

Black Hole Feedback: Towards the Unification of Outflows in Active Galactic Nuclei

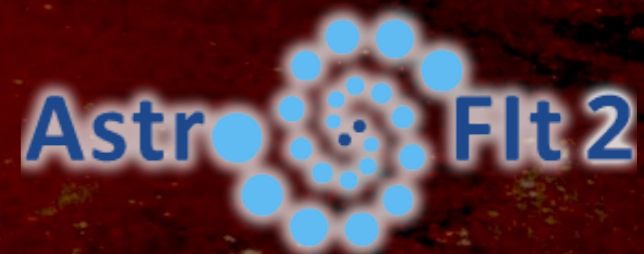


Emanuele Nardini

INAF/Osservatorio Astrofisico di Arcetri

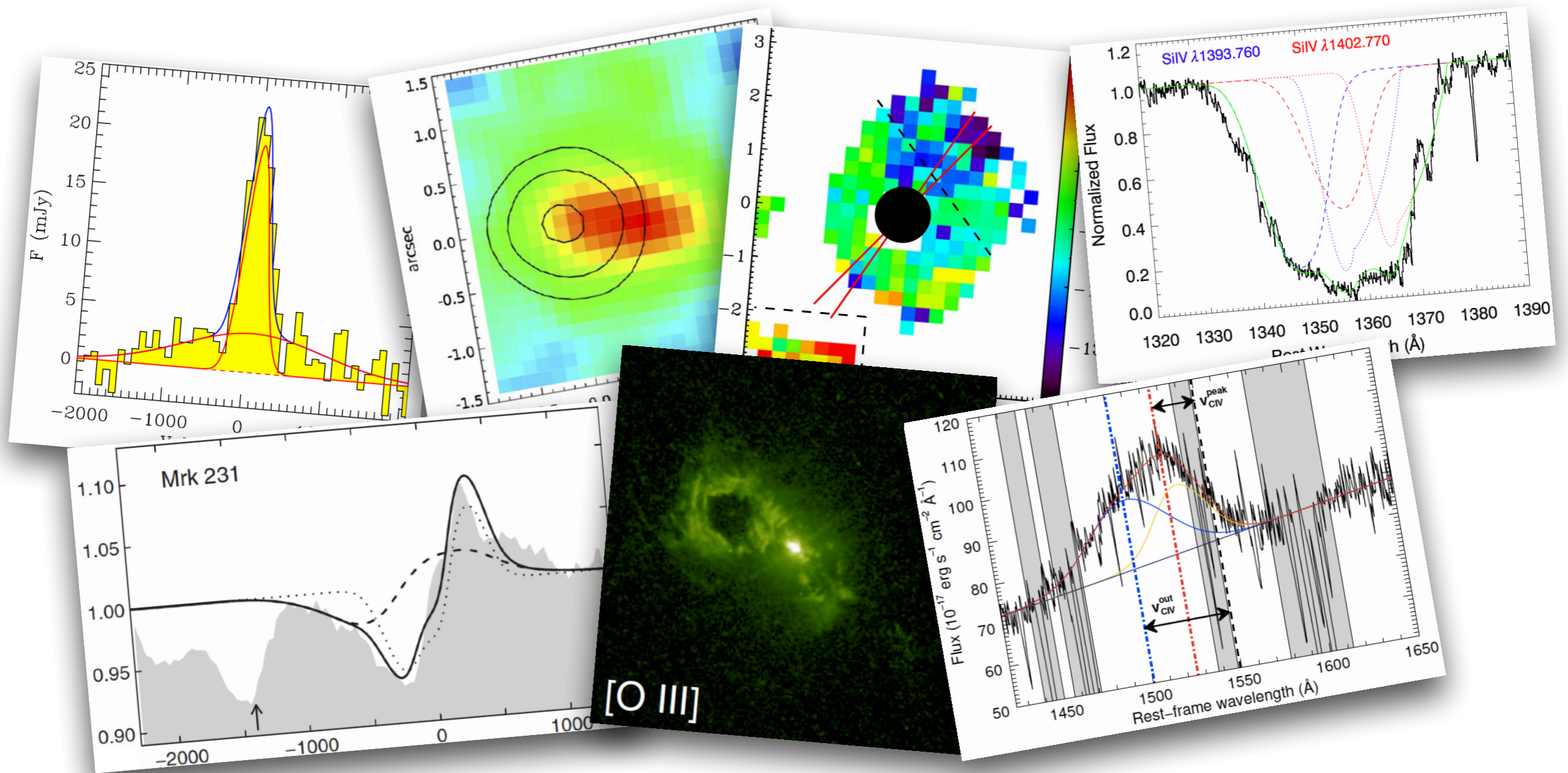


AstroFlt2 Second Annual Meeting
Roma, 23–24 October 2018

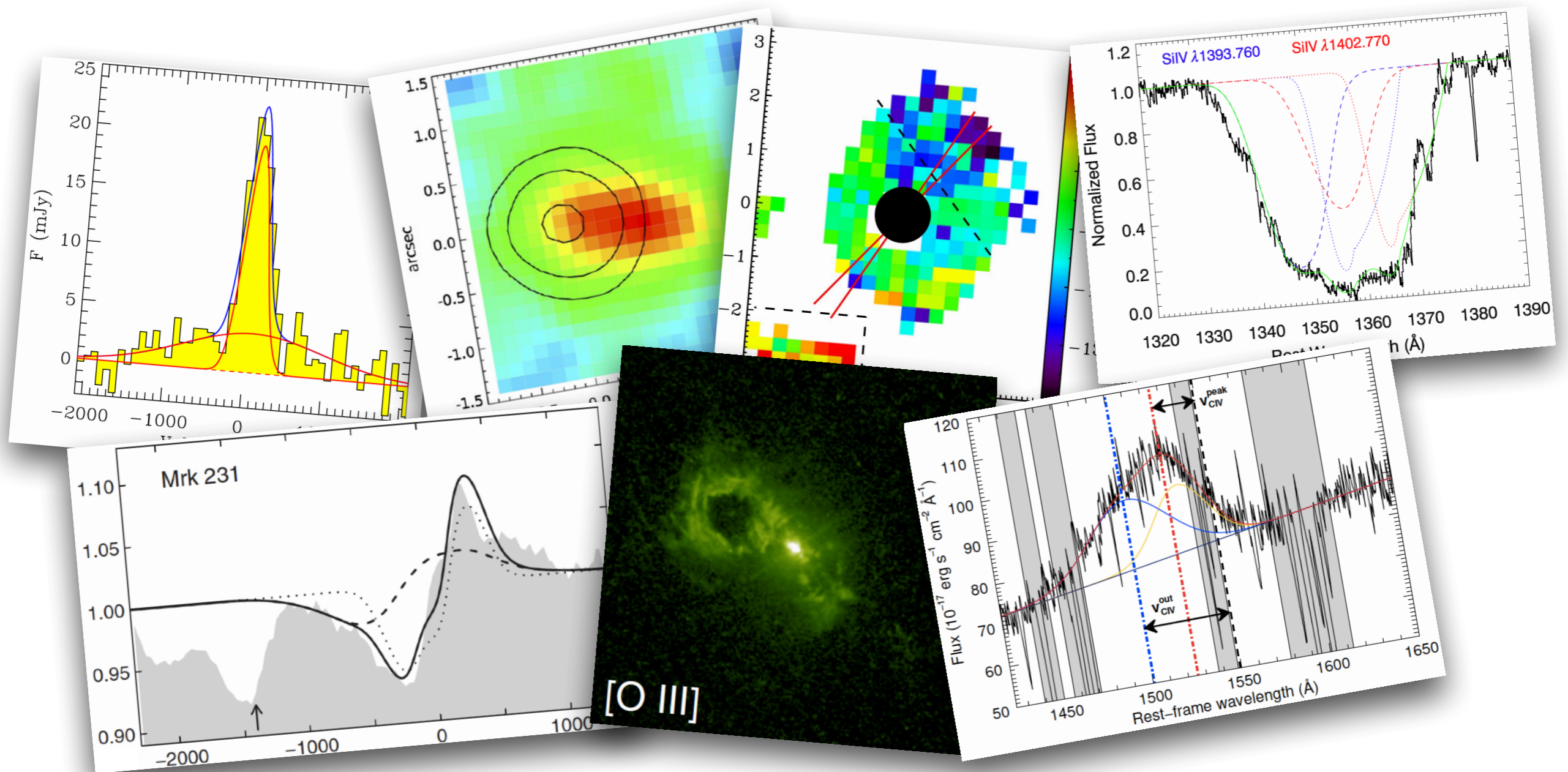


X-ray winds and galaxy evolution

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X-ray winds and galaxy evolution



$$E_{\text{BH}}/E_{\text{gal}} \sim 10^{-4} (c/\sigma)^2$$

The energy necessary to drive such outflows throughout a galaxy is released at sub-pc scales

