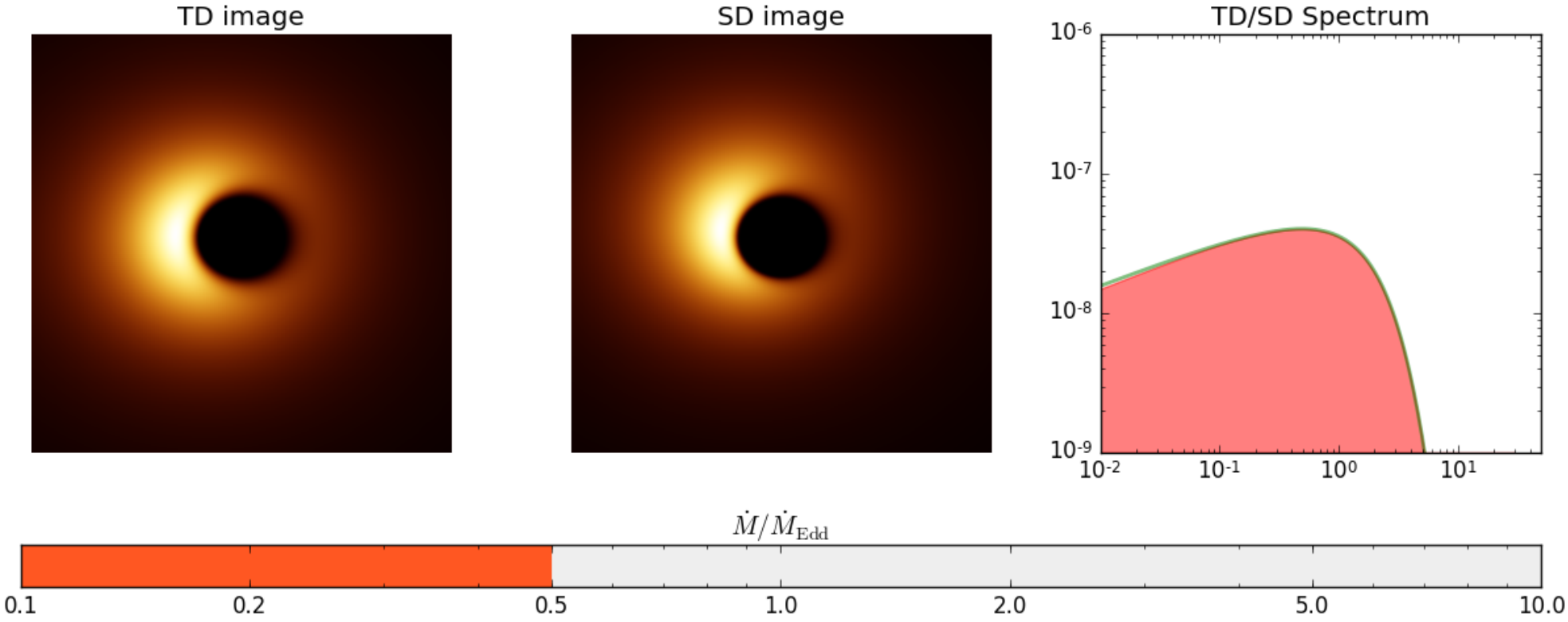

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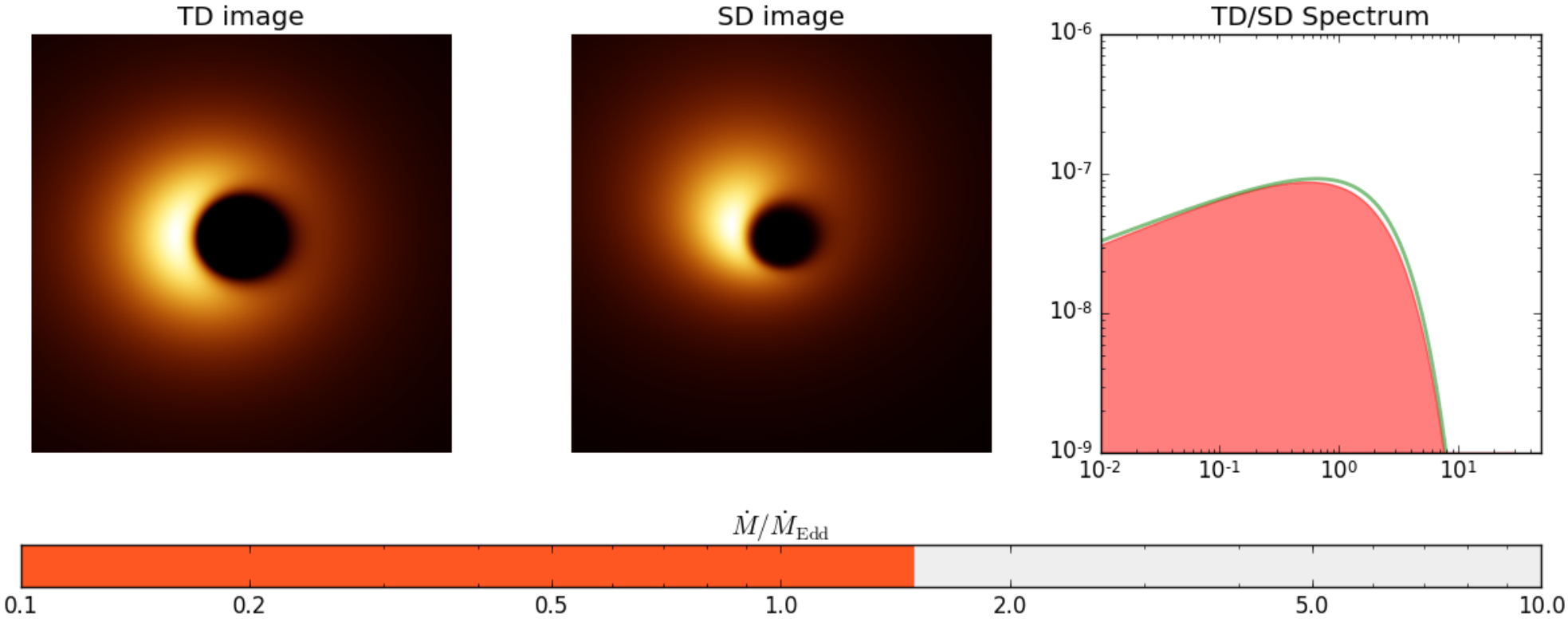

