MegaSaura: a spectroscopic sample of lensed starbursts at Cosmic Noon — and one particularly interesting member

T. E. Rivera-Thorsen[1] with Håkon Dahle[1], Max Grönke[2], Matt Bayliss[3], Jane Rigby[4], the SGAS collaboration

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MegaSaura

A spectroscopic sample of lensed starbursts at Cosmic Noon[1]

- **Backbone: Magellan/MagE spectra**
- Two selection effects: Lensing and rest-frame UV brightness
- UV Brightness makes it reasonably comparable to e.g. (e)LARS
- Ambition: Apples-to-apples comparison with (e)LARS, GPs and other local samples
- A few galaxies added to the sample after initial announcement, including the Sunburst

[1] Rigby+ 2018a,b

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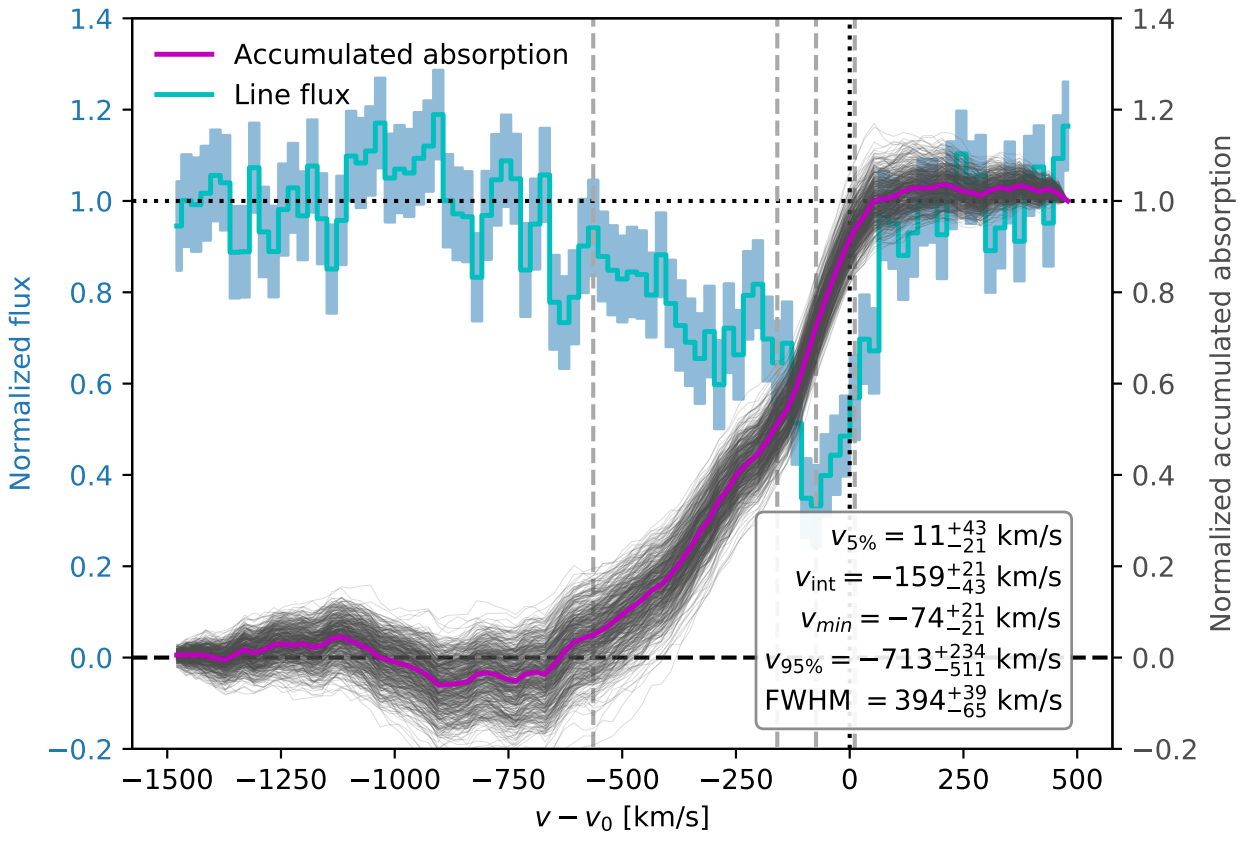
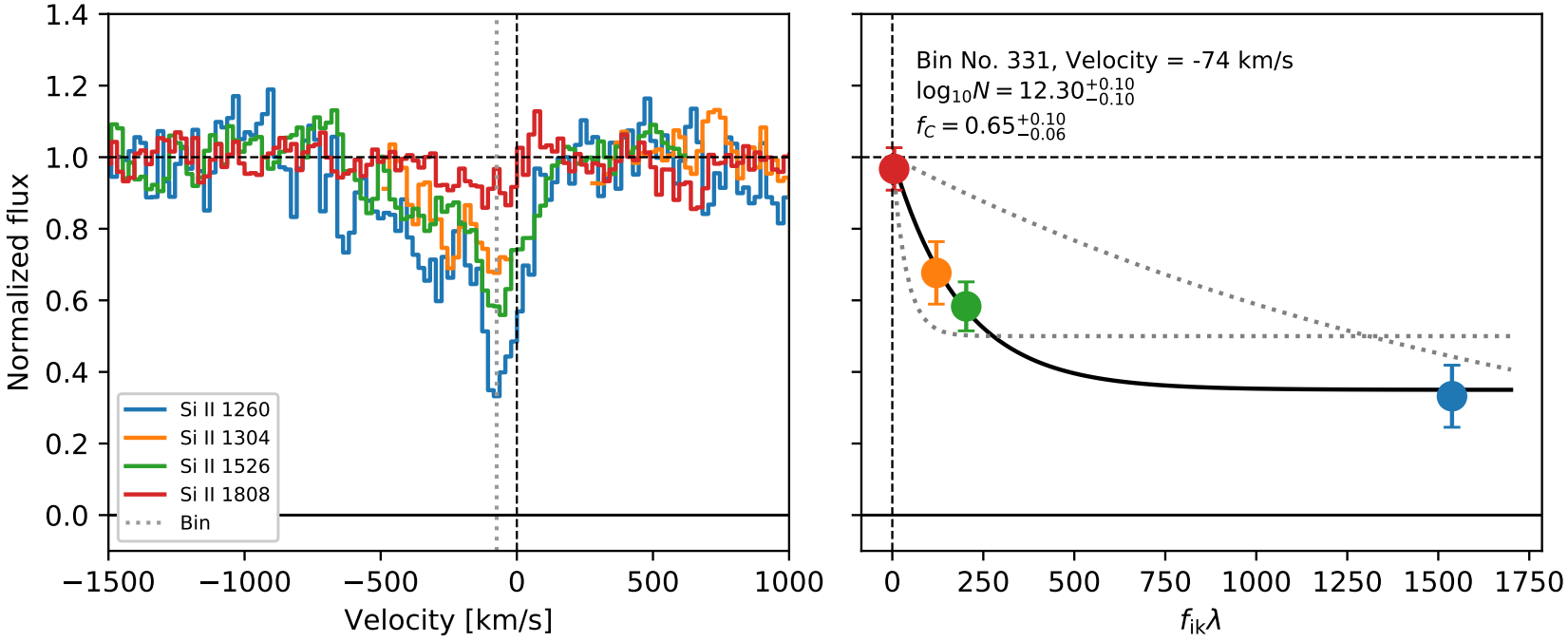
Preliminary analysis: Kinematics