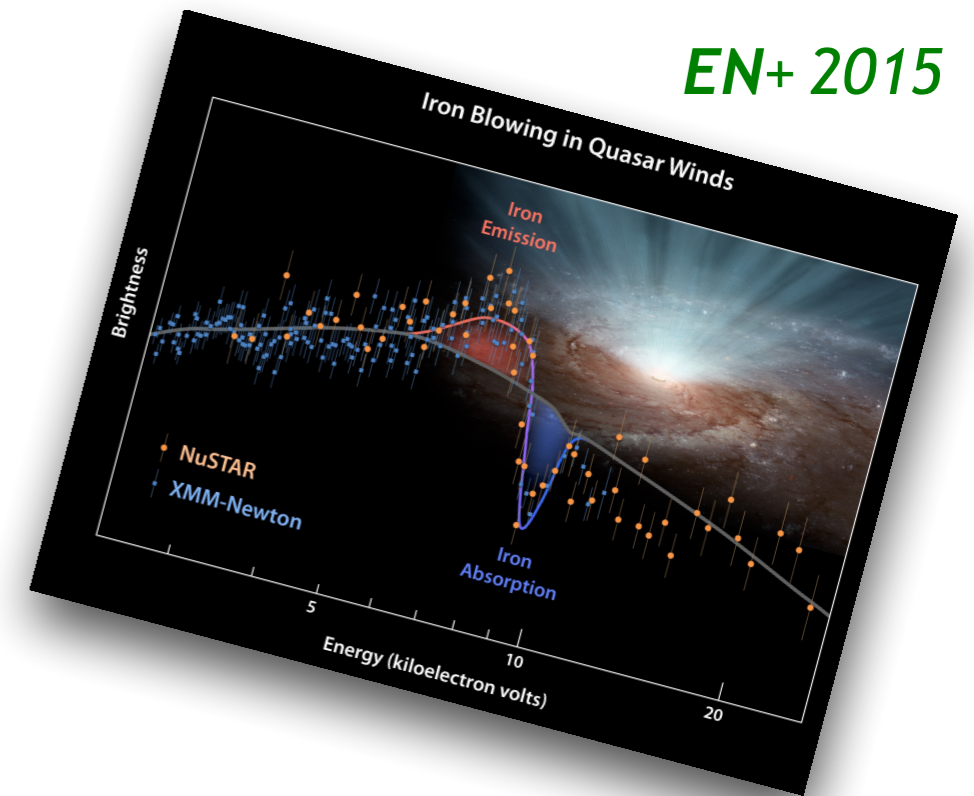
Physical structure of SMBH winds

Best laboratory for studying accretion disc winds

PDS 456

Most luminous radio-quiet quasar at low redshift

EN+ 2015



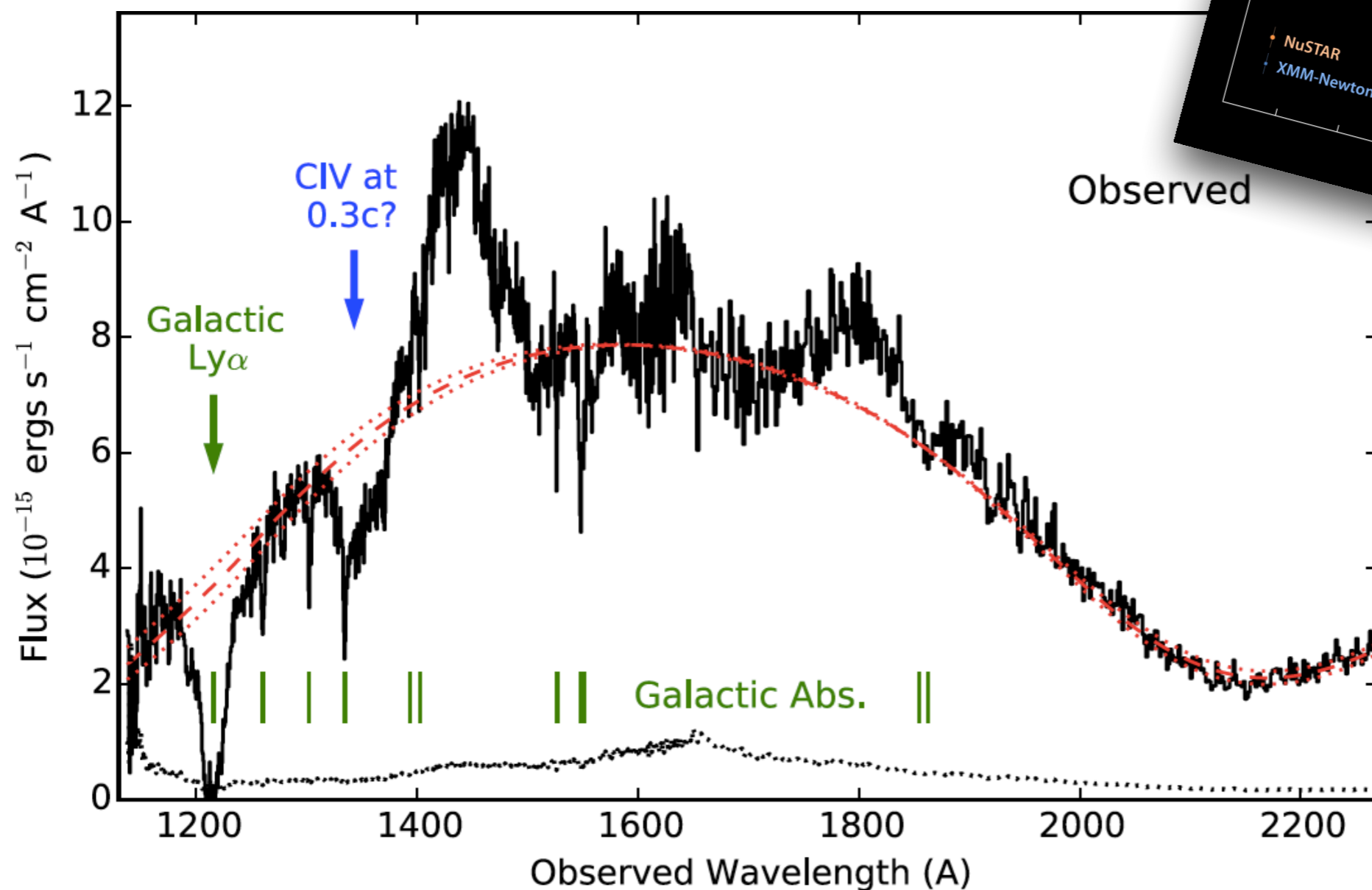
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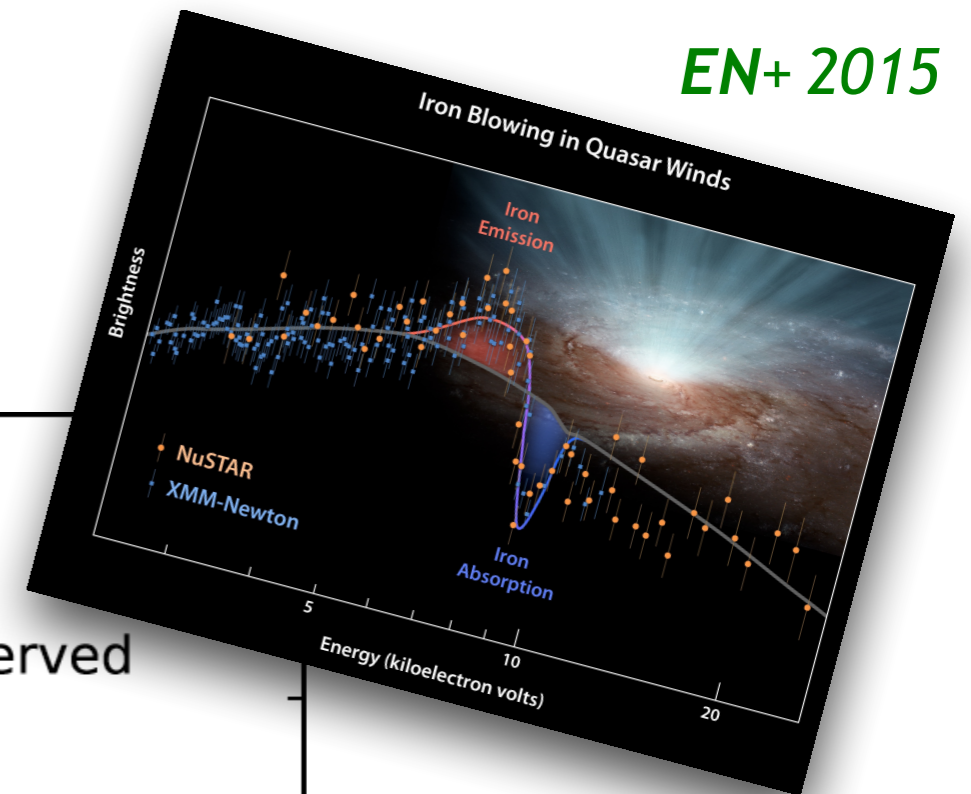
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Observed