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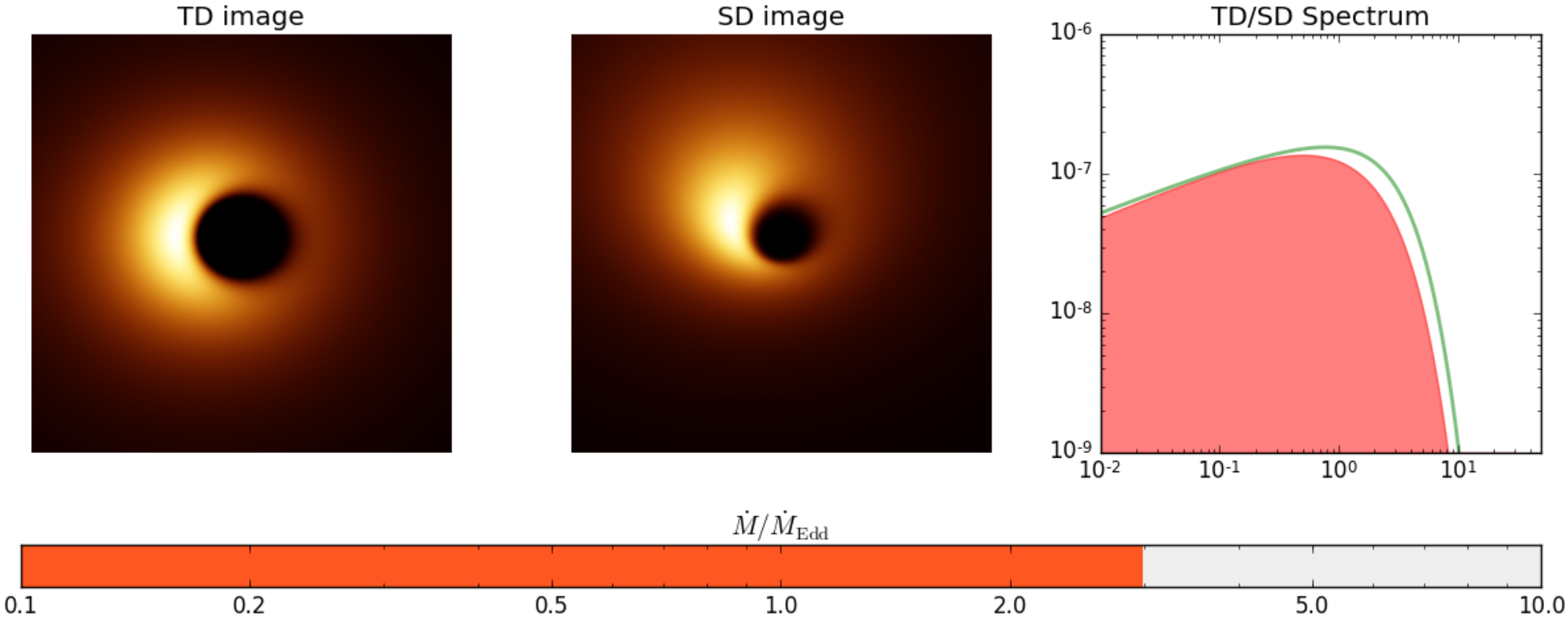

