

Exploring LGRB host galaxy through mock observations and radiative transfer

LUX Day - Meudon - 16/06/2026

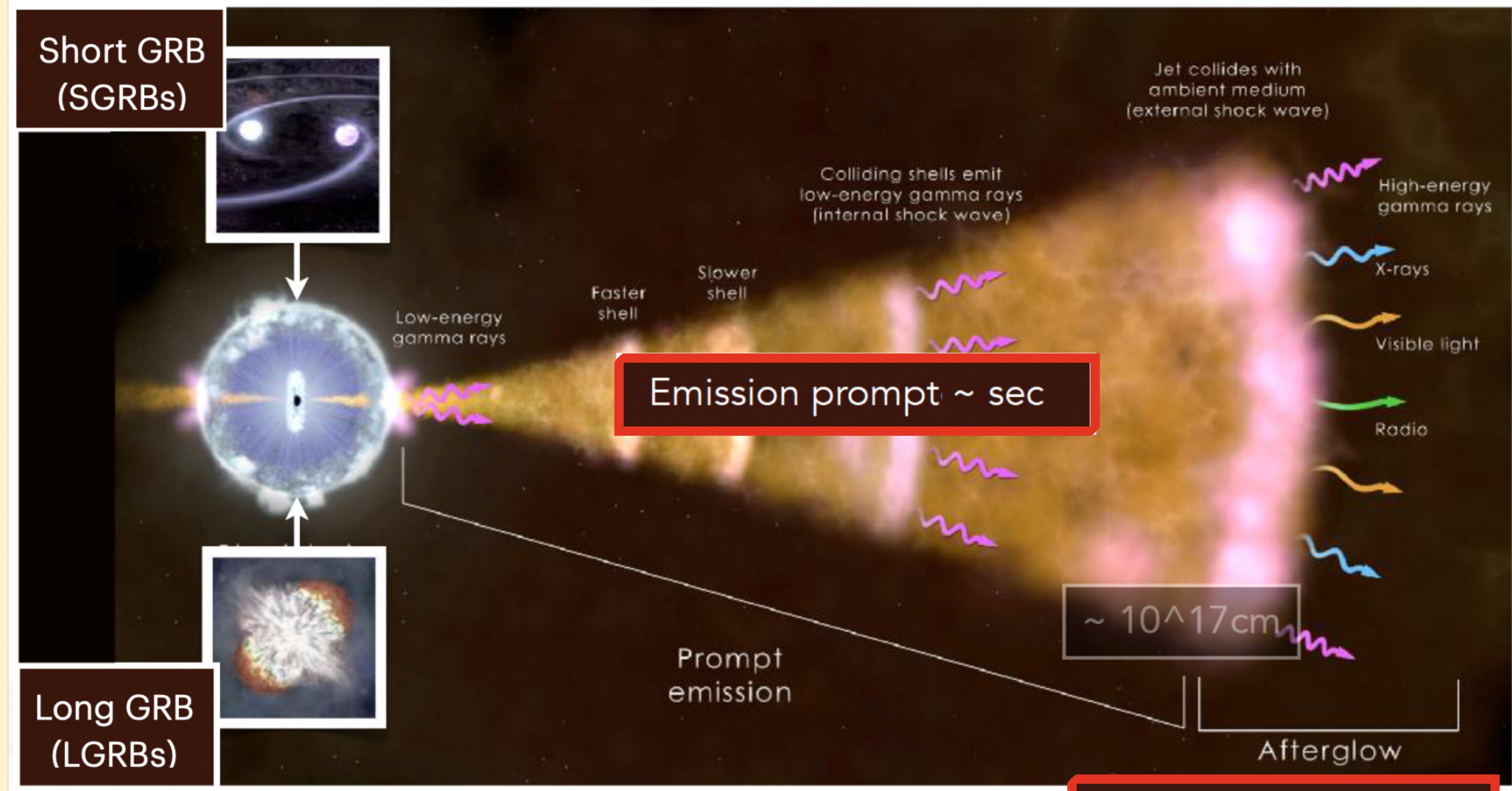
Marine Garnichey, Susanna Vergani at LUX - Observatoire de Paris