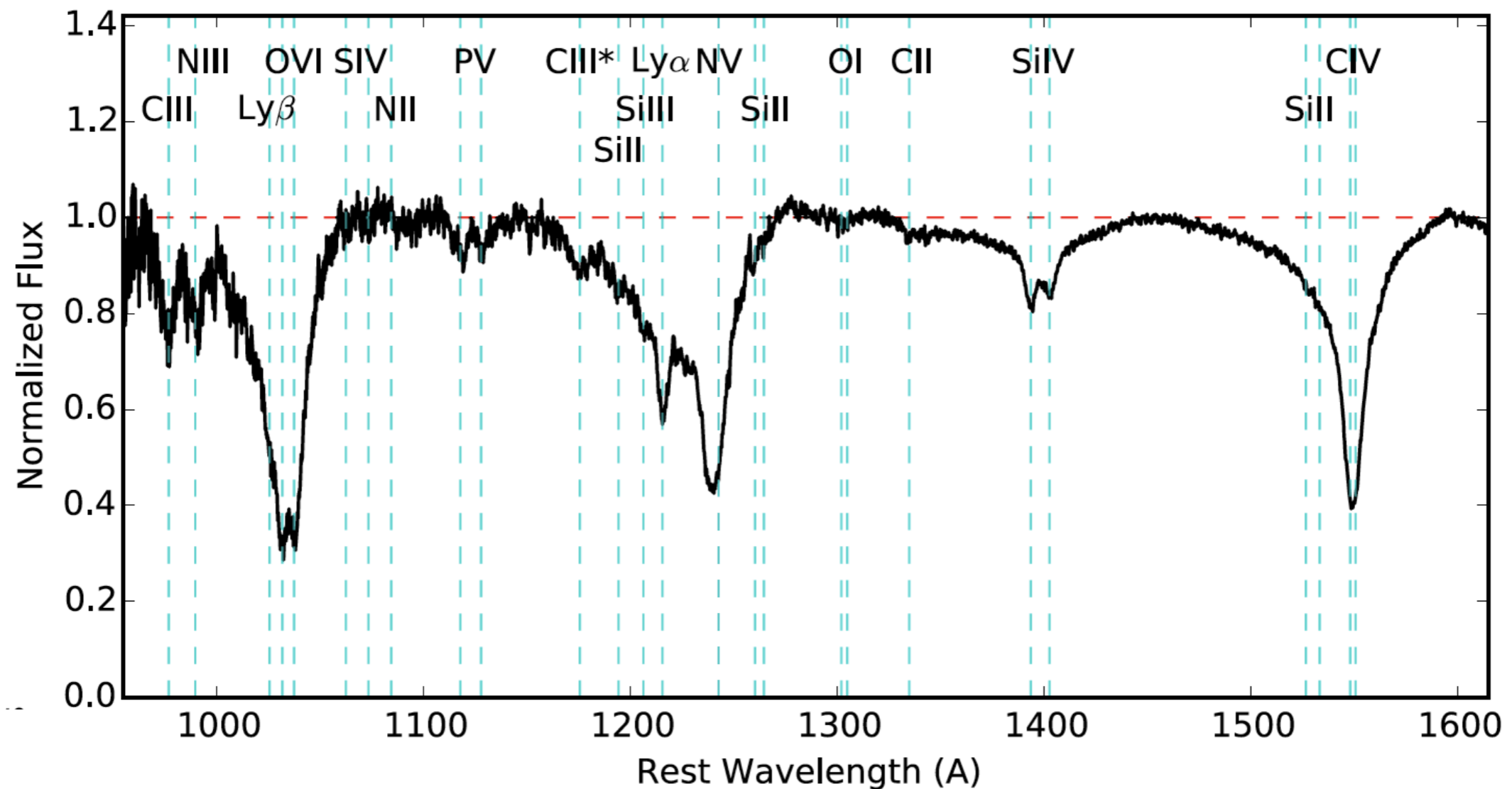


HST/STIS

BAL-like feature
but problematic
identification as
Ly α or N v

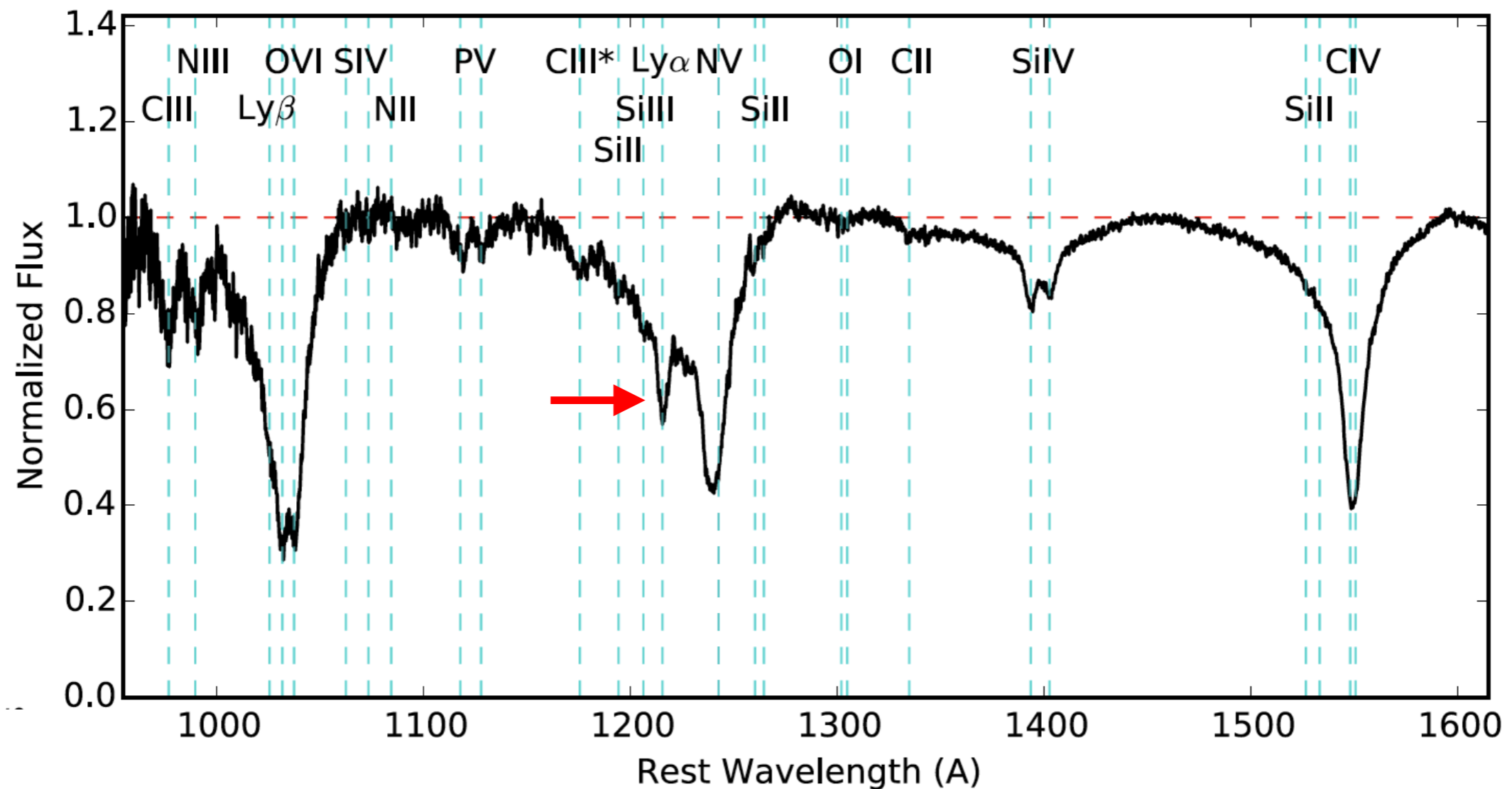
Hamann, Chartas,
Reeves, EN 2018

Physical structure of SMBH winds



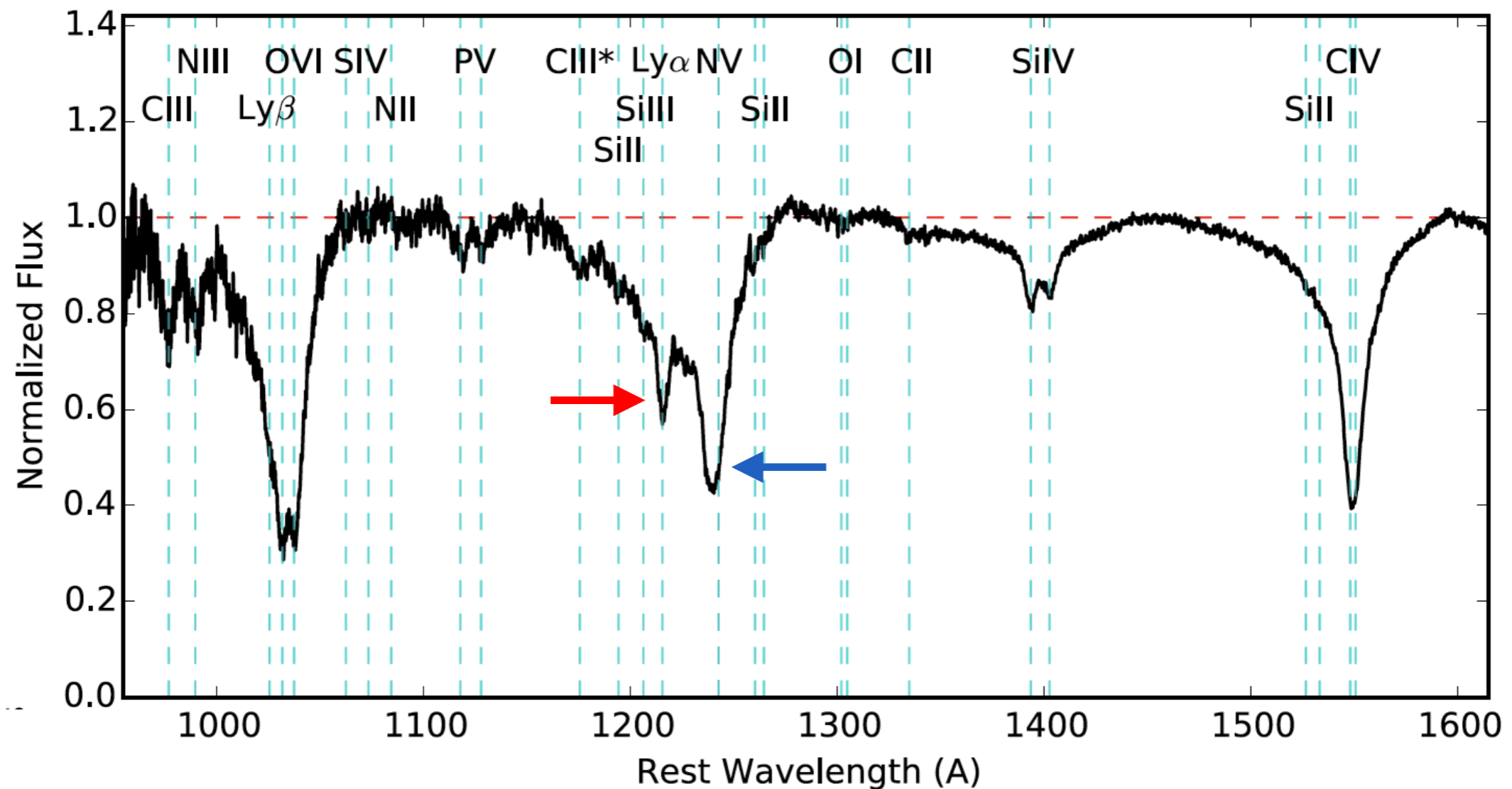
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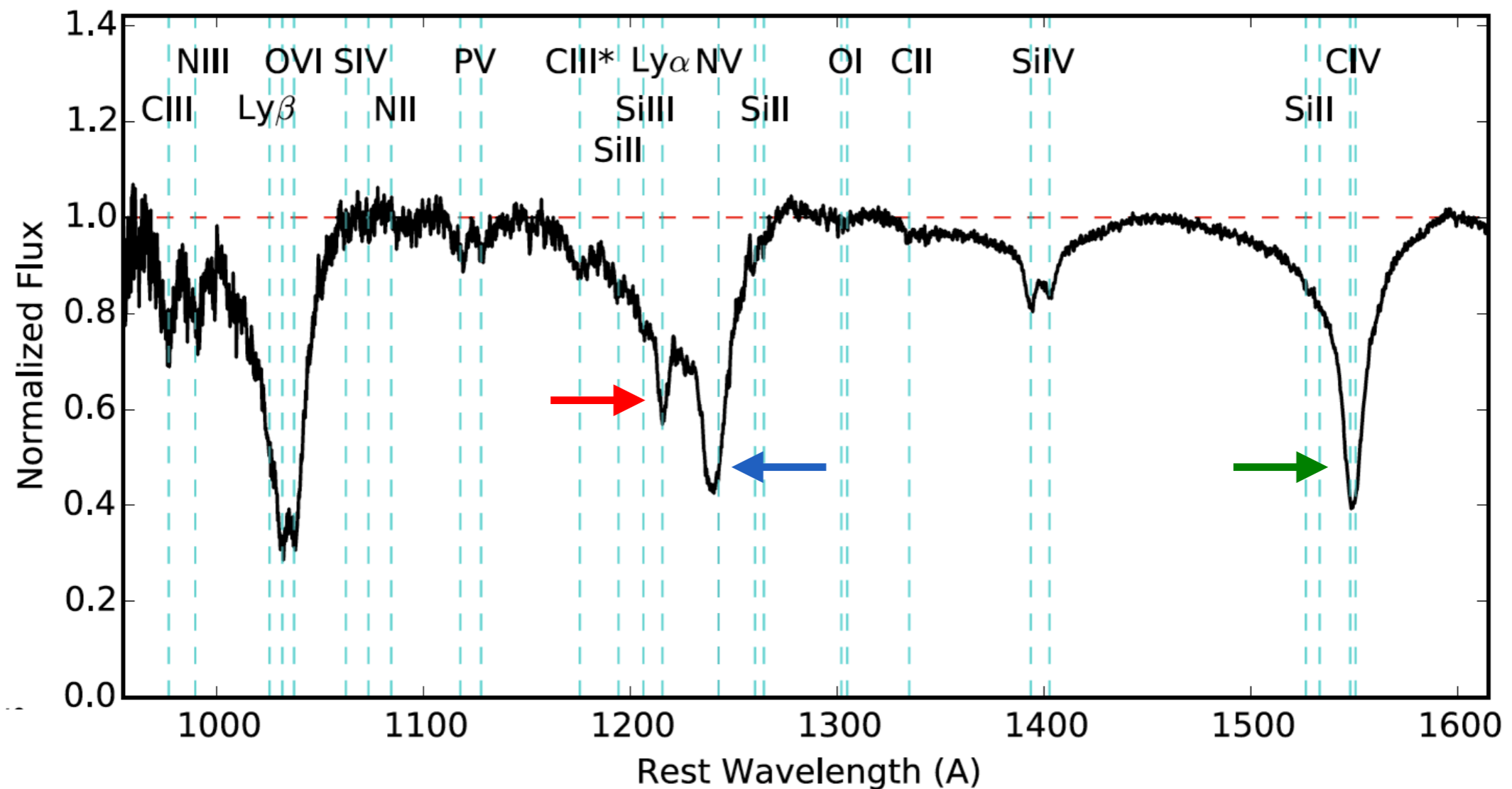
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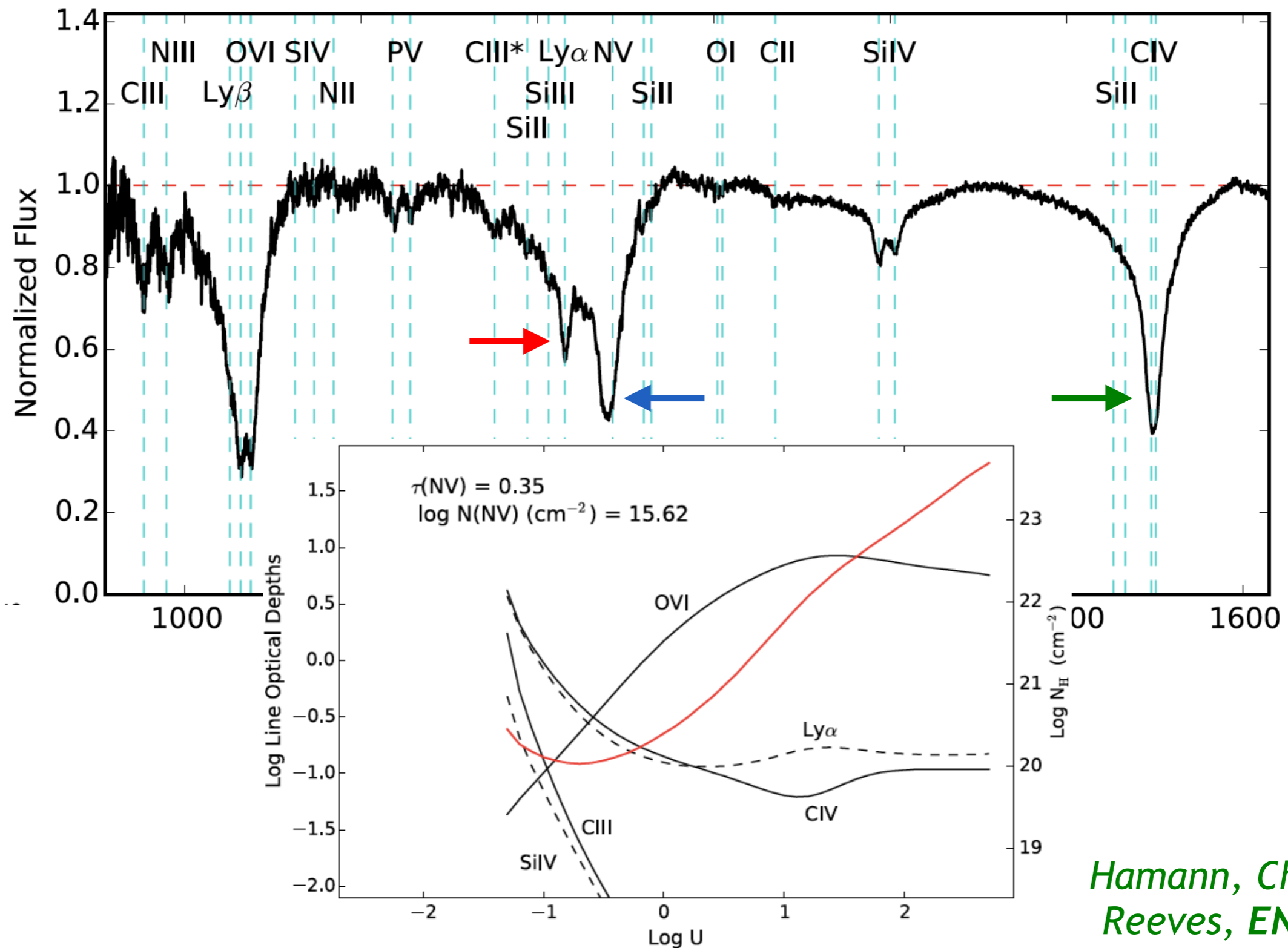
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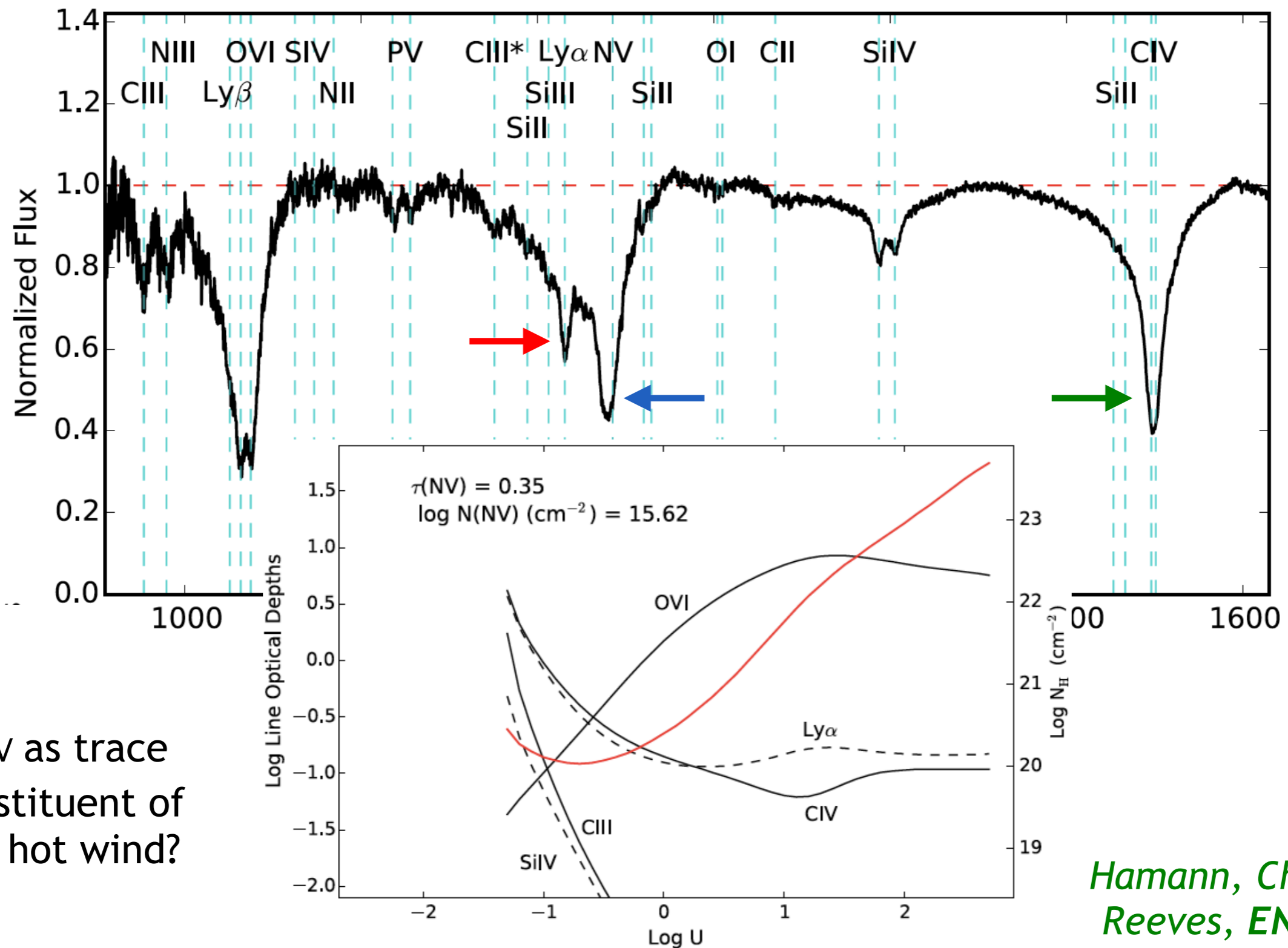
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Physical structure of SMBH winds



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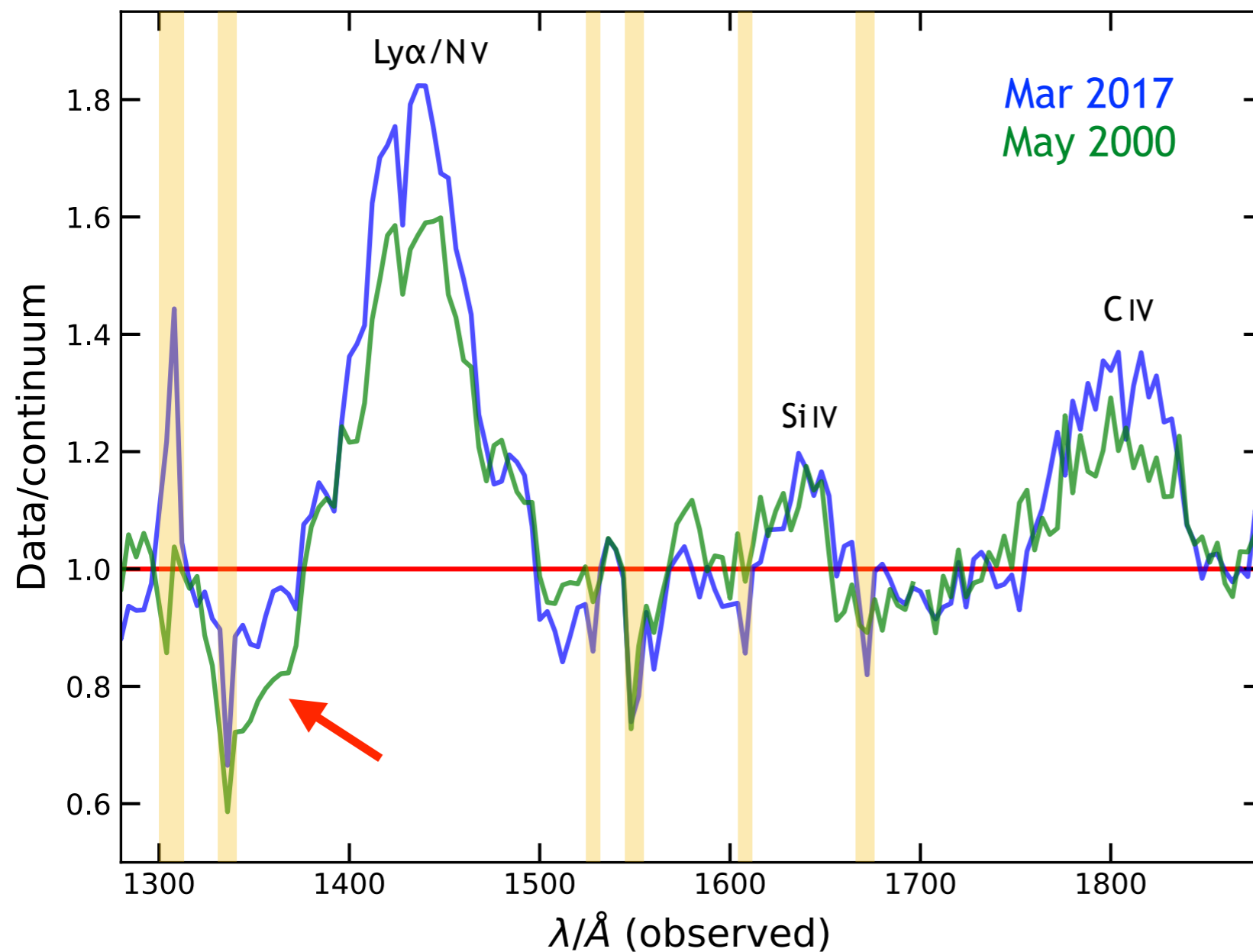
Physical structure of SMBH winds



C IV as trace
constituent of
the hot wind?