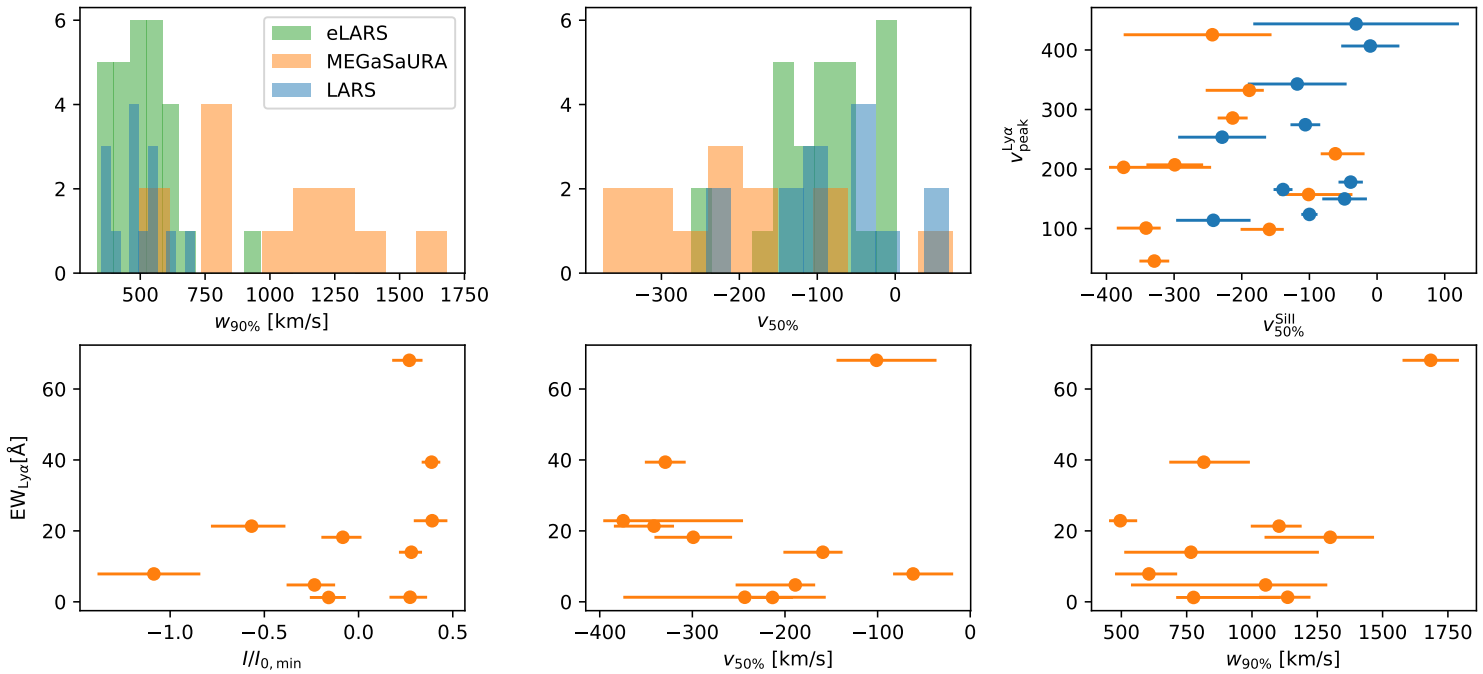
Example kinematic measurements: SGAS J090000+2234

Preliminary analysis: Apparent optical depth



Example AOD fitting: SGAS J090000+2234

First results: Strong winds, somewhat weaker absorption lines



Initial results of Megasaura and (e)LARS

The “Sunburst Arc”
PSZ1-ARC G311.6602–18.4624

The largest and brightest known lensed galaxy

- ~ 1.3 **Mag brighter than the nearest competitor**
- **Extends over 55″ on the sky**
- **Likely to also intrinsically be very bright**
- **Preliminary lens models suggest an extremely fortunate alignment between lens and galaxy**