ANR Pegasus

In collaboration with Maxime Trebitsch (LUX)



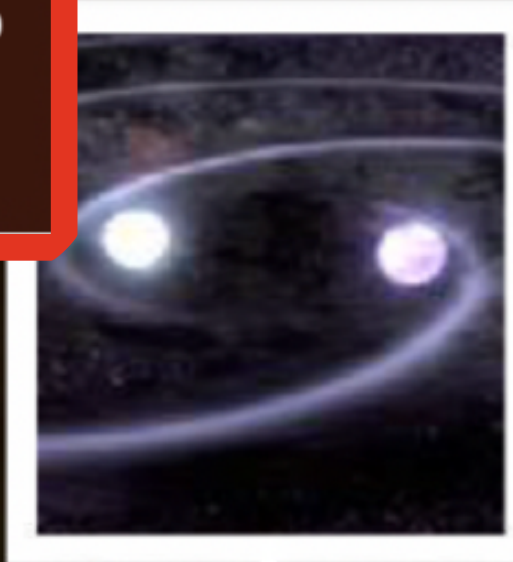
Understand the evolution of high redshift galaxies thanks to the information revealed by Gamma-Ray Bursts



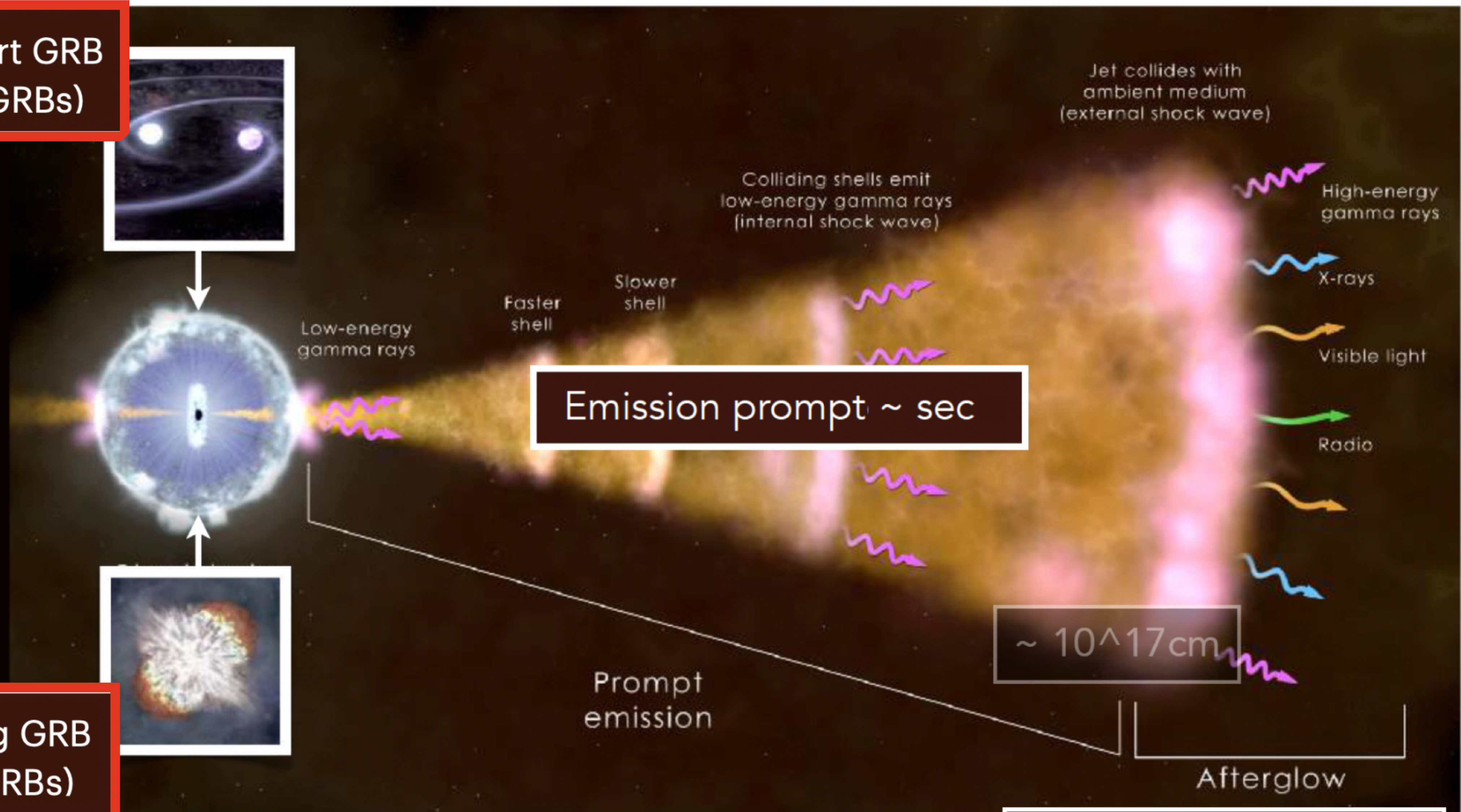
Production of a Gamma-Ray Burst (GRB)
Credits: NASA