*Hamann, Chartas,
Reeves, EN 2018*

Physical structure of SMBH winds

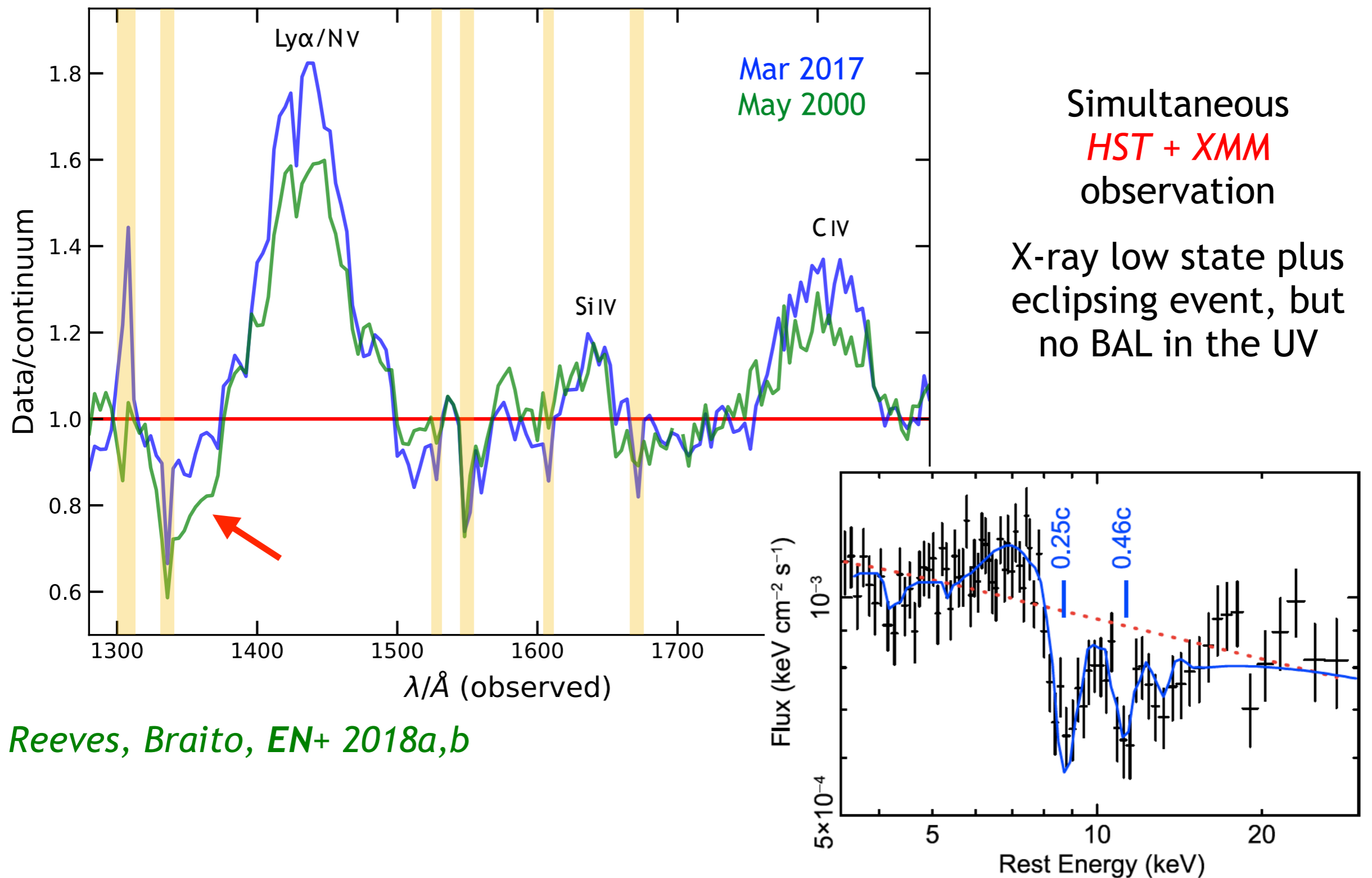


Simultaneous
HST + *XMM*
observation

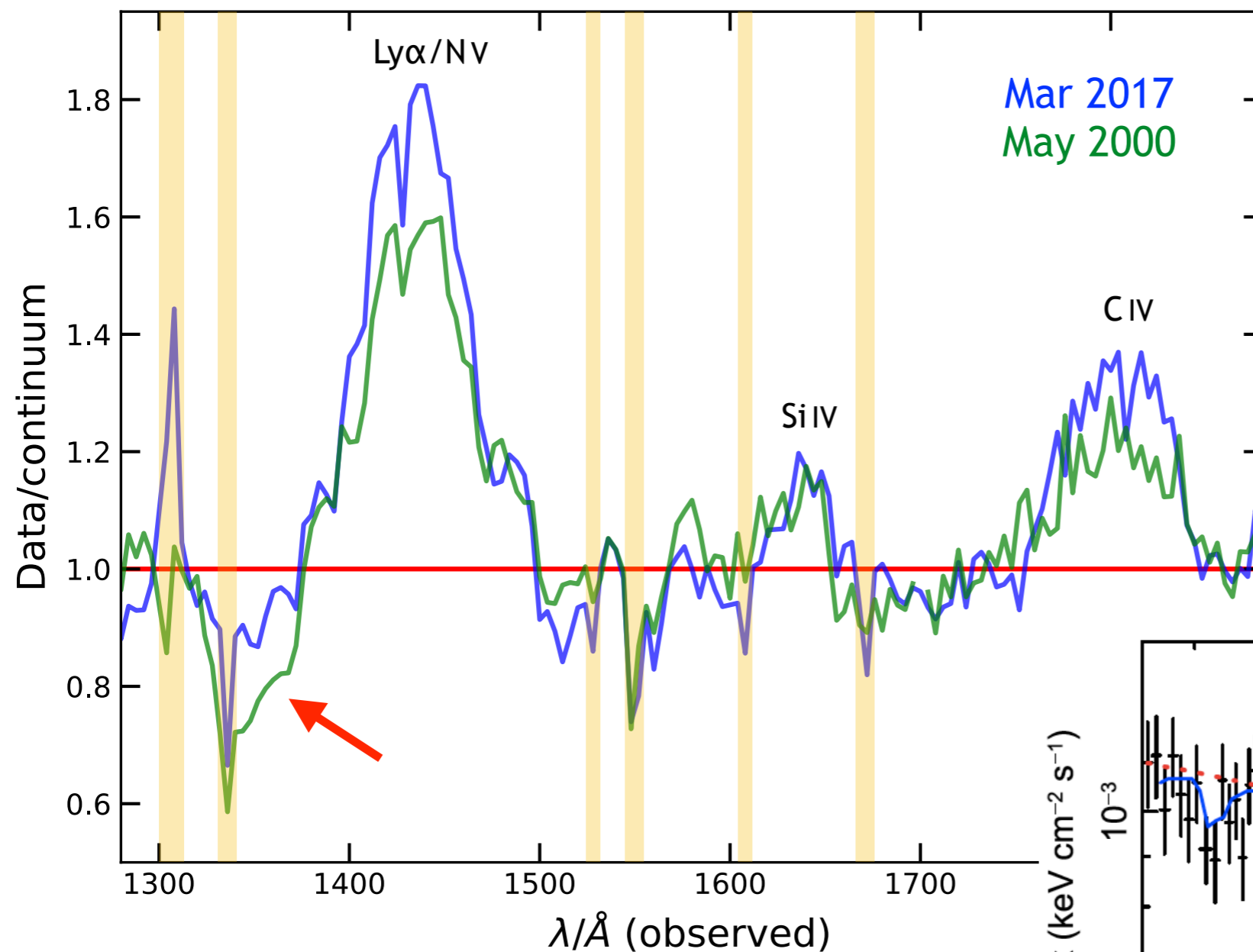
X-ray low state plus
eclipsing event, but
no BAL in the UV

Reeves, Braito, EN+ 2018a,b

Physical structure of SMBH winds



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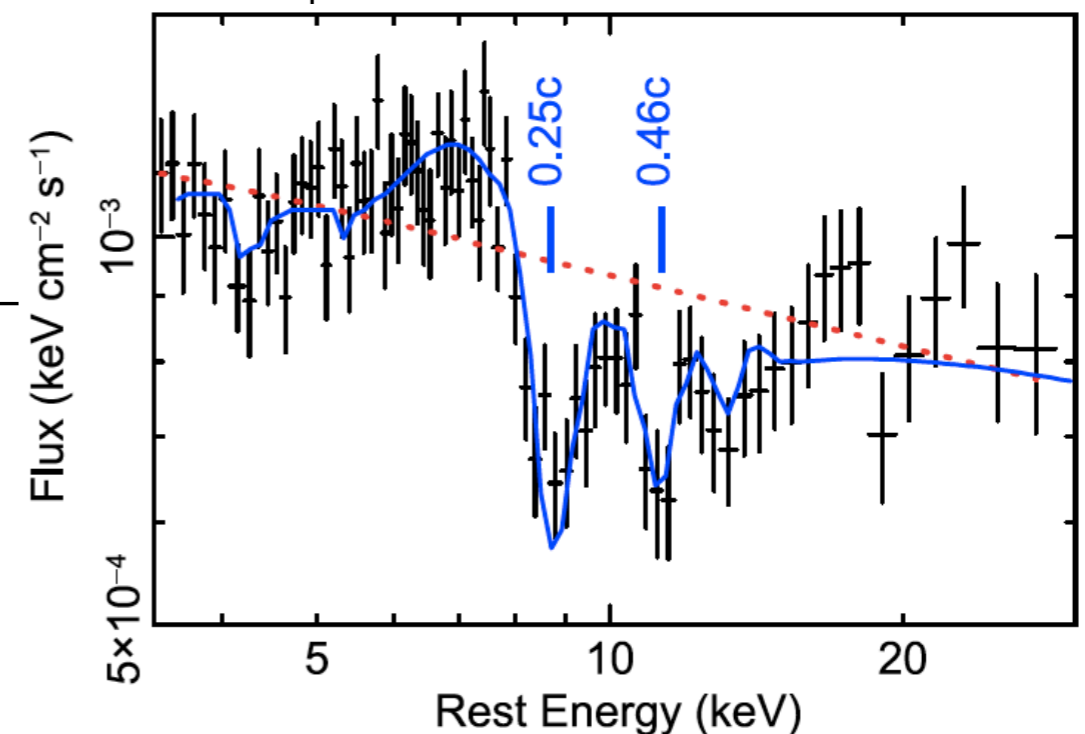