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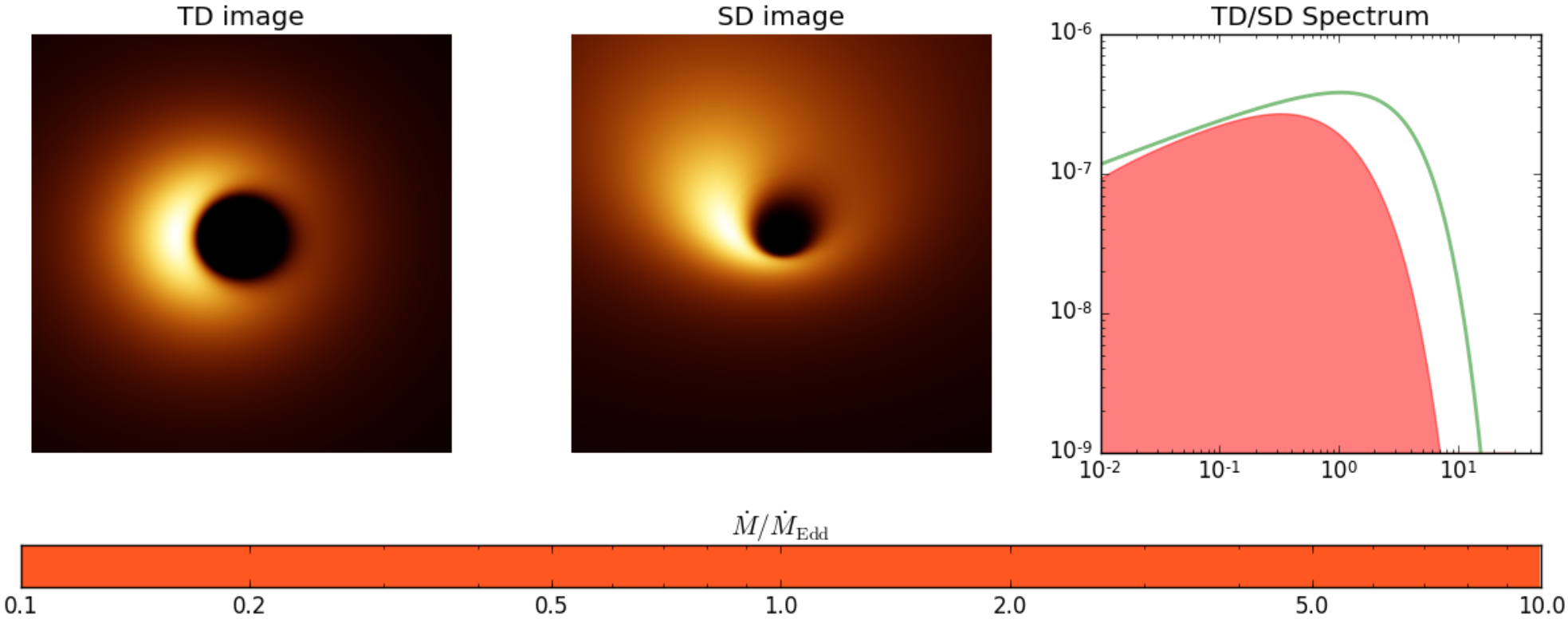
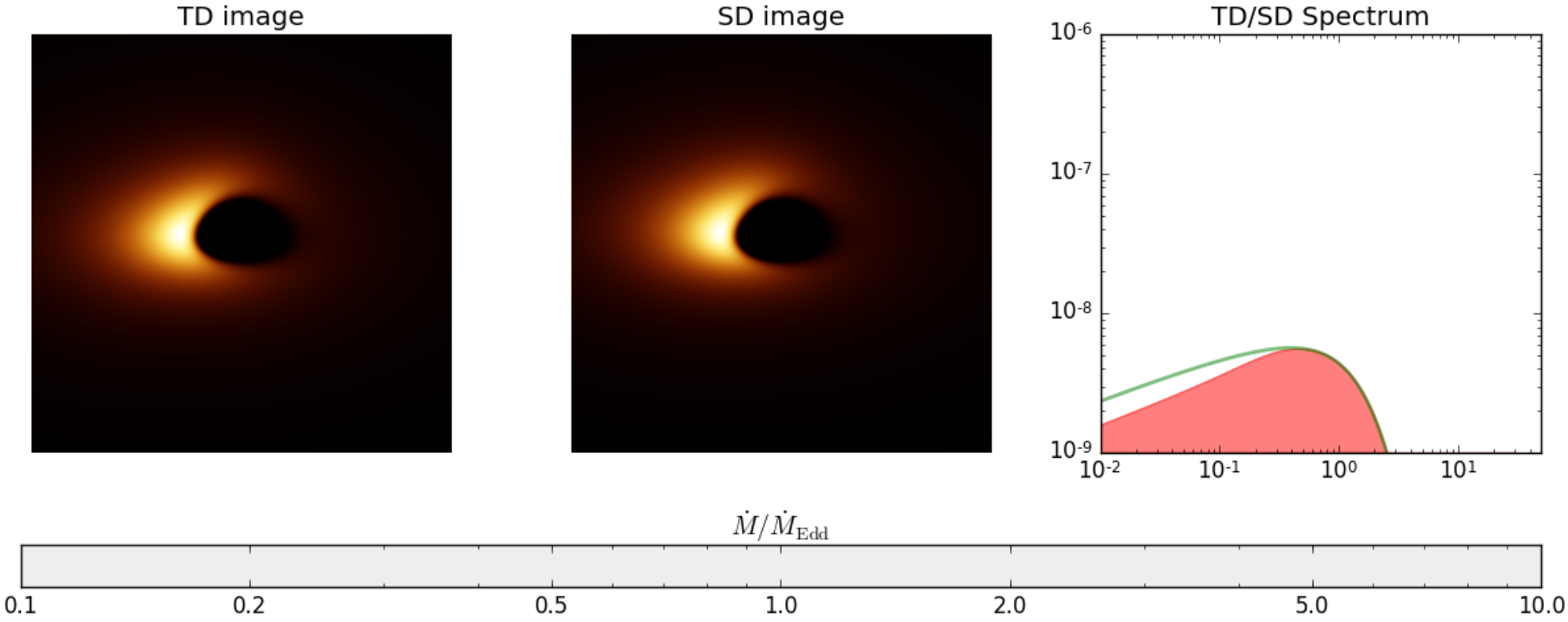