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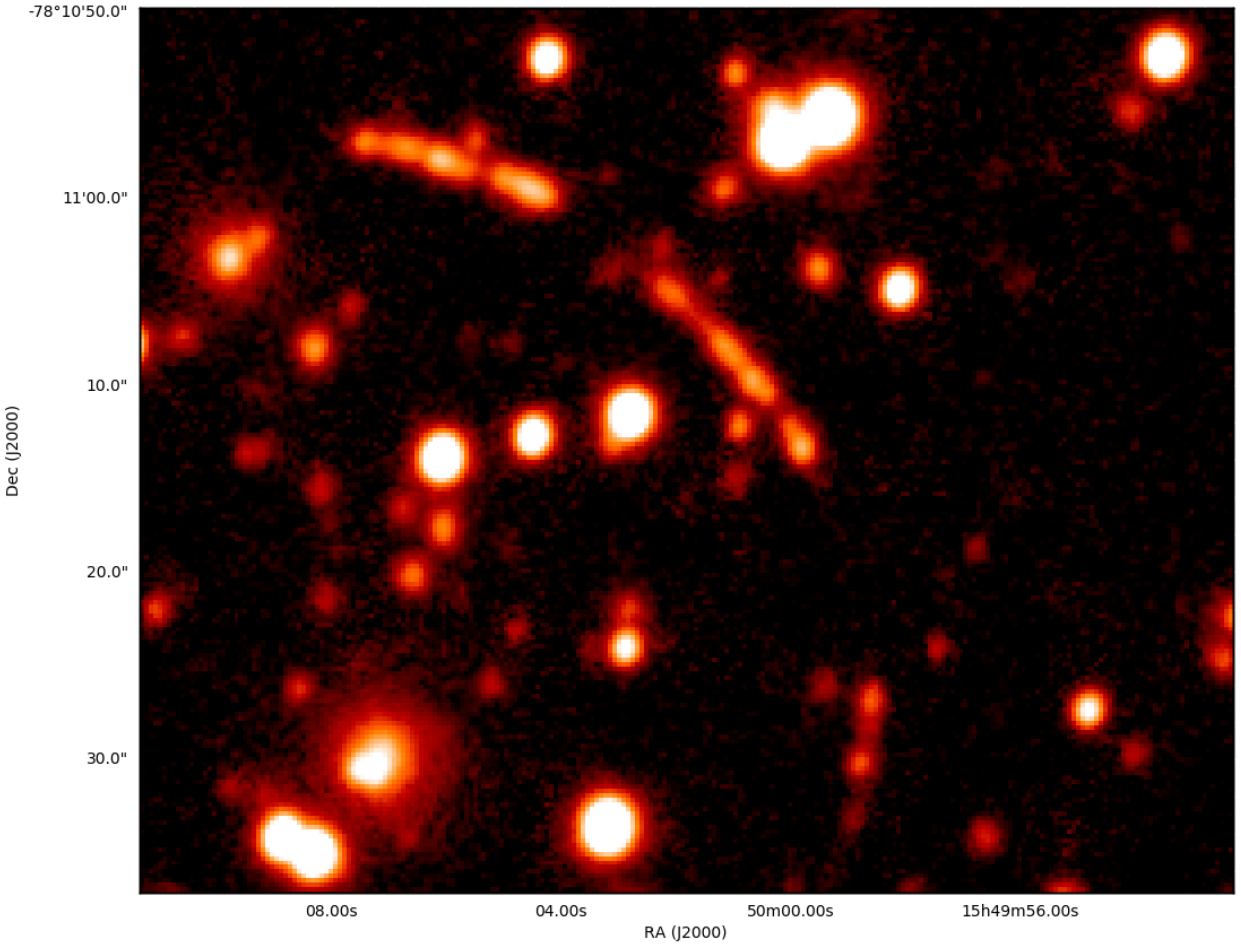
The lensing cluster was found in Planck foreground

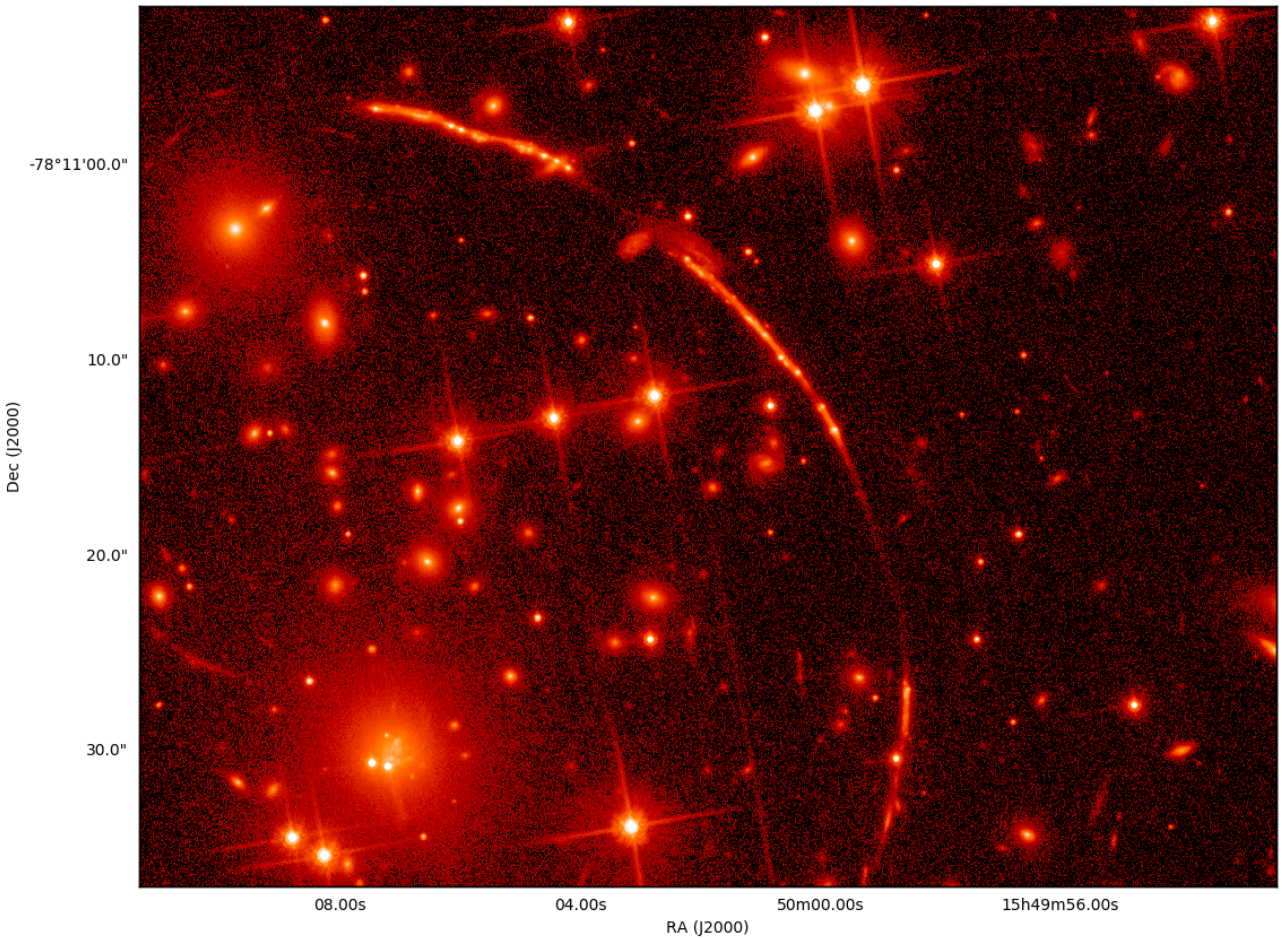
Discovery imaging with NTT



Data from Dahle+ 2016

The lensing cluster was found in Planck foreground

Recent observations with HST



PI: H. Dahle

The galaxy-lens alignment is *bonkers*

...at least according to preliminary models.