Afterglow emission
a few hours --> years
(depending on
the frequency range)

Short GRB
(SGRBs)

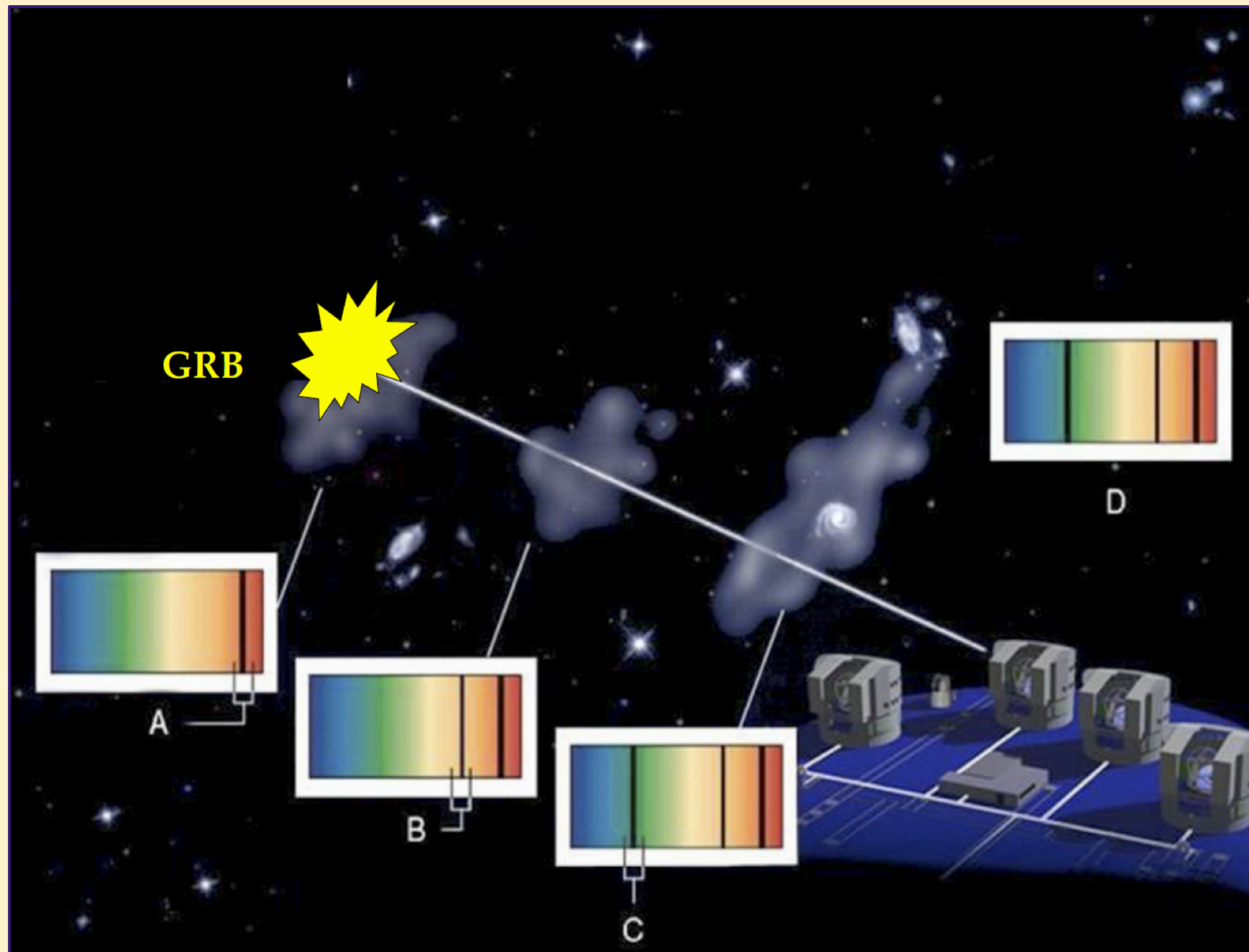