ULX spectra (a=0.00, i=60°)



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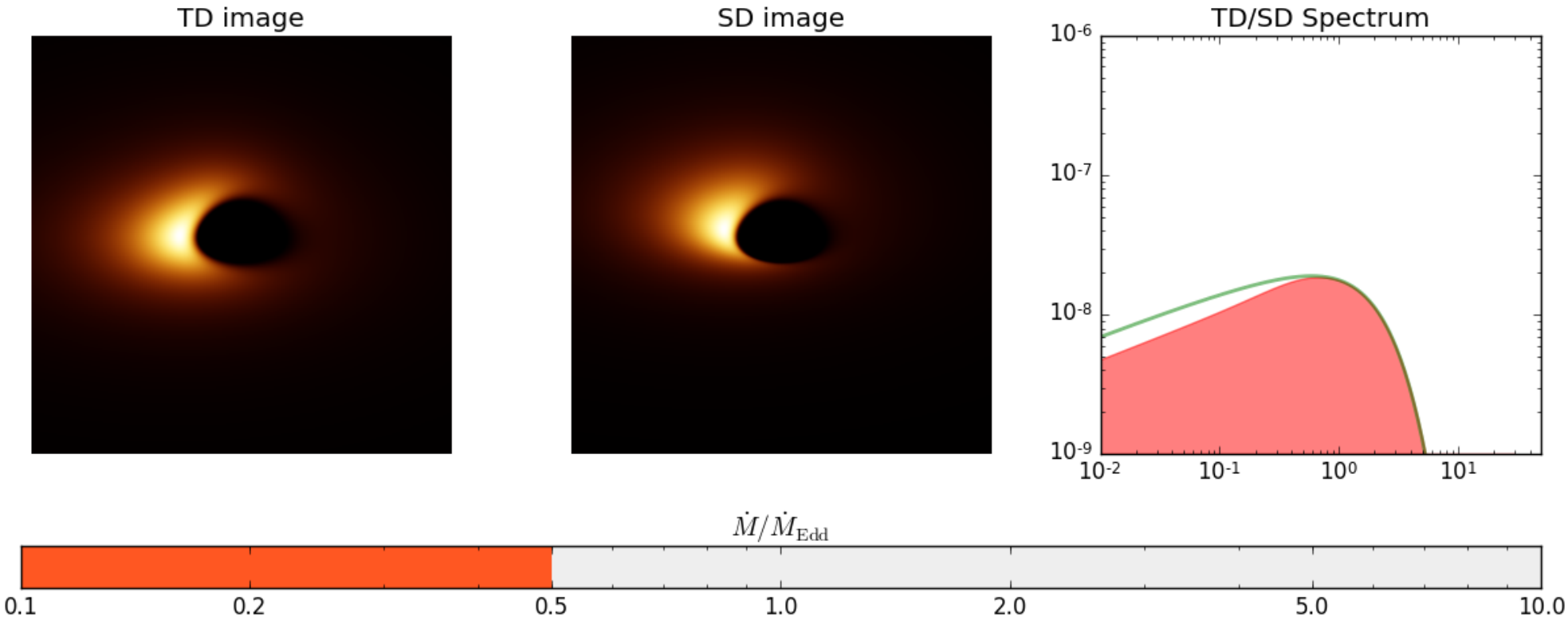