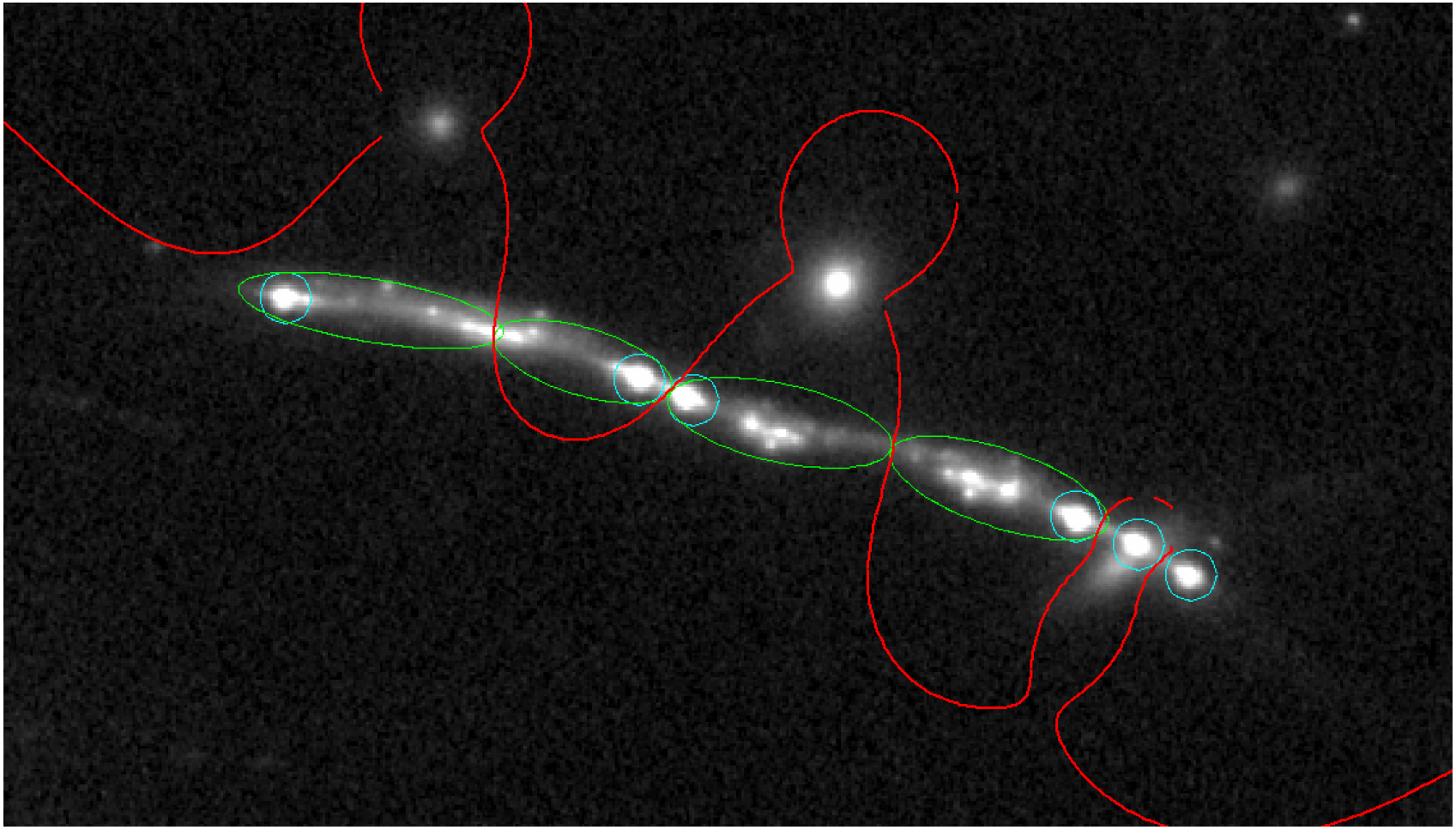
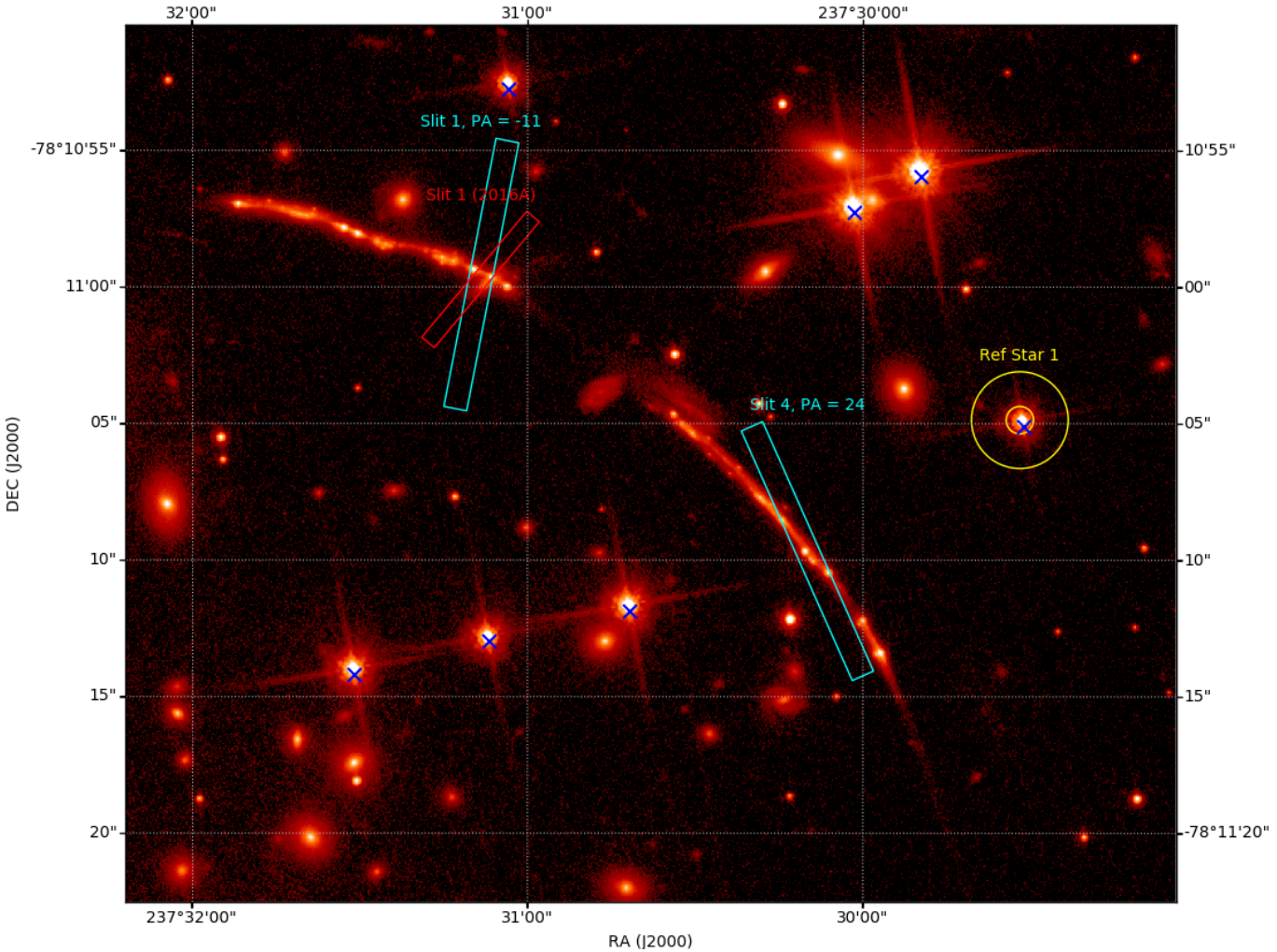