Long GRB
(LGRBs)



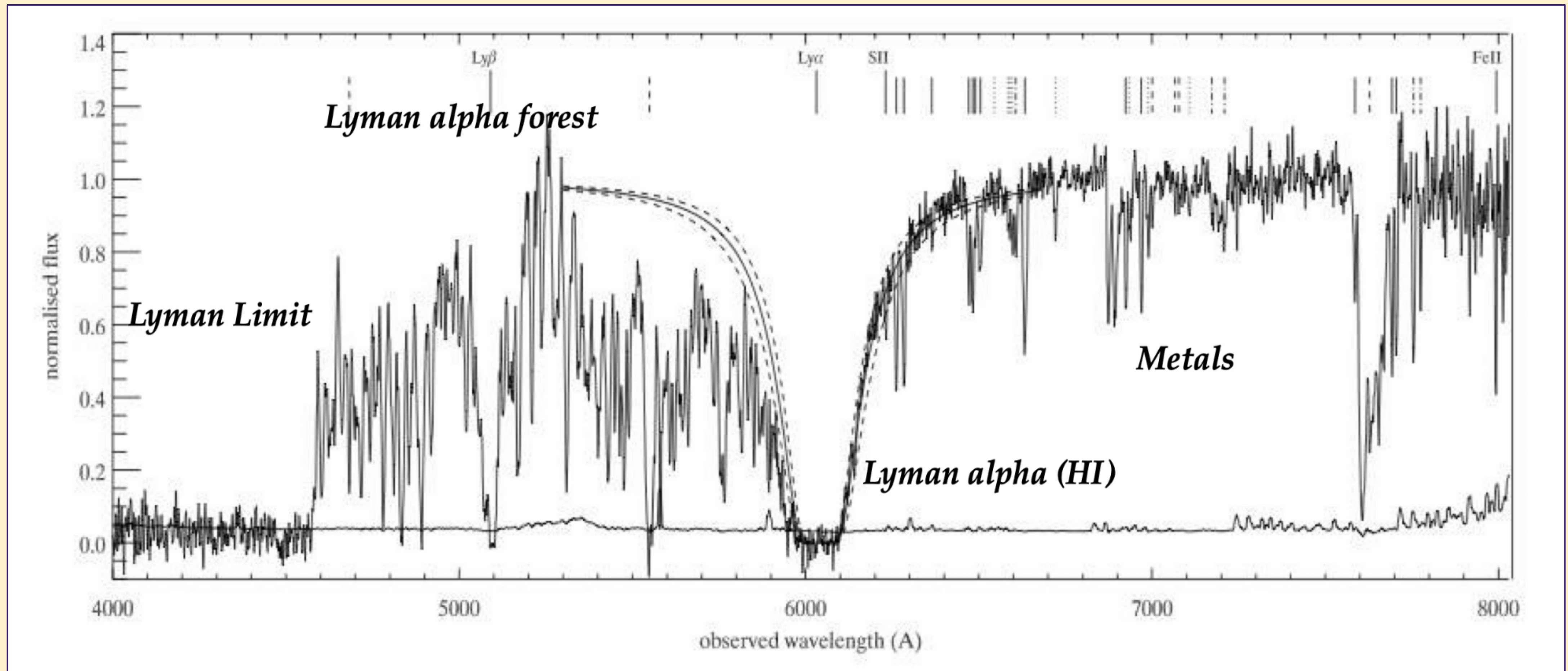
Production of a Gamma-Ray Burst (GRB)
Credits: NASA