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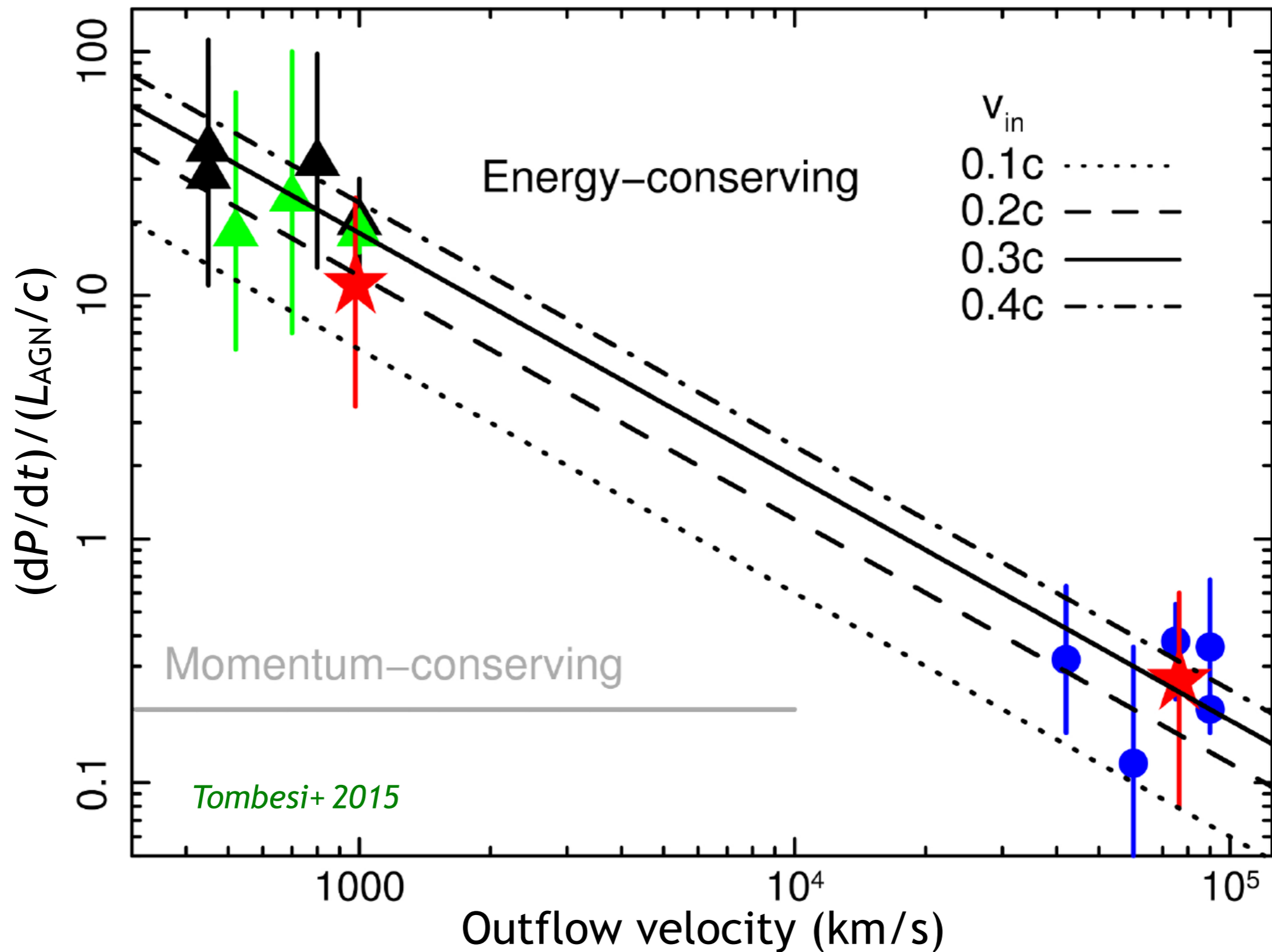
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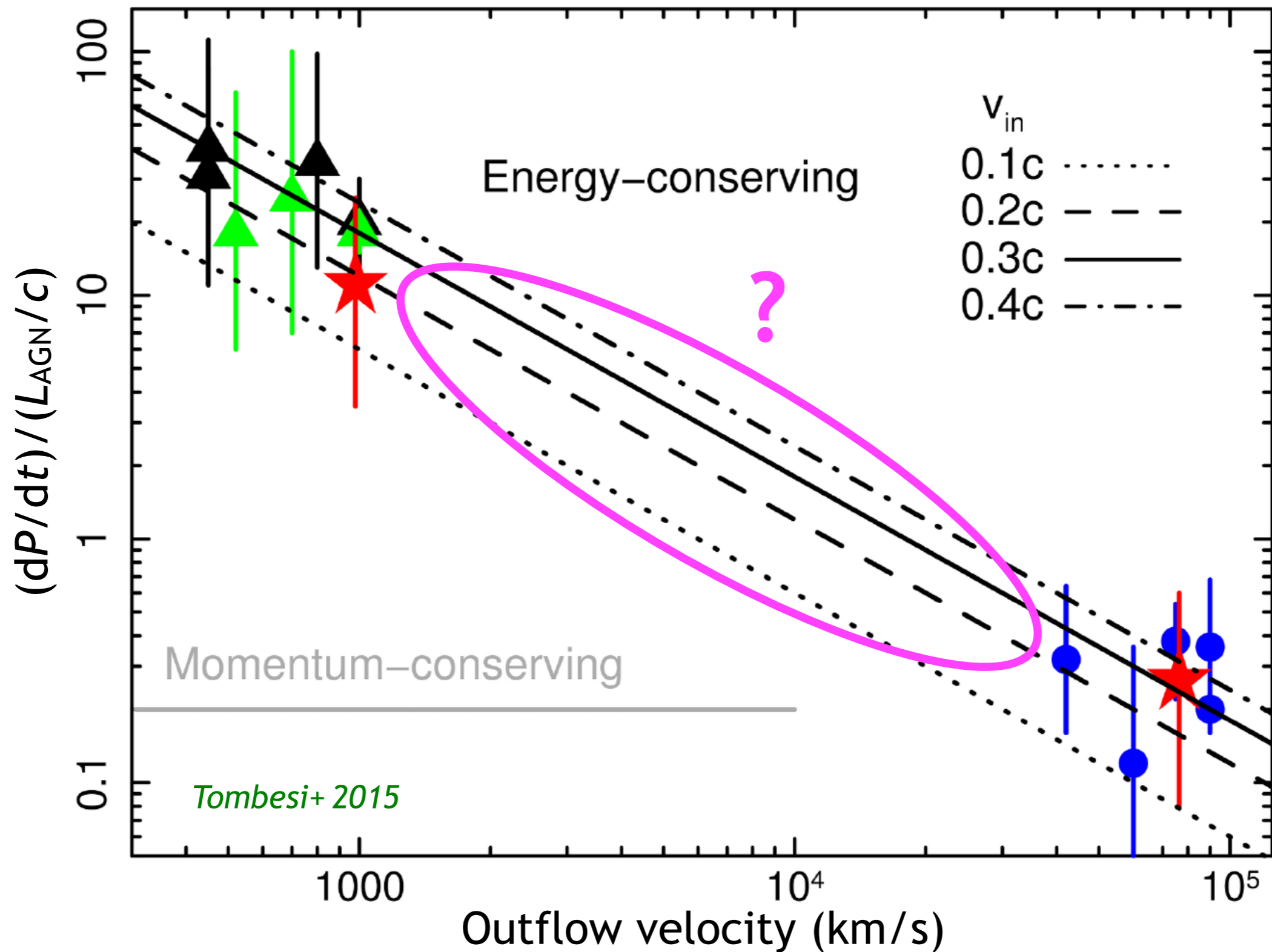
Ionization, delay, source size?



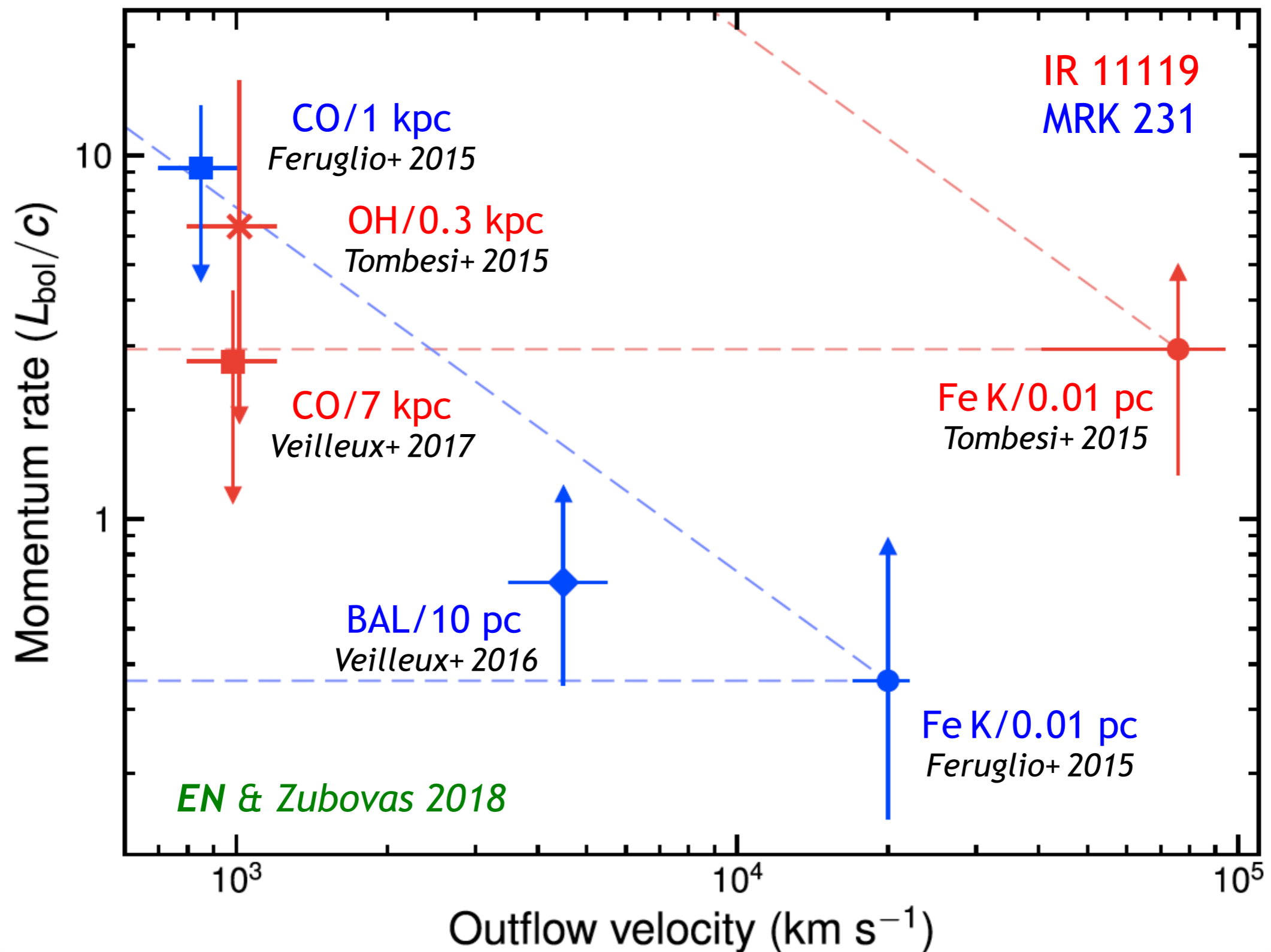
Unification of AGN outflows?



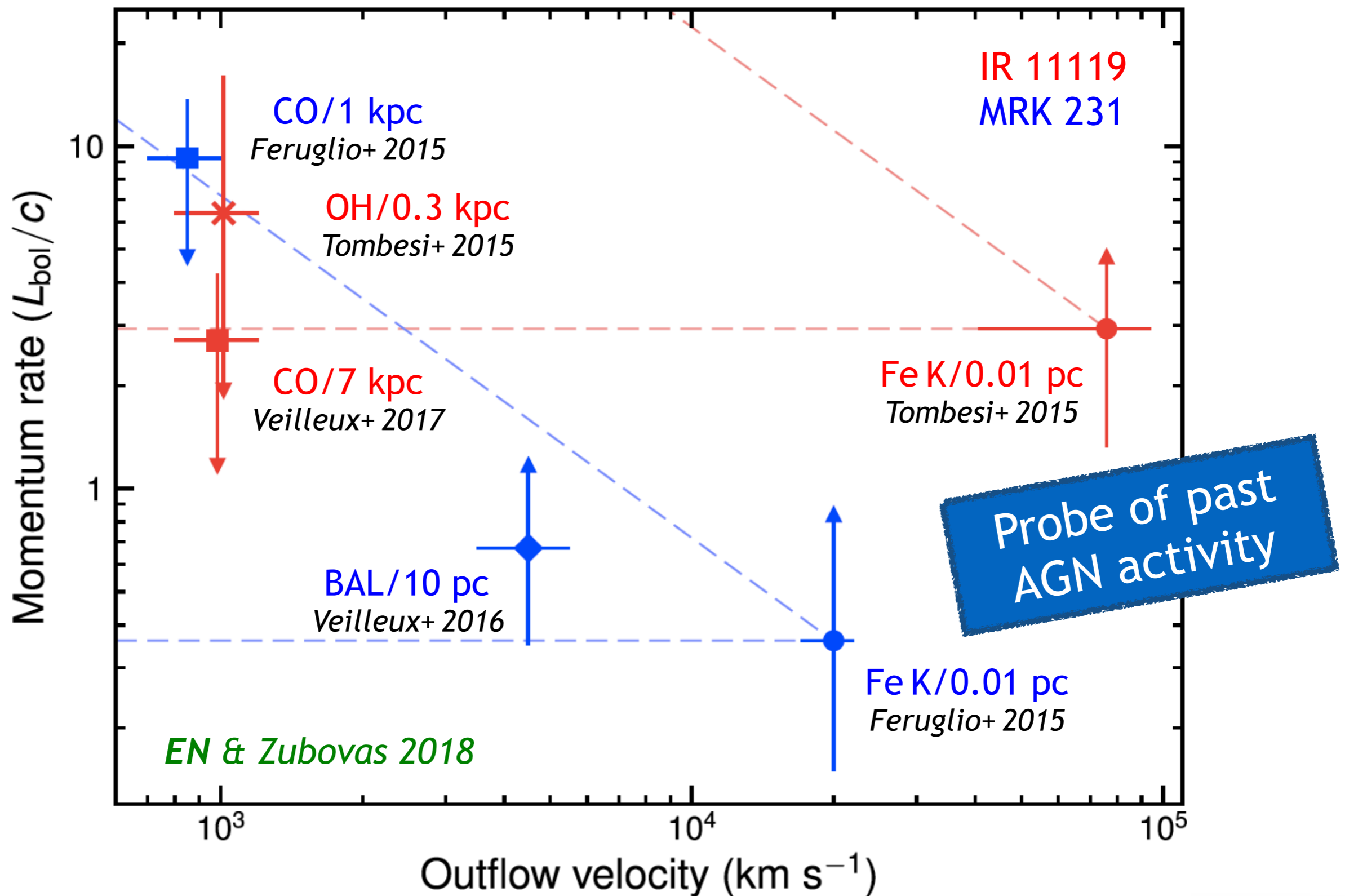
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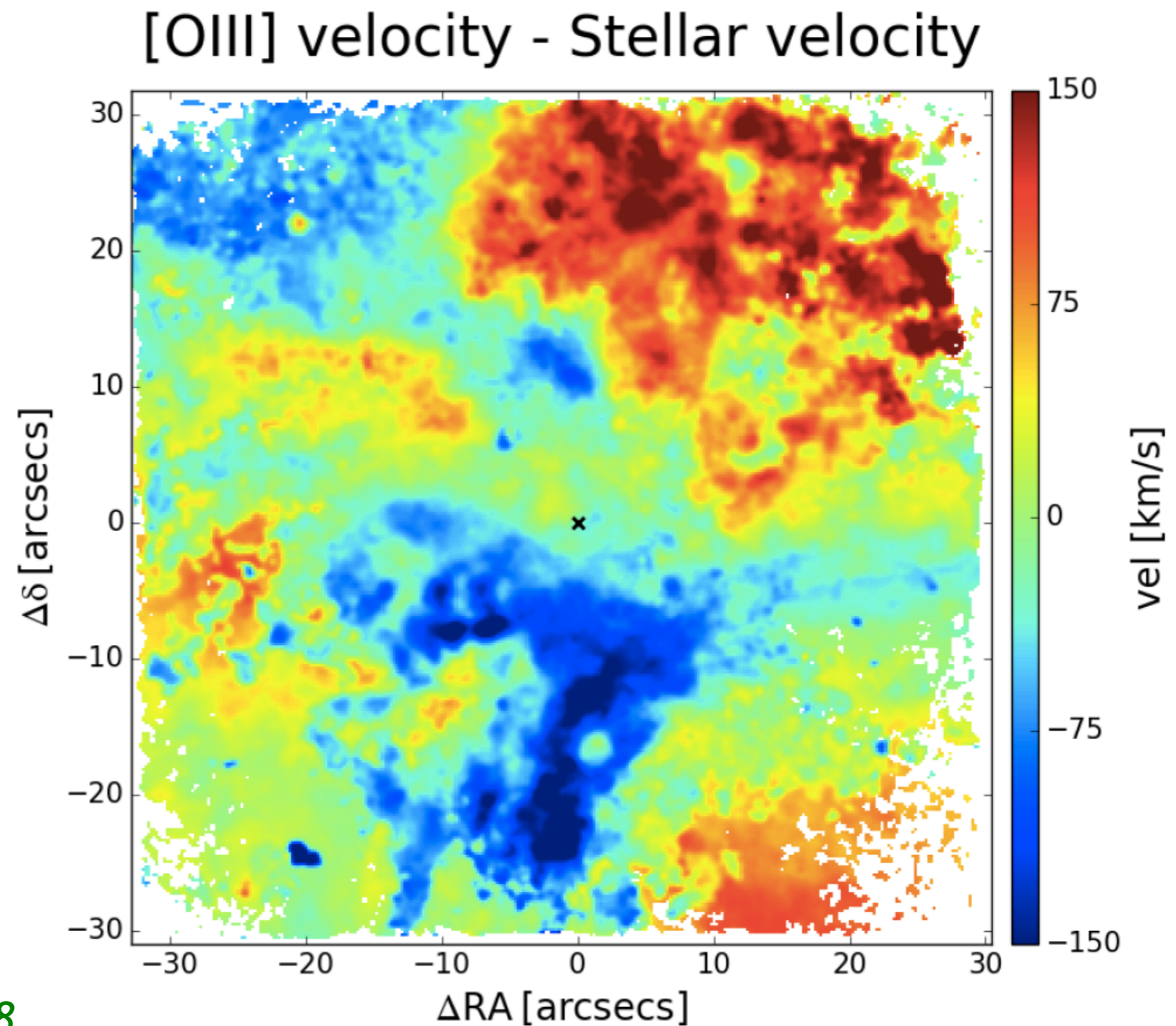