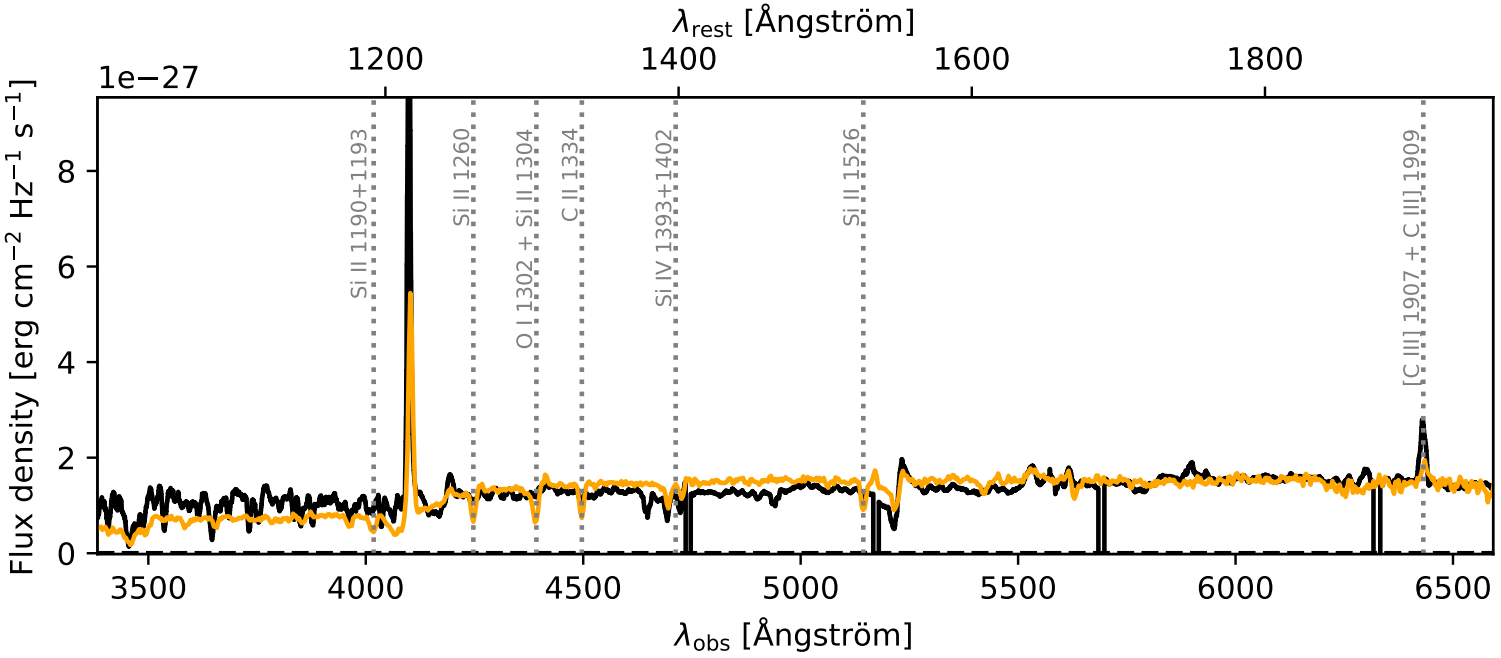