Afterglow emission
a few hours --> years
(depending on
the frequency range)



Observation of the afterglow's emission on the line of sight
Credits: Adapted from ESO PR0813a

GRB 050730 $z=3.968$

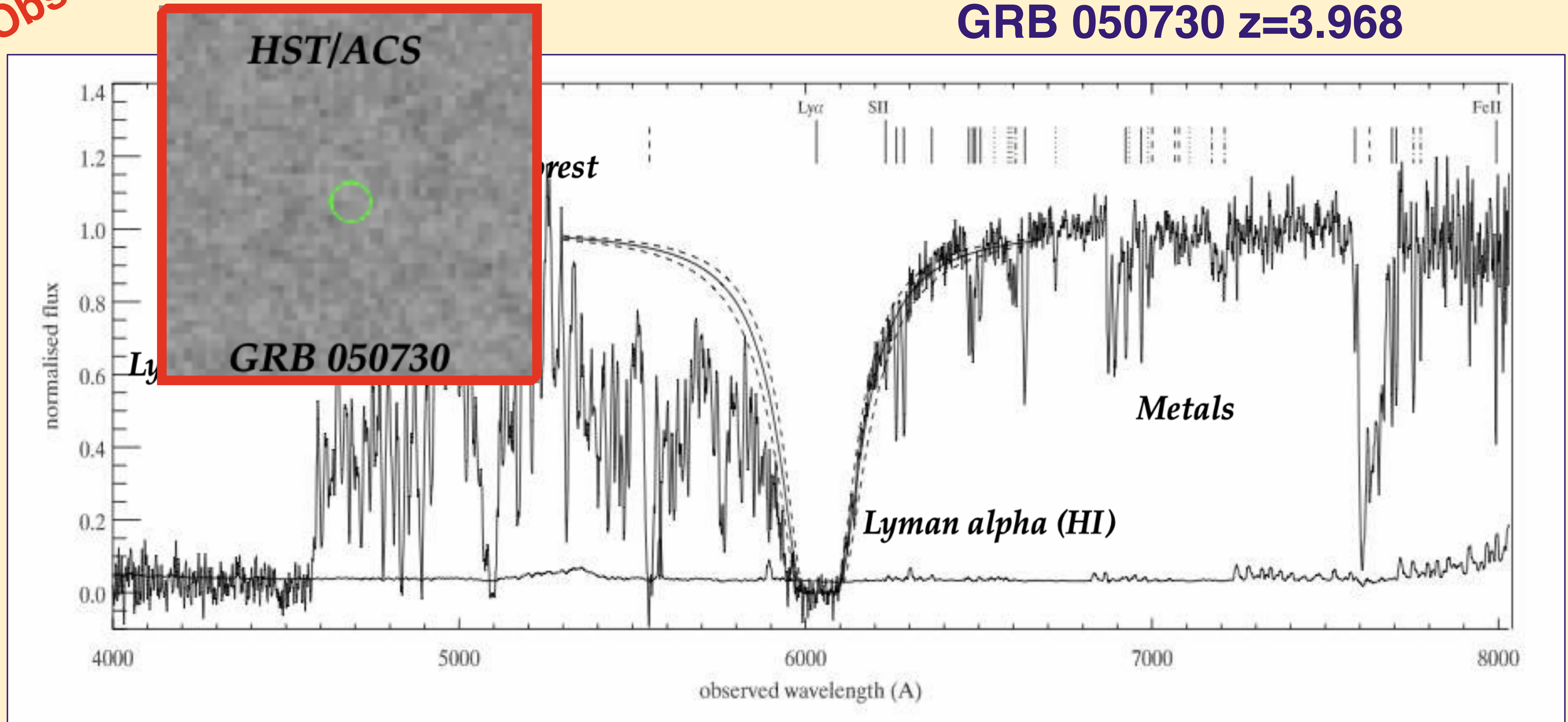


Absorption spectra from the afterglow's emission on the line of sight
Starling et al. 2005