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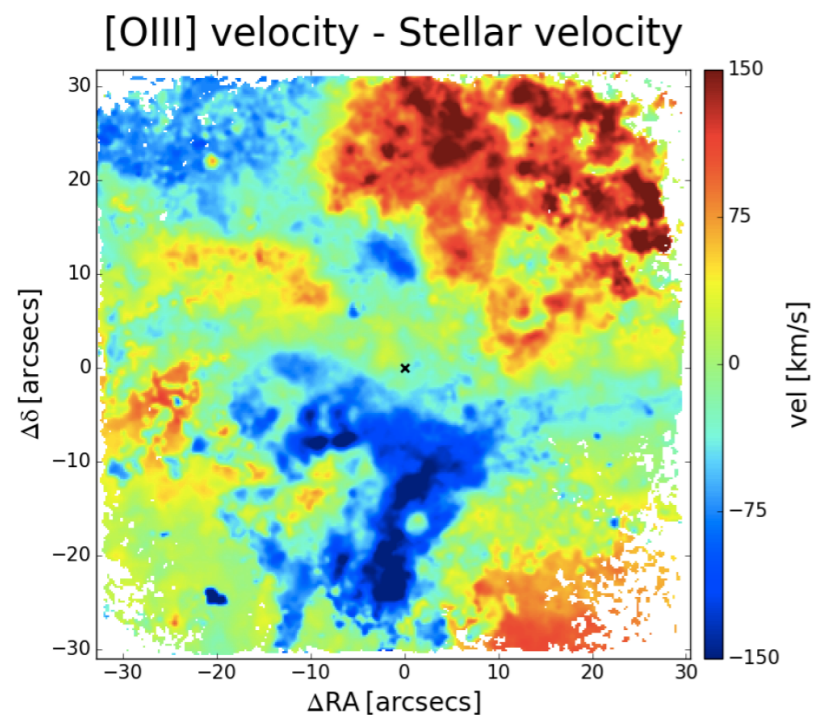
A case study: NGC 1365

MUSE + Chandra
spatially resolved
analysis of local
Seyfert galaxies in
the MAGNUM survey



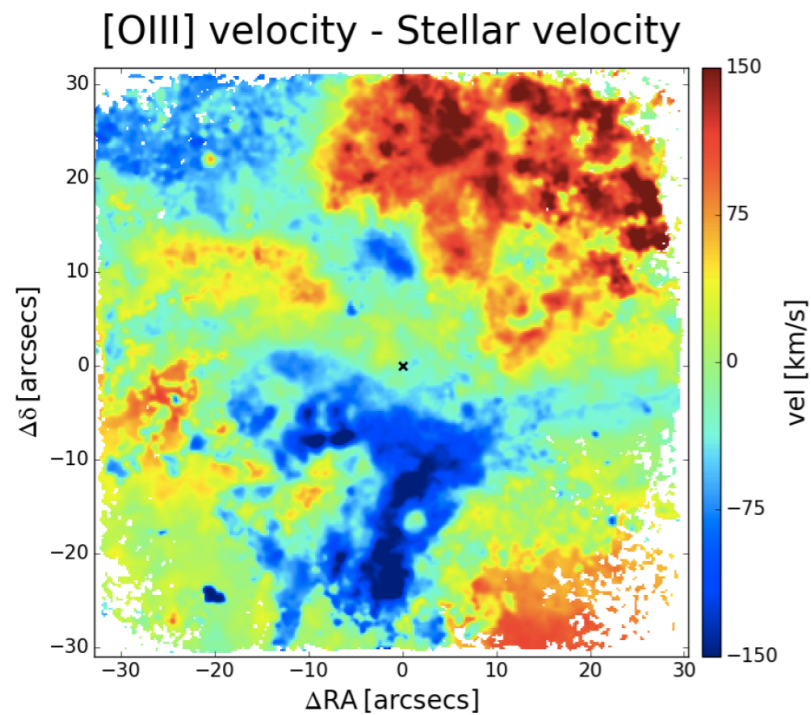
Venturi, EN+ 2018

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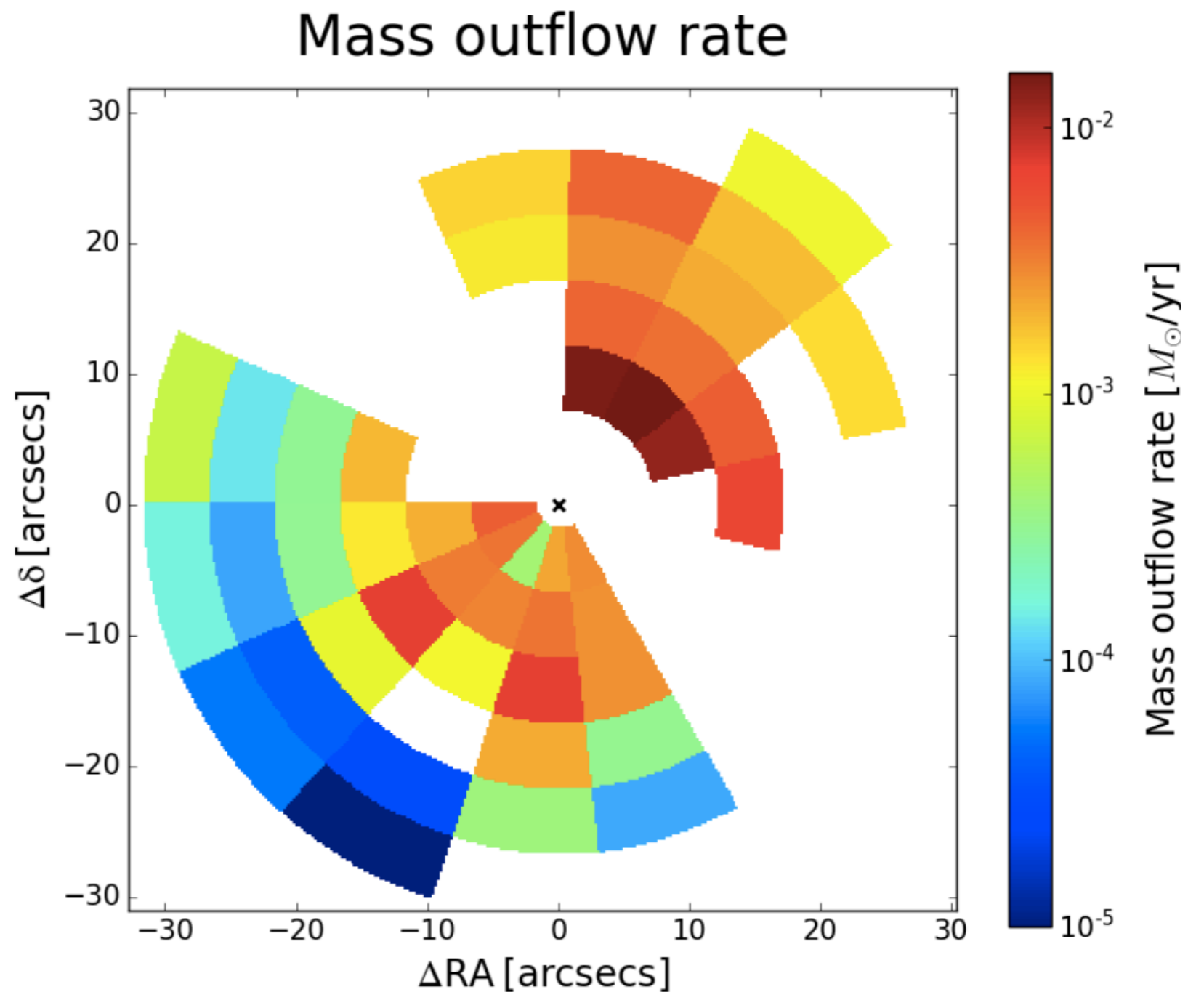
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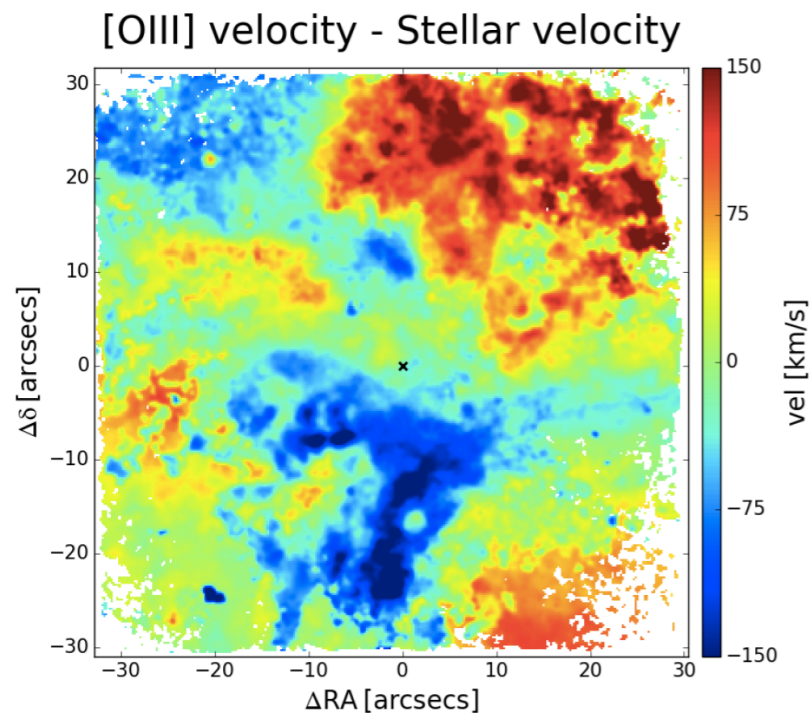