Image: Keren Sharon, UMich

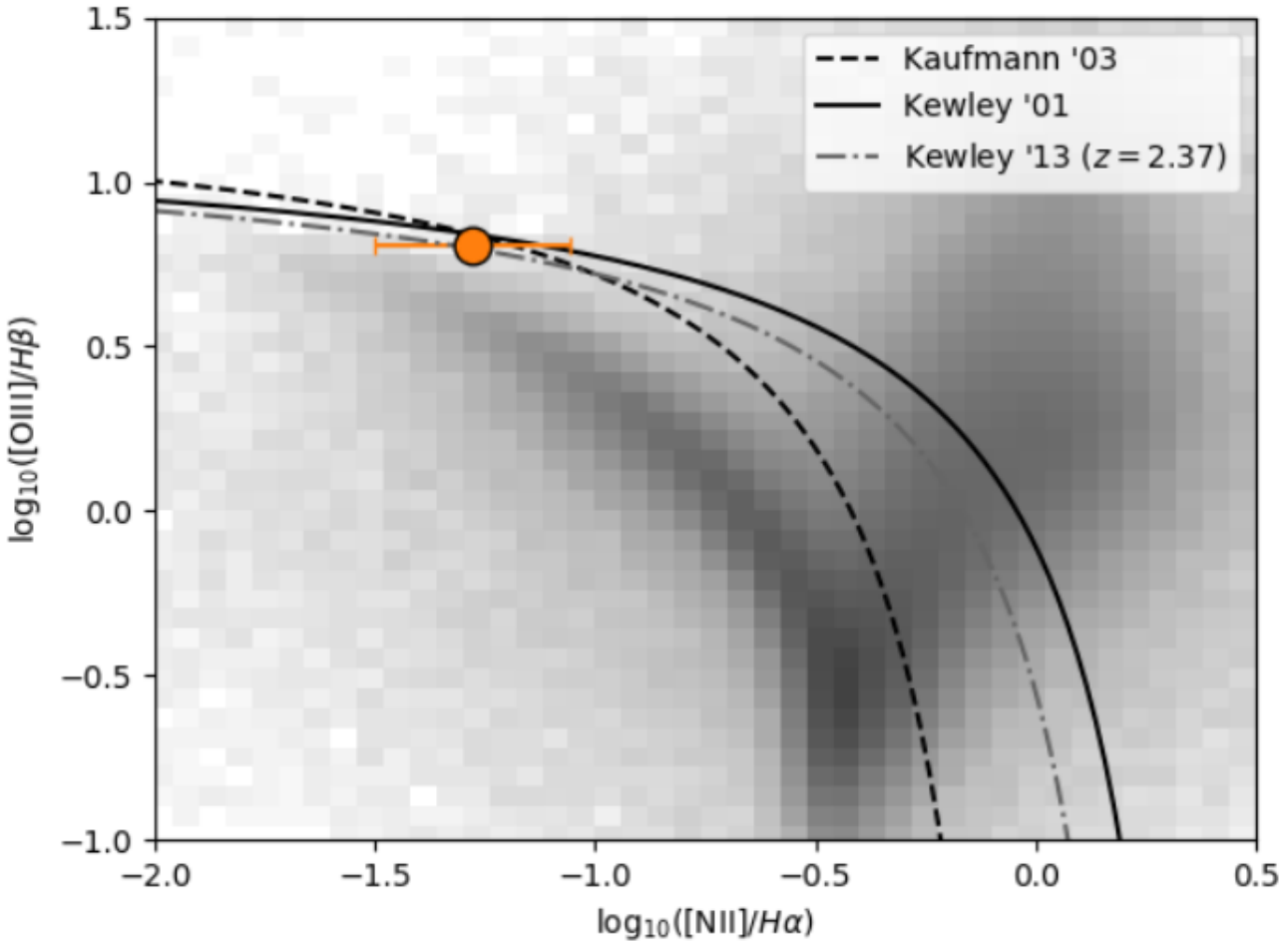
We acquired spectra with Magellan-FIRE and MagE



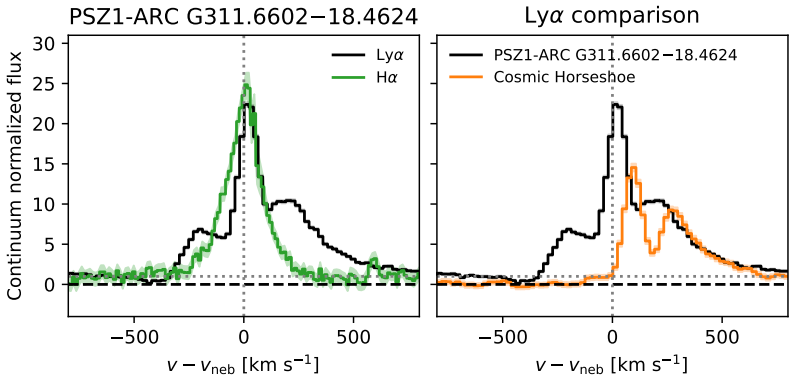
It is a typical star-forming galaxy

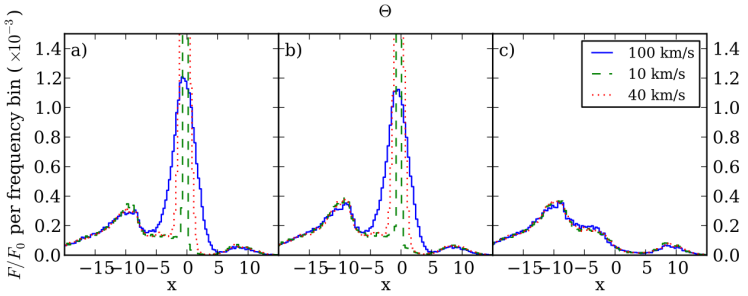


Similar to a local-Universe Green Pea

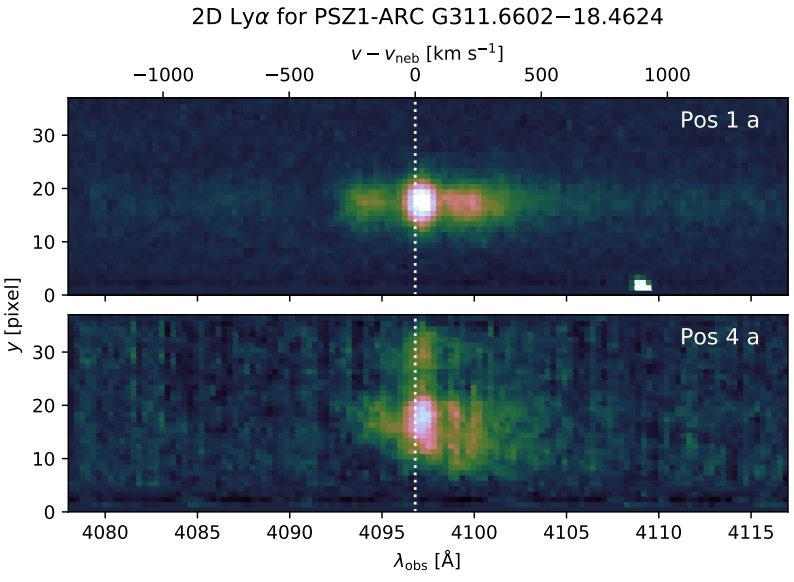


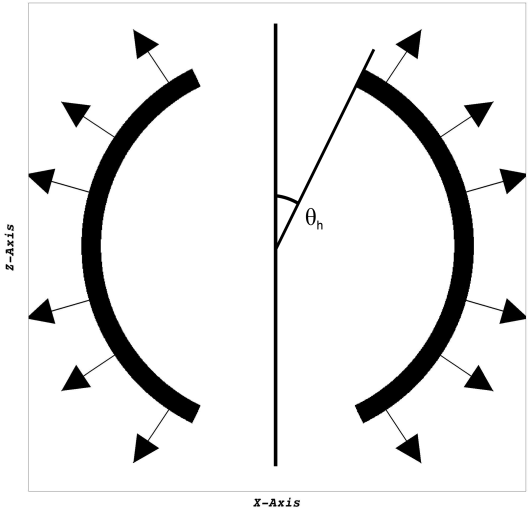
The big "Wow!": Textbook triple-peak Lyα