~1h Observation

$r > 28.5$

GRB 050730 $z=3.968$

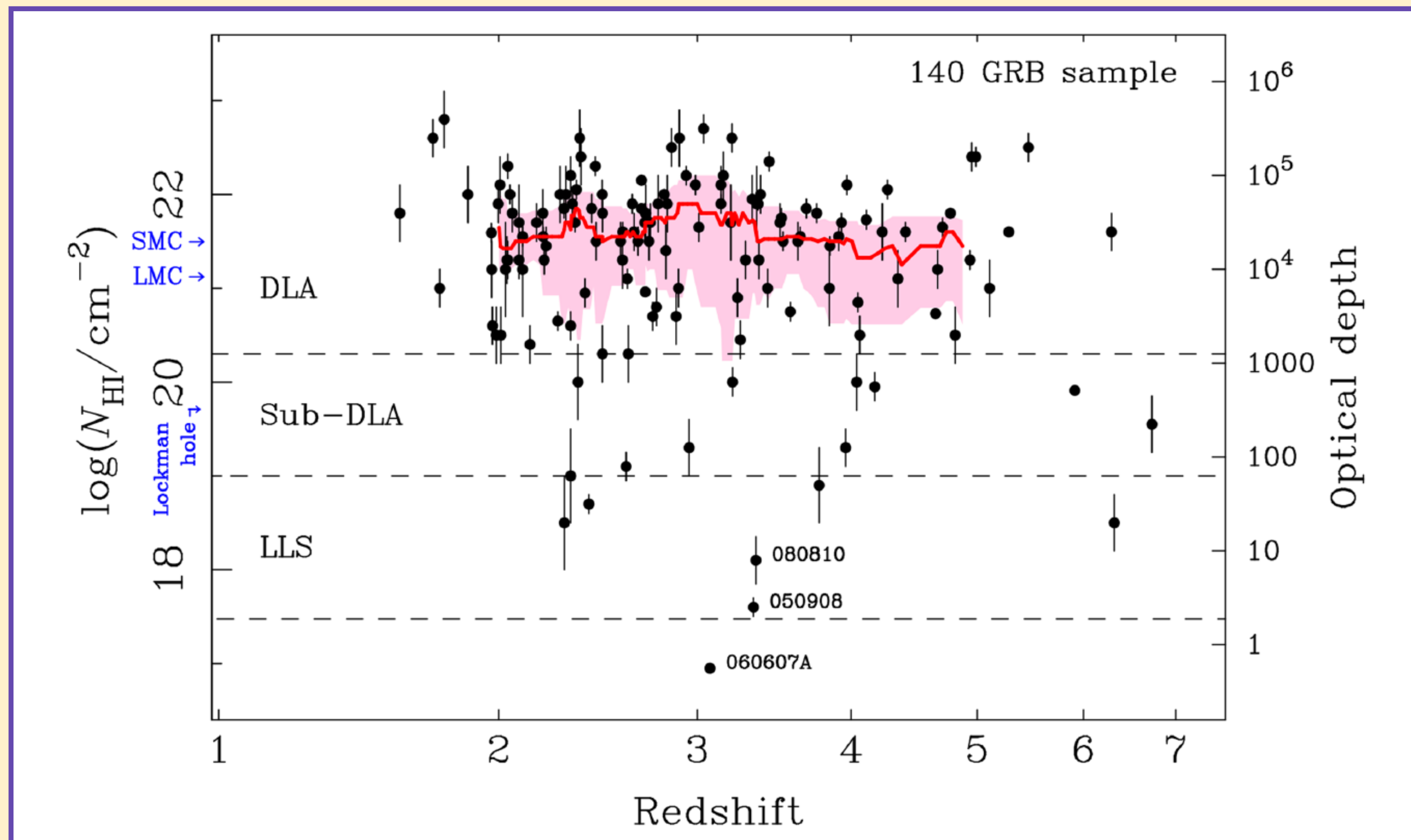


Absorption spectra from the afterglow's emission on the line of sight
Starling et al. 2005

Do galaxy simulations agree with GRB observations ?