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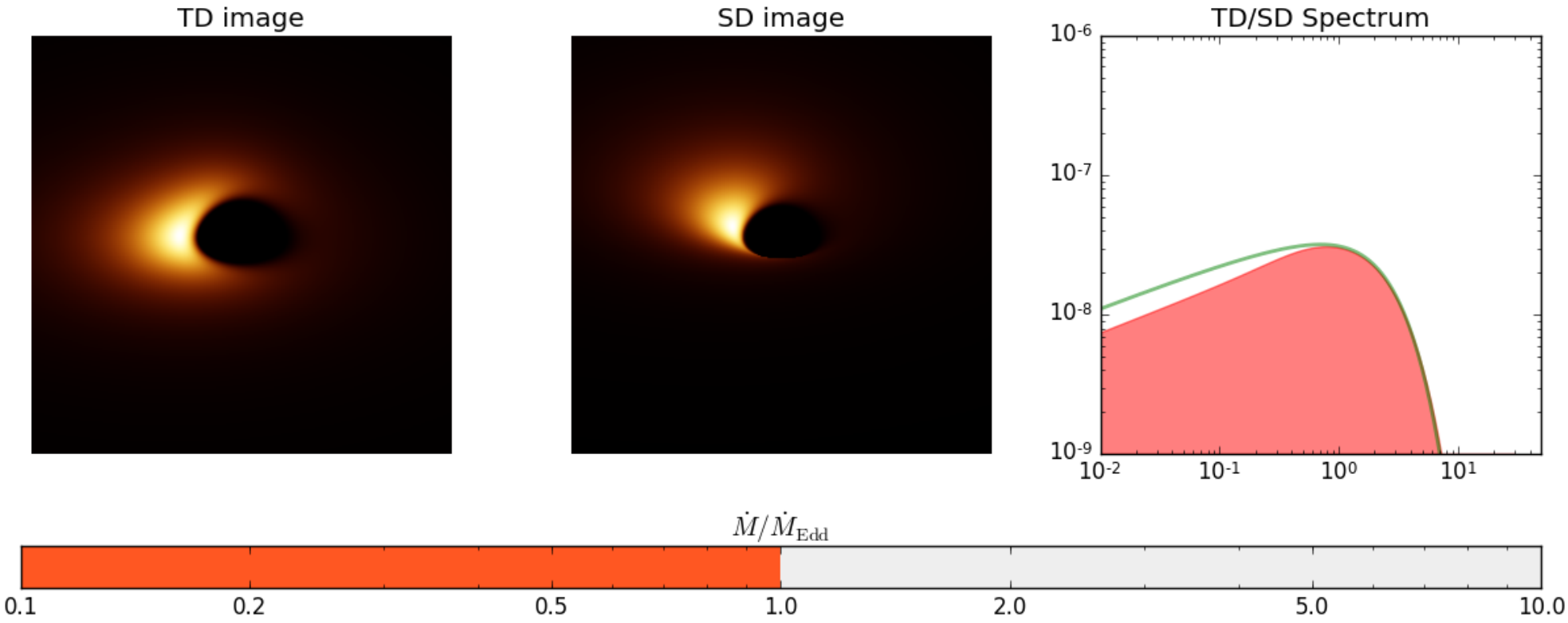