Simulated profile (Behrens+ 2014)





Dahle+ 2017 (HST Midcycle proposal)

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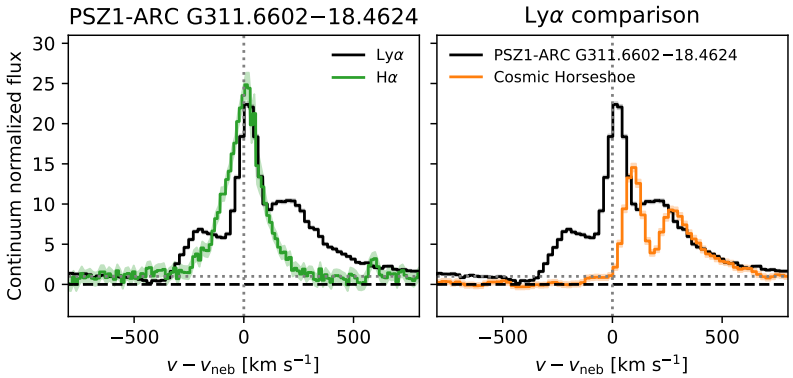

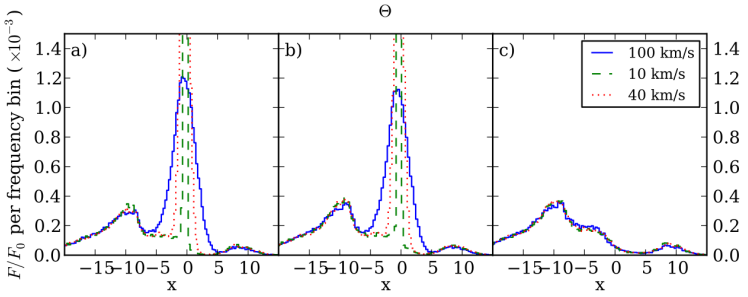

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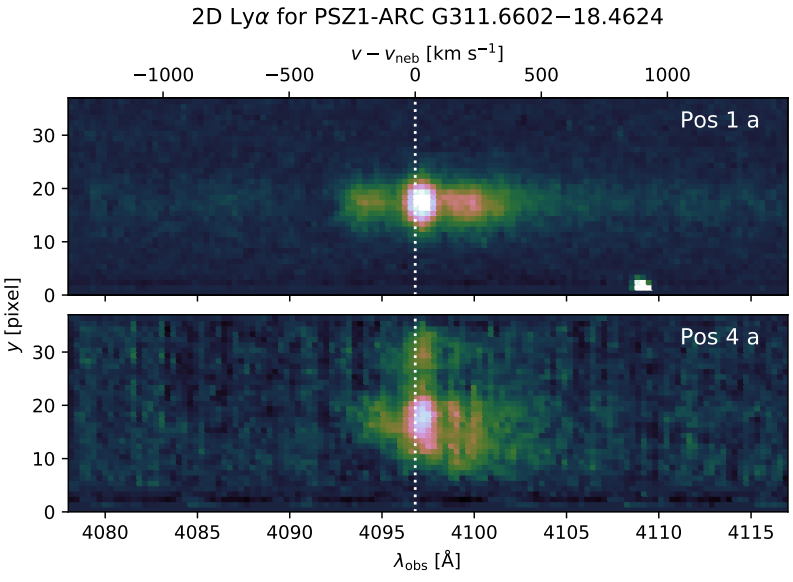

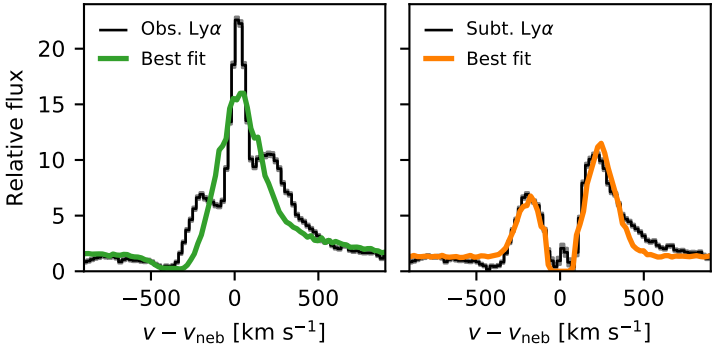

Lyα RT fits, with and without central peak

(Rivera-Thorsen+ 2017b)

Dahle+ 2017 (HST Midcycle proposal)