$$\dot{M}_{\text{out}} = \frac{M_{\text{out}} v_{\text{out}}}{\Delta R}$$

Venturi, EN+ 2018

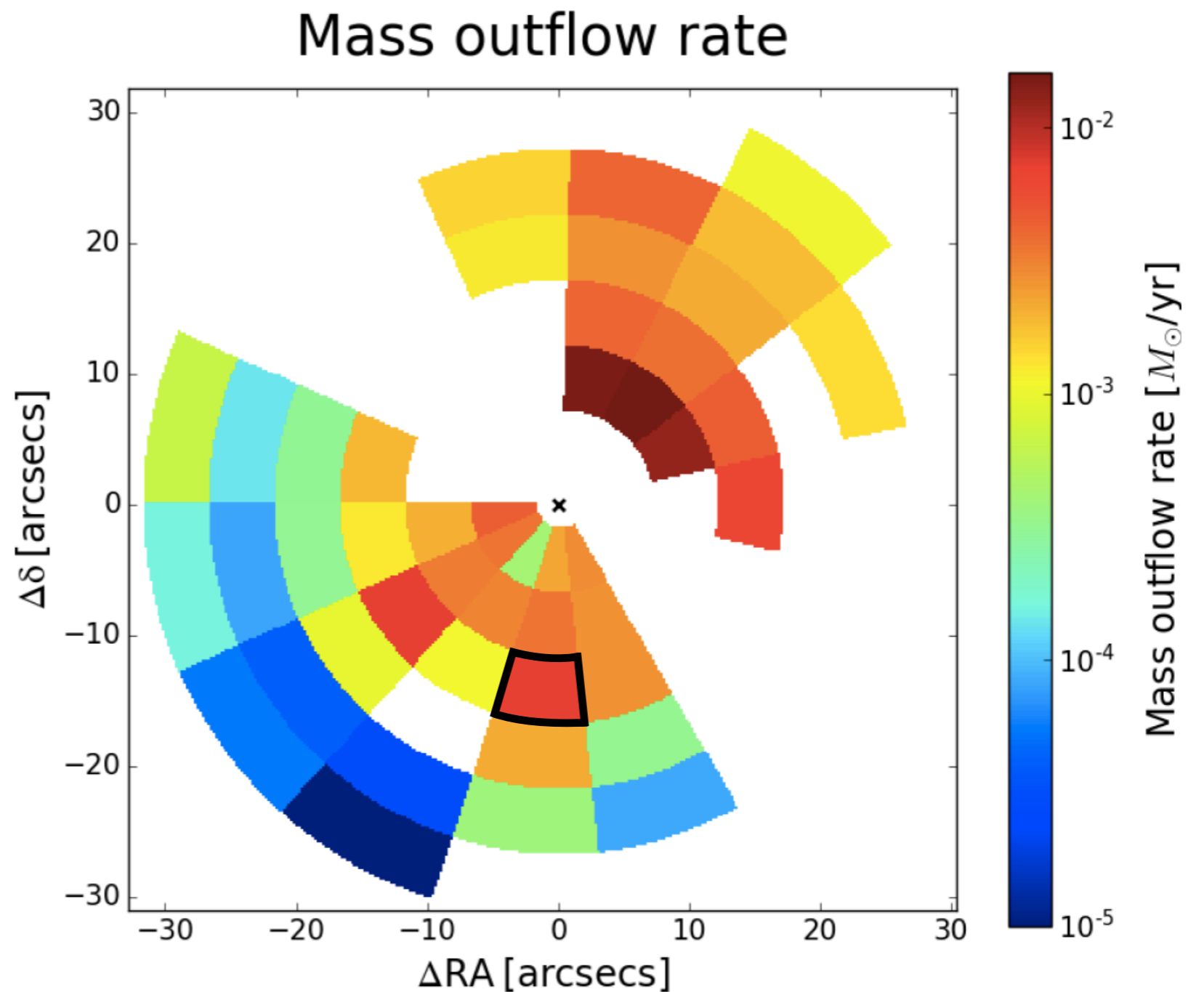


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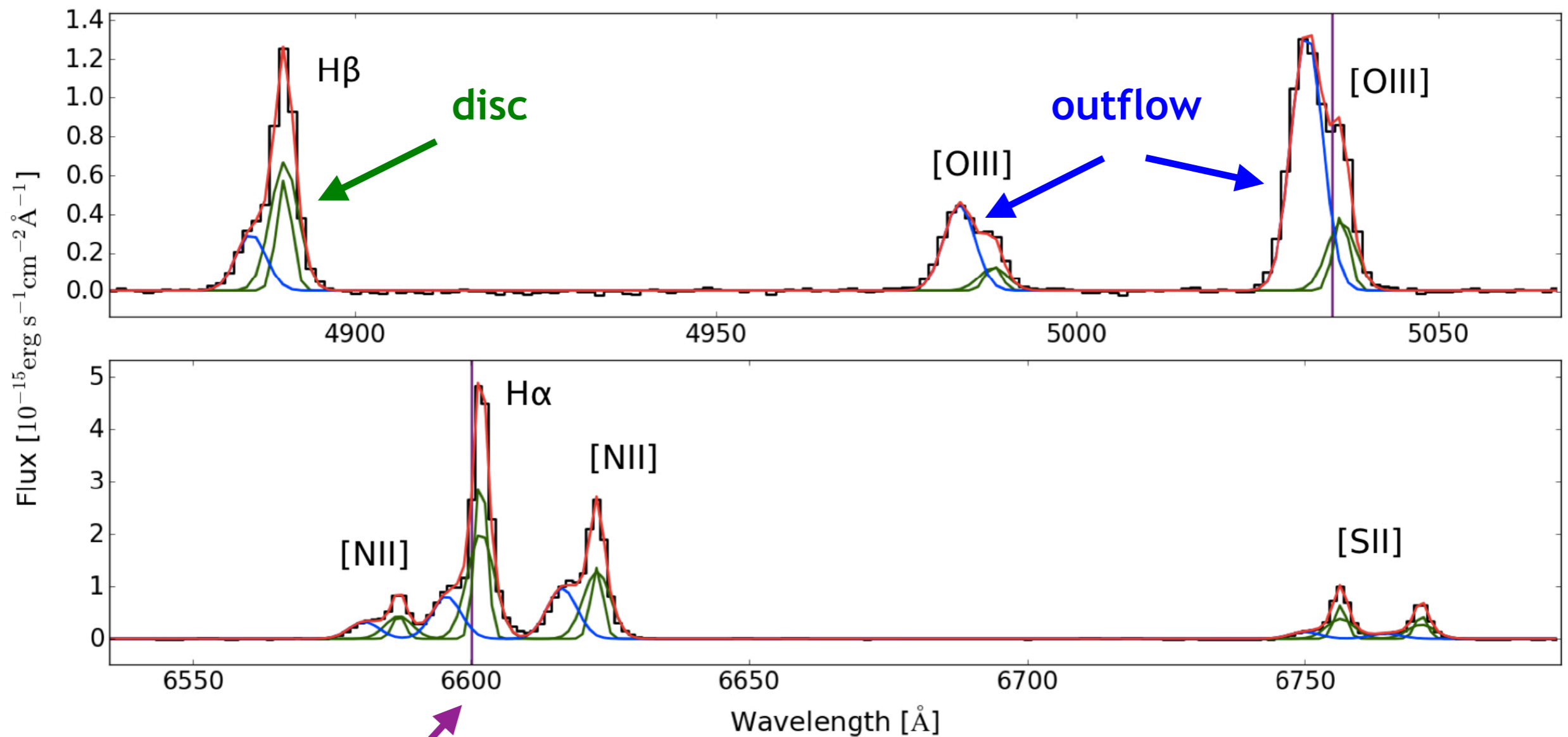


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Venturi, EN+ 2018



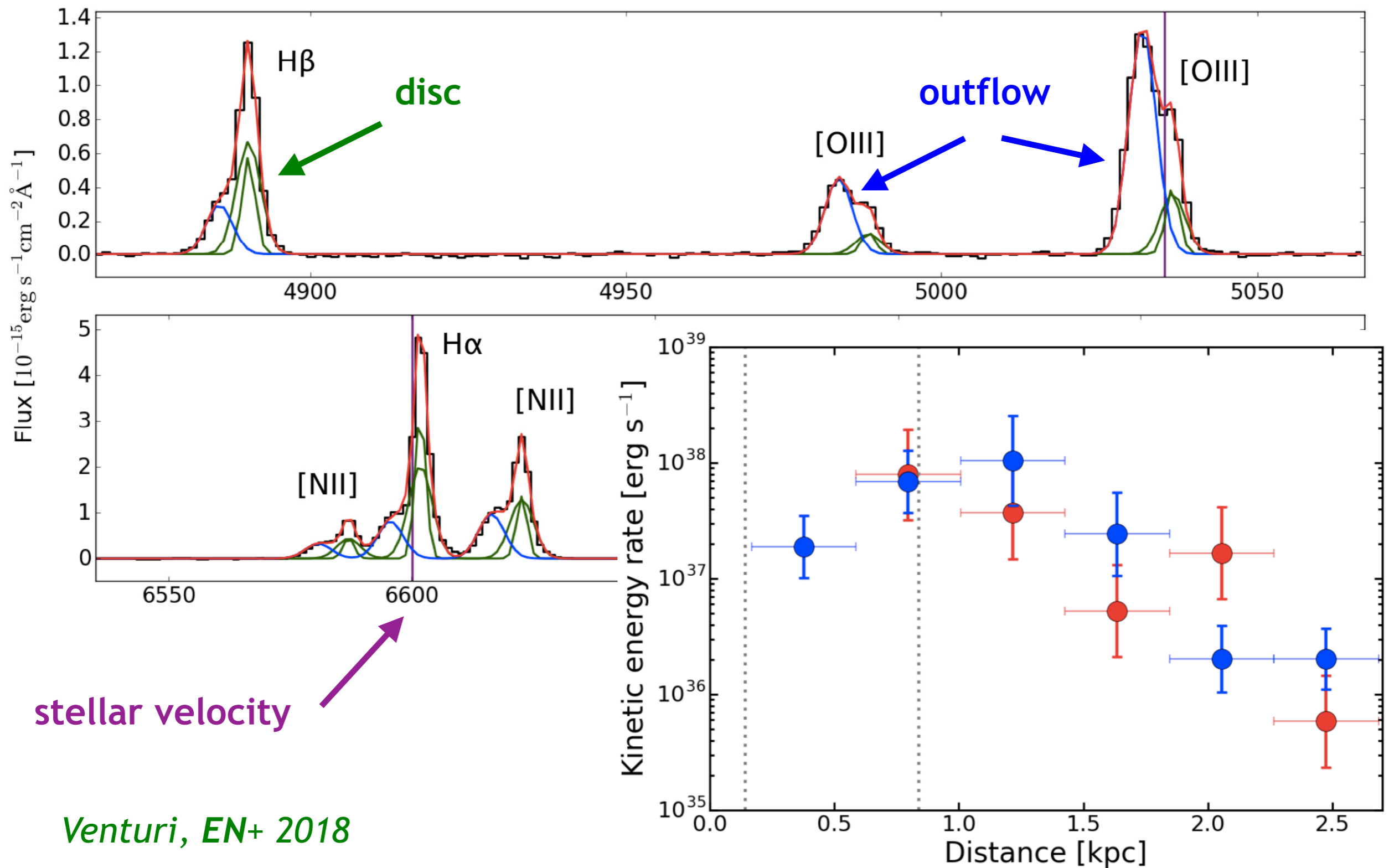
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stellar velocity

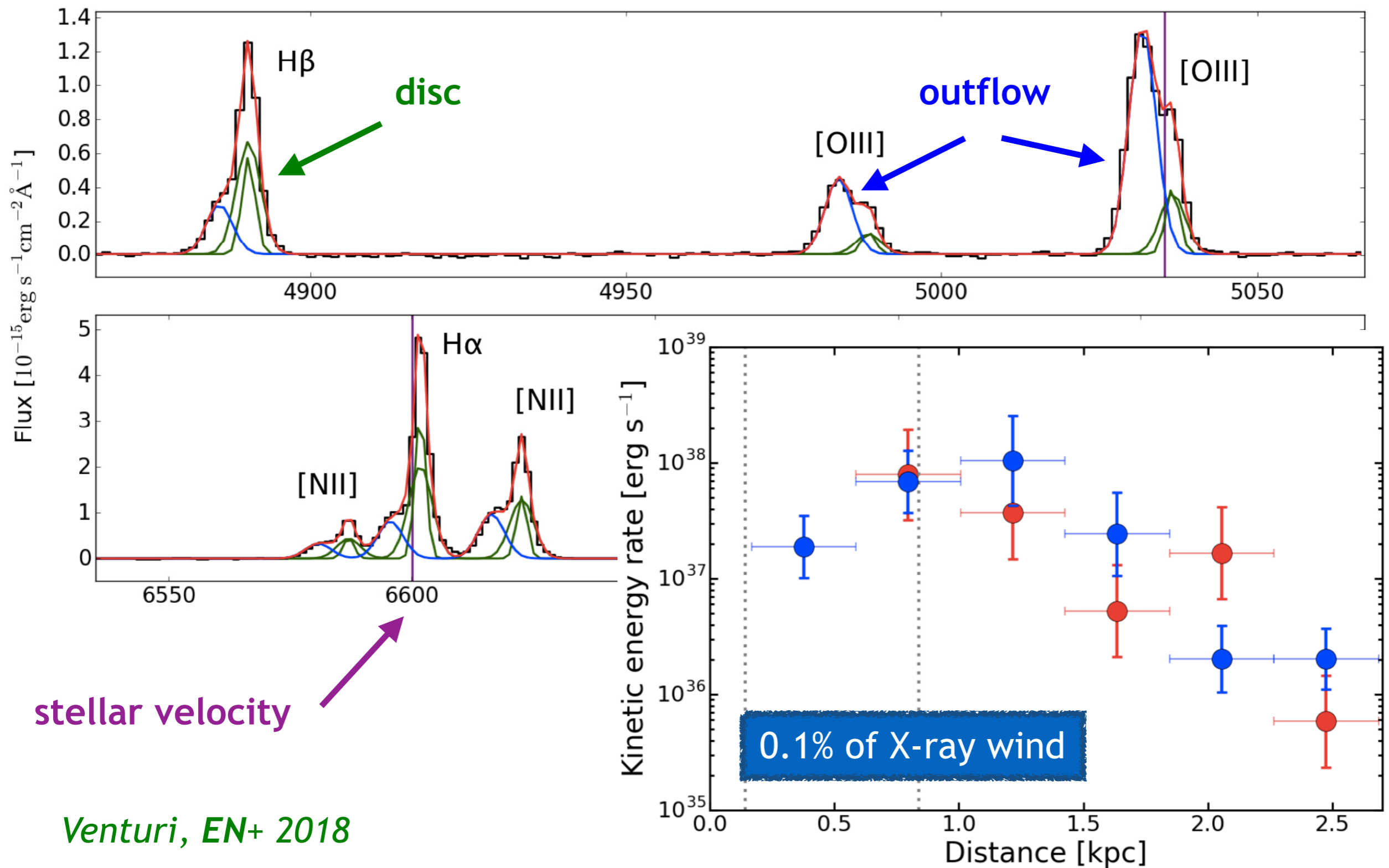
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Venturi, EN+ 2018