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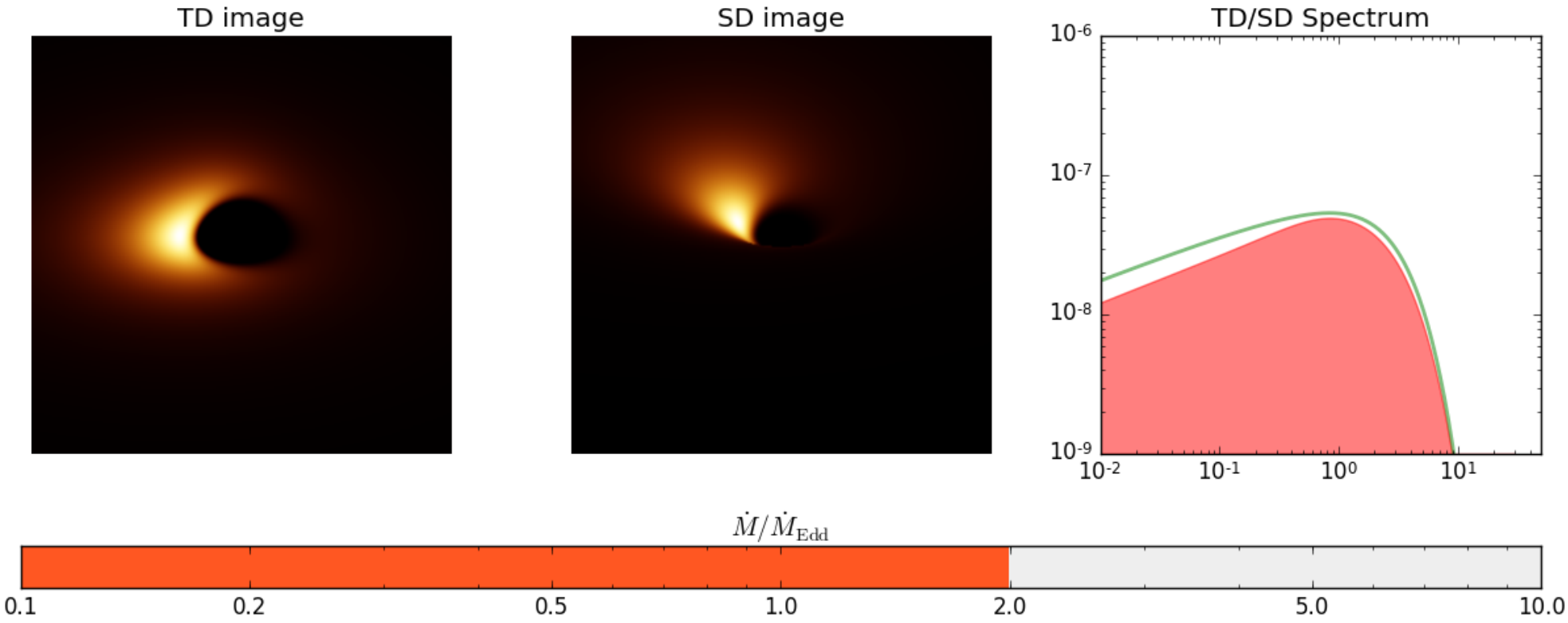