Can we use galaxy simulations to interpret GRB observations ?

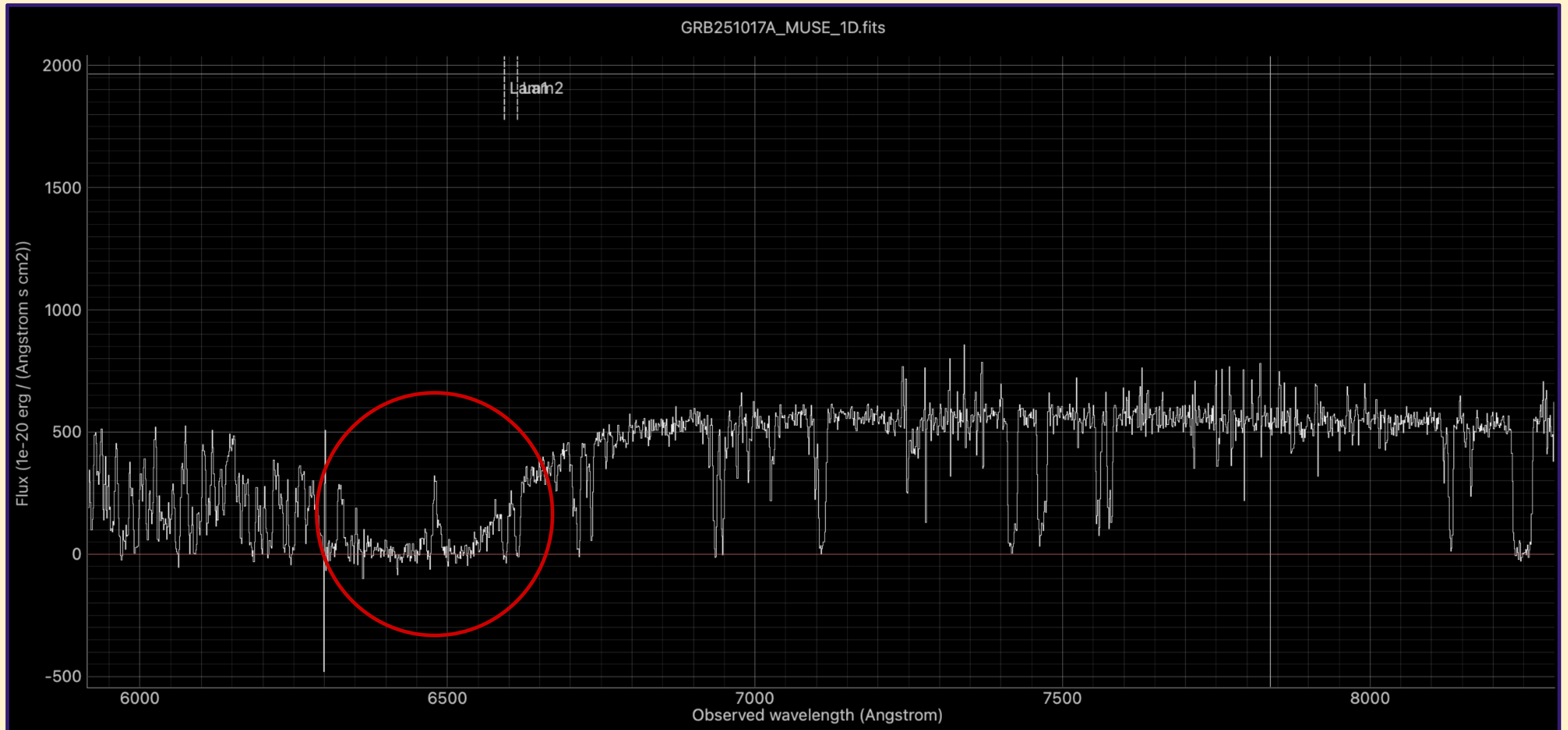