Work in progress

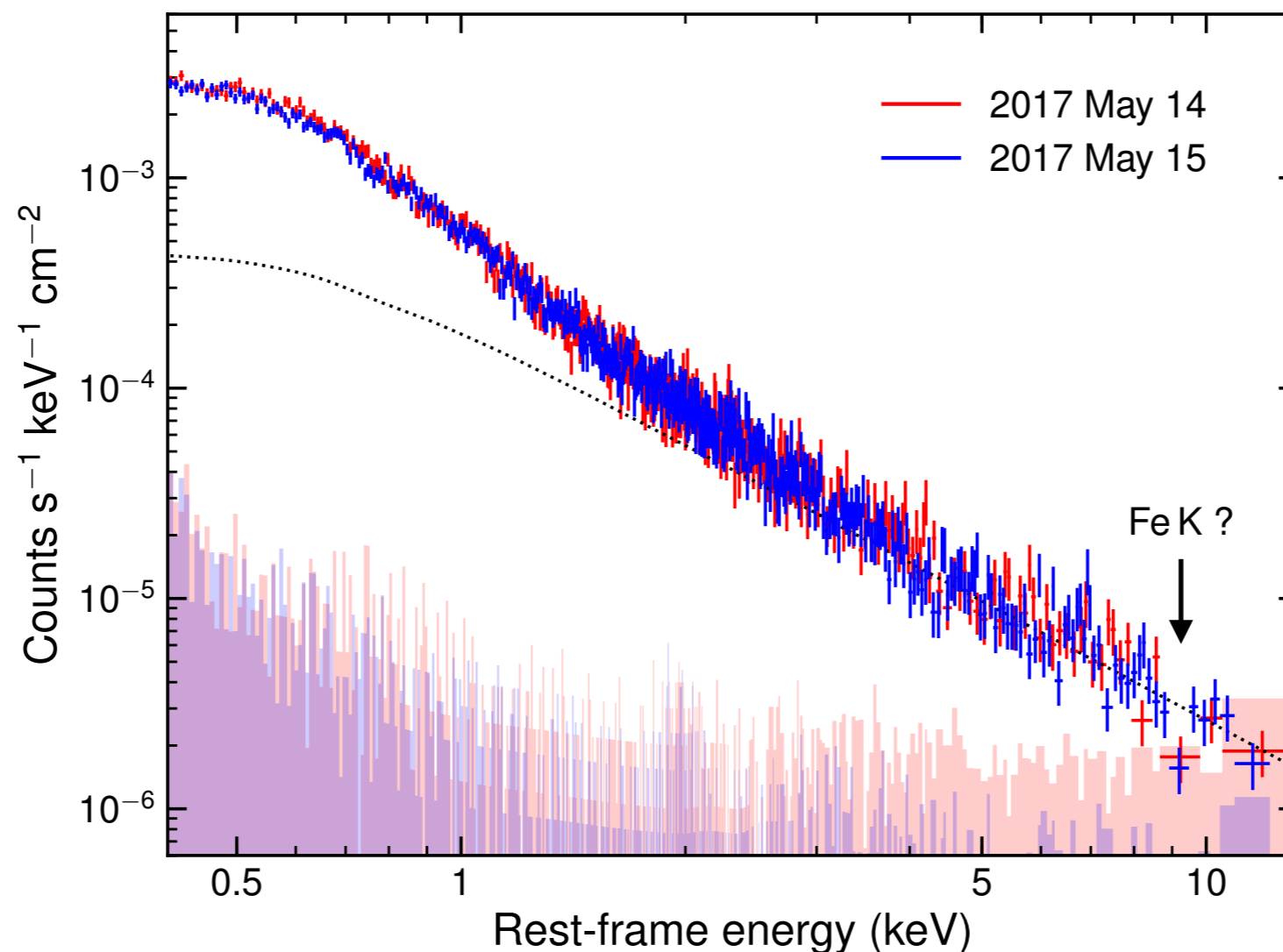
★ An informed quest for ultra-fast X-ray winds

Identification of sources in the ‘X-ray blow-out’ evolutionary phase through multi-wavelength indicators

Work in progress

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EN+ subm.

Work in progress

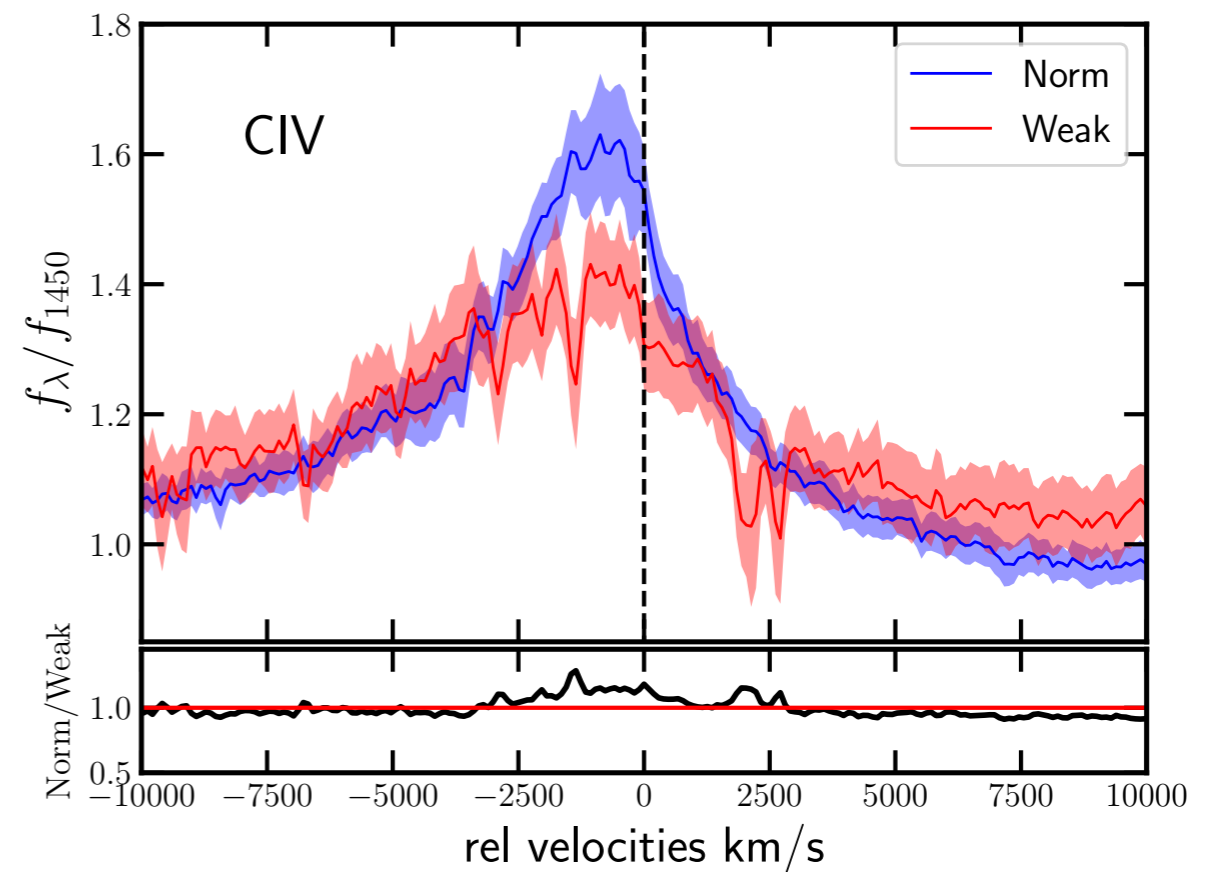
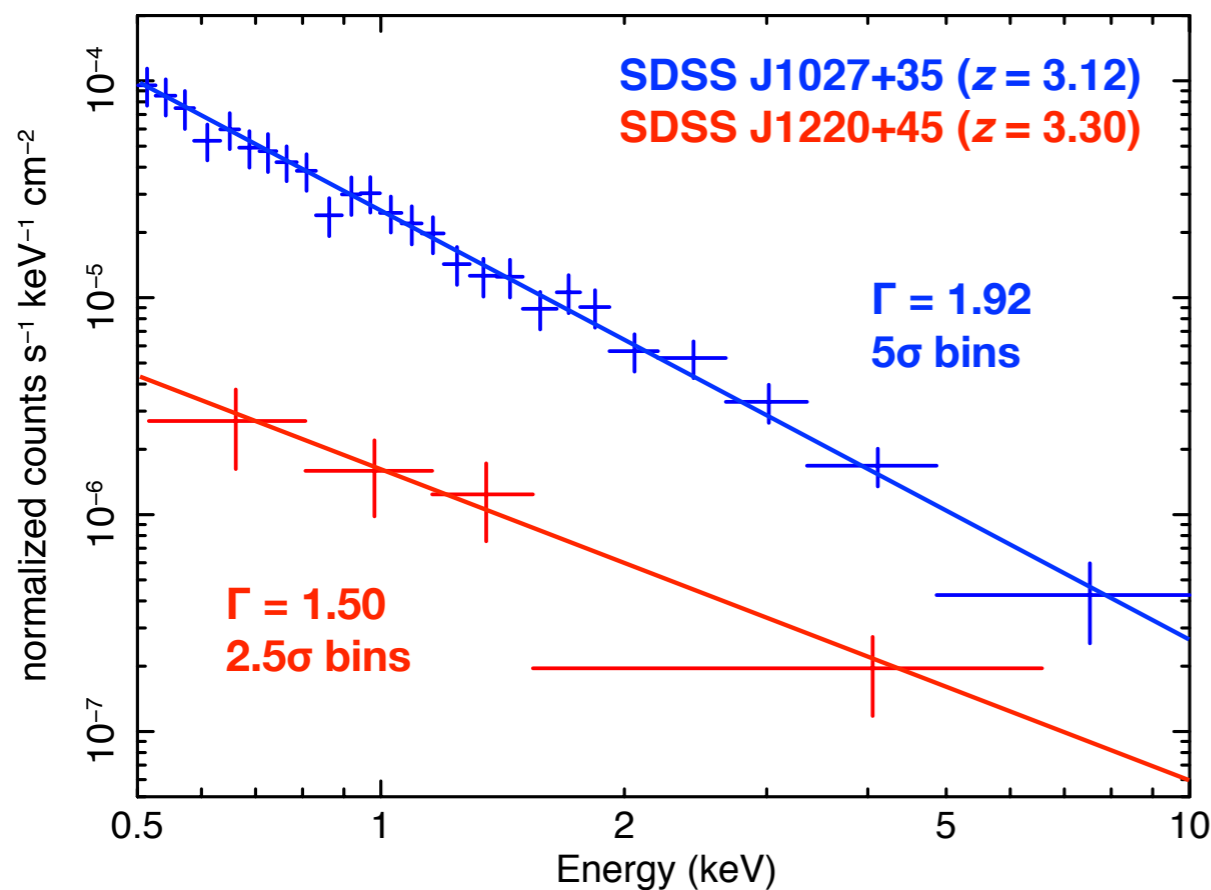
★ A new population of X-ray weak quasars

Unexpectedly large fraction of X-ray weak sources in a sample of 30 optically blue quasars at $z = 3$: evidence for winds?

Work in progress

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EN+ in prep.

Work in progress

★ Nuclear activity in Brightest Cluster Galaxies

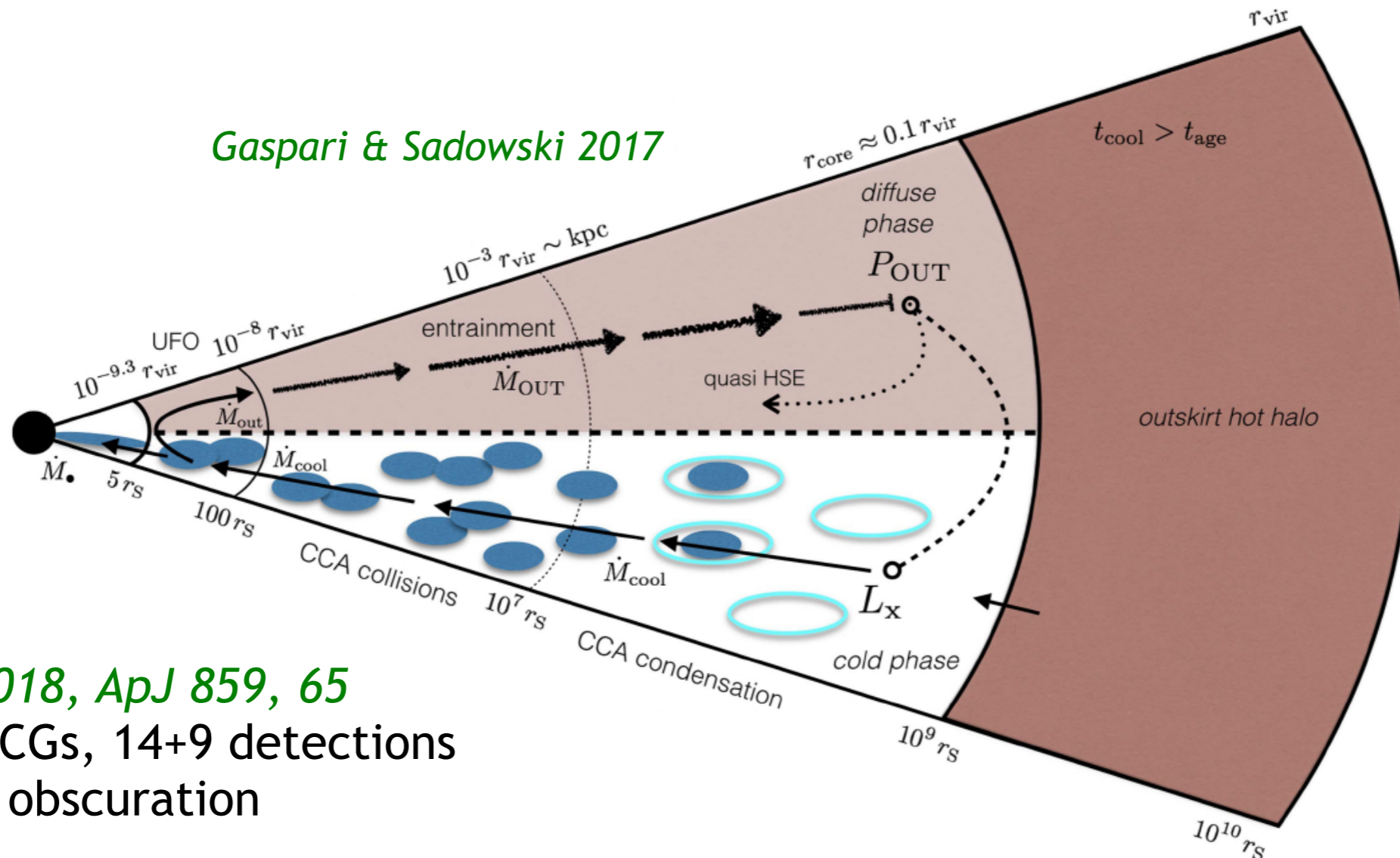
Study of the X-ray properties of massive, low-activity systems to test the AGN feedback models on the largest scales

Work in progress

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Study of the X-ray properties of massive, low-activity systems to test the AGN feedback models on the largest scales

Gaspari & Sadowski 2017



Yang+ 2018, ApJ 859, 65

81+51 BCGs, 14+9 detections
hints of obscuration

Work in progress

★ Joint *MUSE/Chandra* view of obscured AGN

Comparison between outflowing NLR components, diffuse soft X-ray emission and morphology of the ionization cones

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