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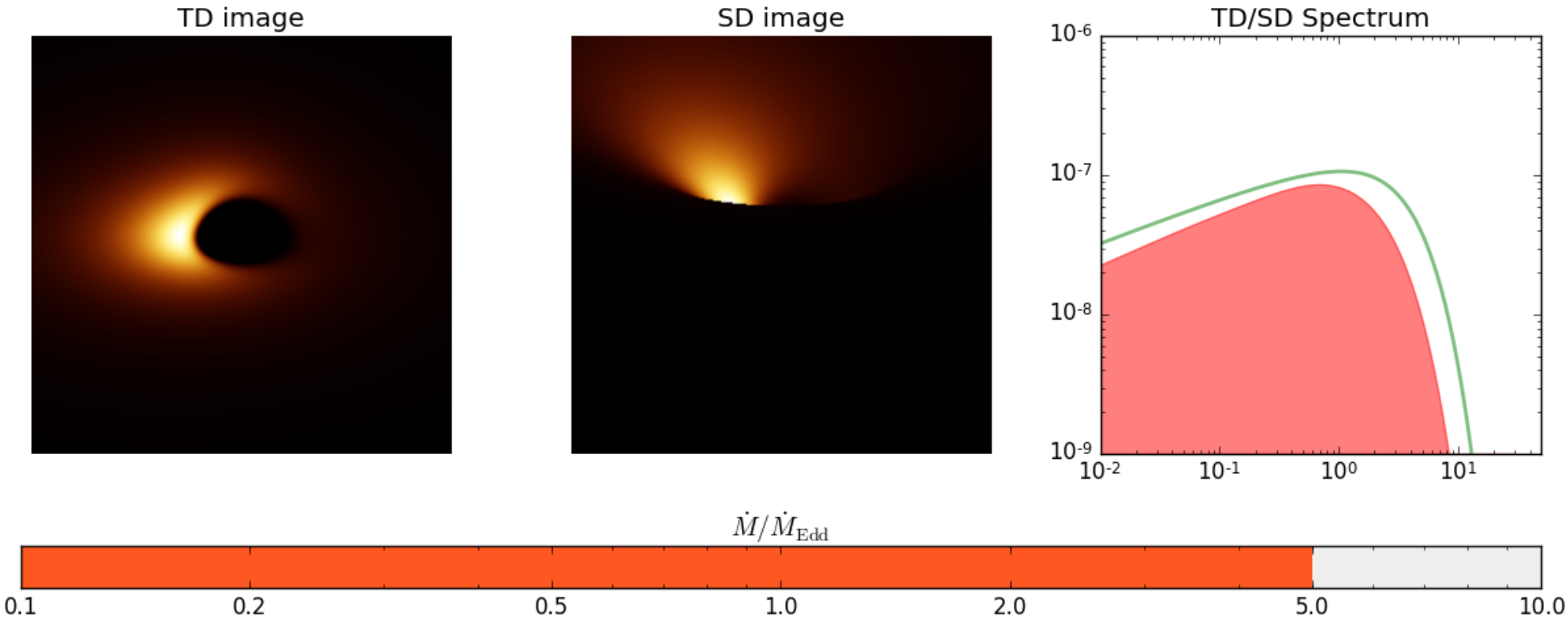