Neutral ISM is extremely tenuous at least in a channel

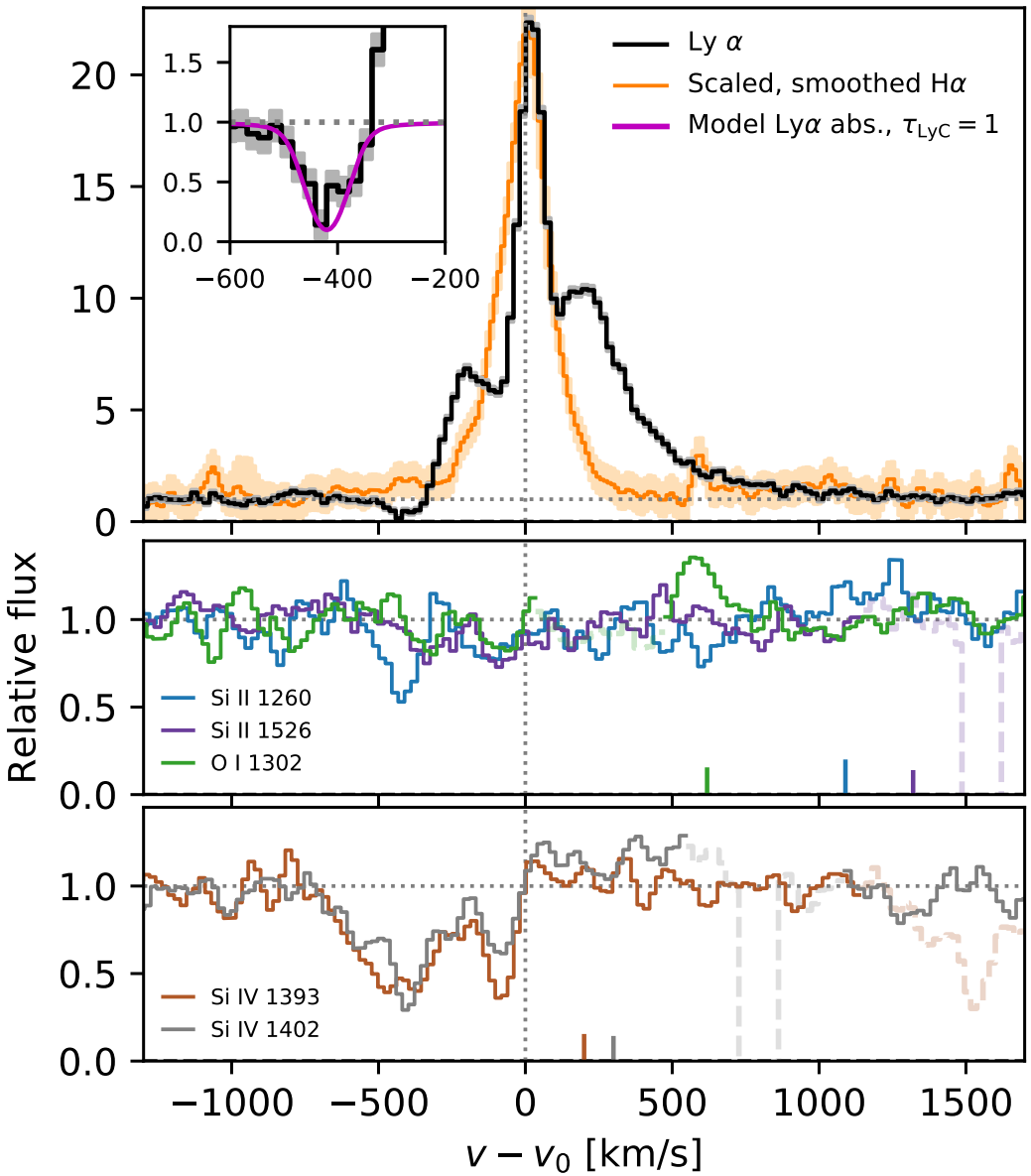

Image: Rivera-Thorsen+ 2017

Lyman-continuum emission likely

Various LyC escape scenarios revealed in Lyα profile

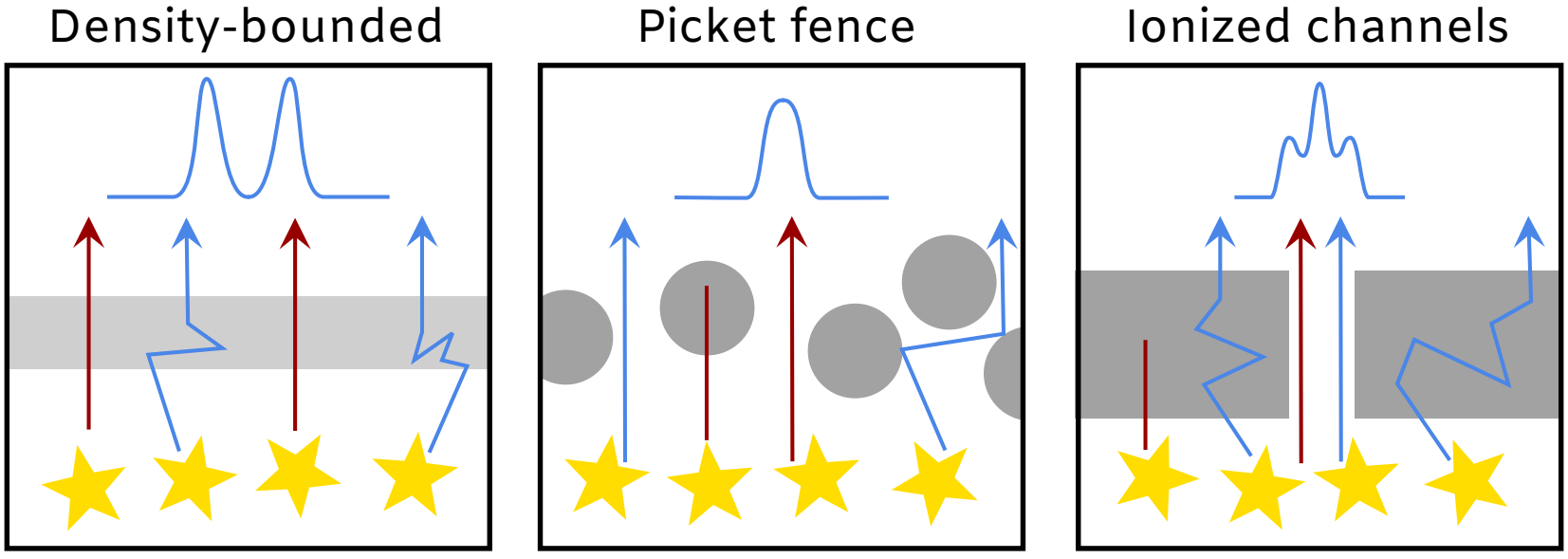

Figure: M. Grönke (Rivera-Thorsen+ 2017)

Outstanding questions

- **What are we actually looking at?**
  — Lens model is under development.
- **Is it leaking ionizing radiation?**
  — HST data scheduled for ultimo April
- **What does it look like in Lyα?**
  — HST narrowband observations scheduled during current cycle
- **We still don't understand the radiative transfer.**
  — better modeling makes it *harder* to reproduce observed Lyα and LyC.

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