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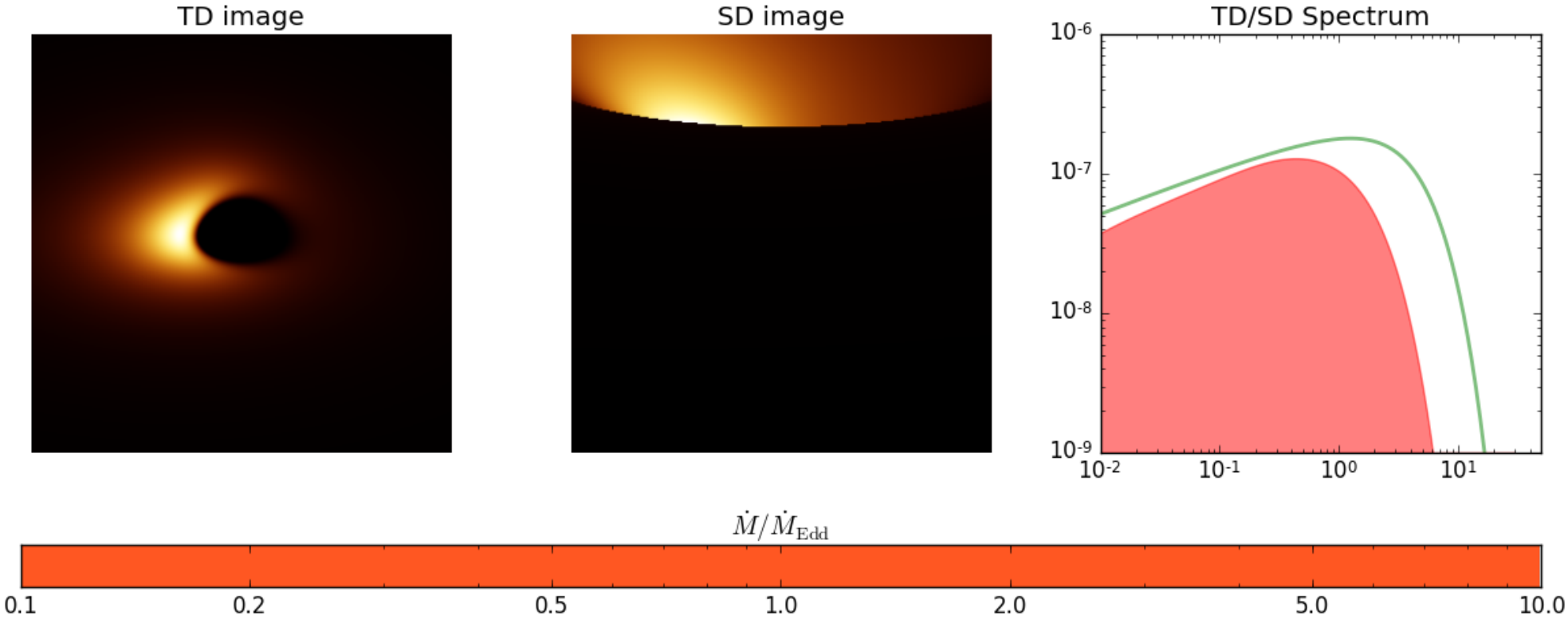
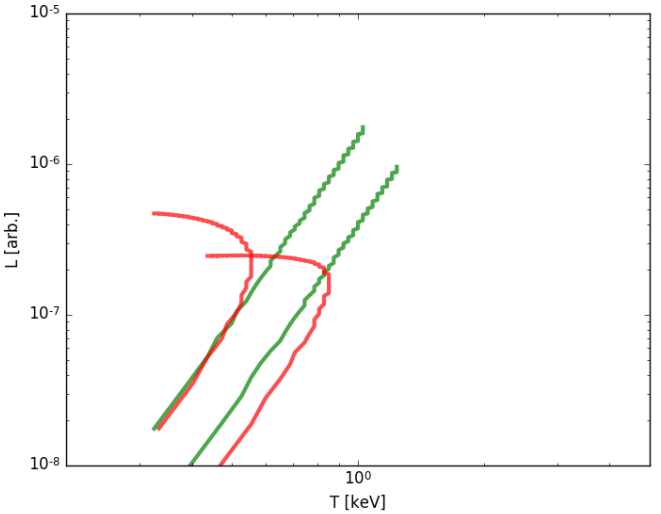
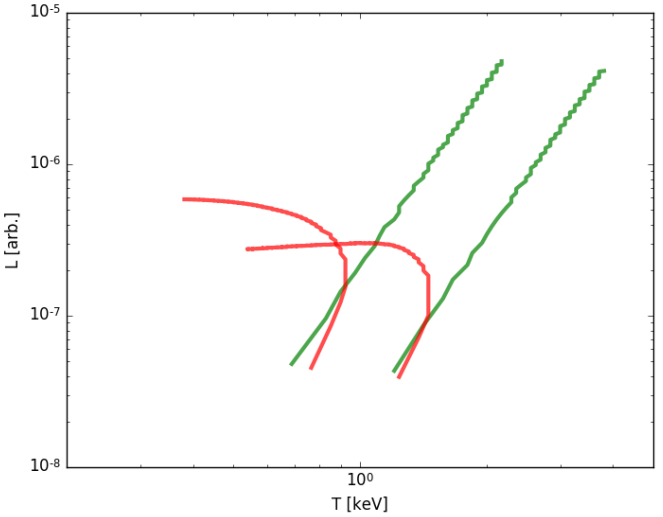


Luminosity vs. Temperature

Deviations in L-T plot:

- ULX spectra show significant deviations from „thin disk“ L-T relation in super-Eddington regime
- it appears to be quite tricky to estimate the true energy output of a source when the disk is strongly radiation pressure dominated using thin disk MCBB models with =>
  masses may be largely overestimated





WP10 Summary

ULX model

- we have computed set of high-luminosity spectra
- they are supposed to be compiled in a FITS table and delivered as XSPEC model
- input to WP12

Plan for RP-III

- connect with WP11 using input from WP4 and compute spectral models for disk+corona geometry with polarization