Predict HI column densities



Tanvir et al. 2019

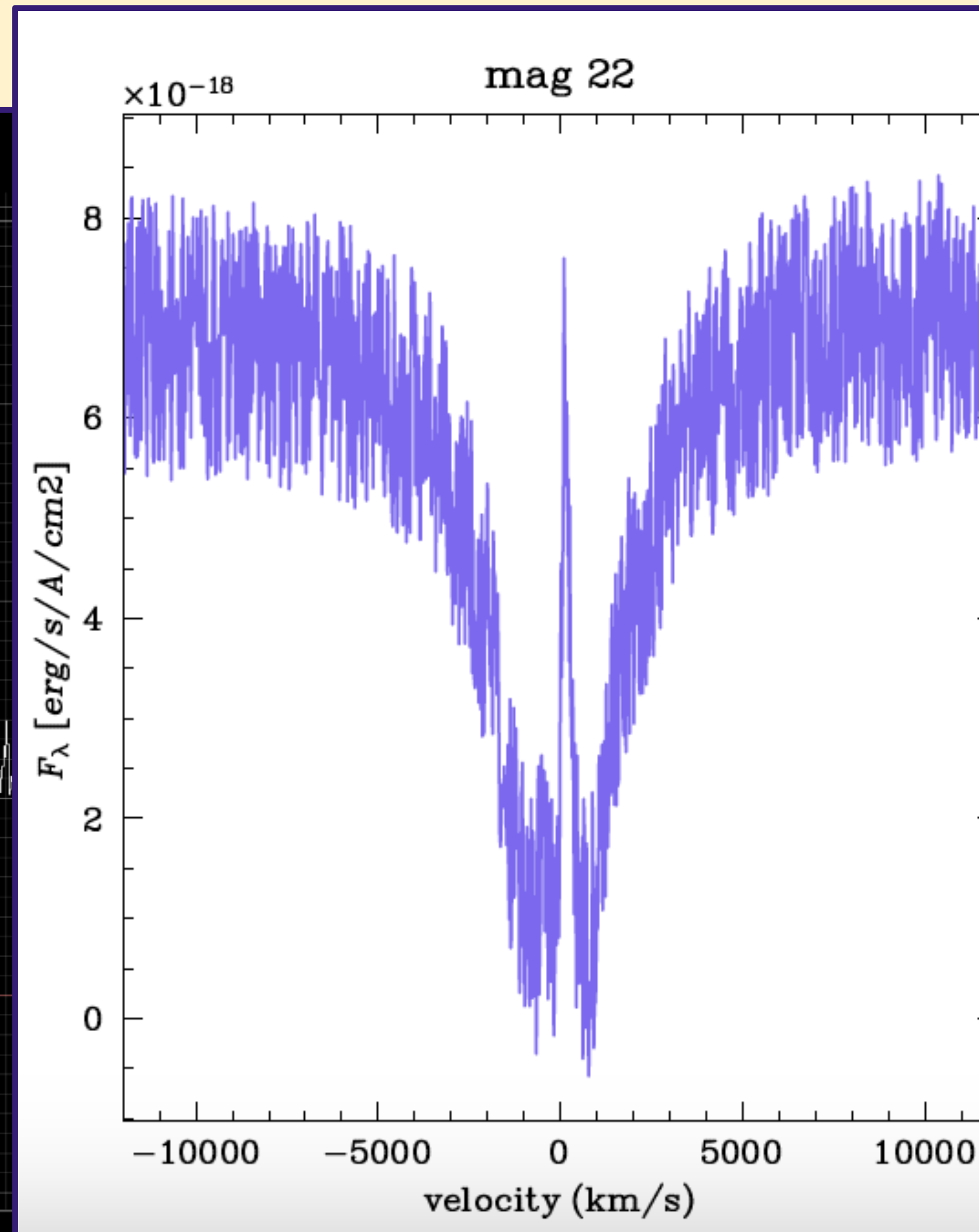
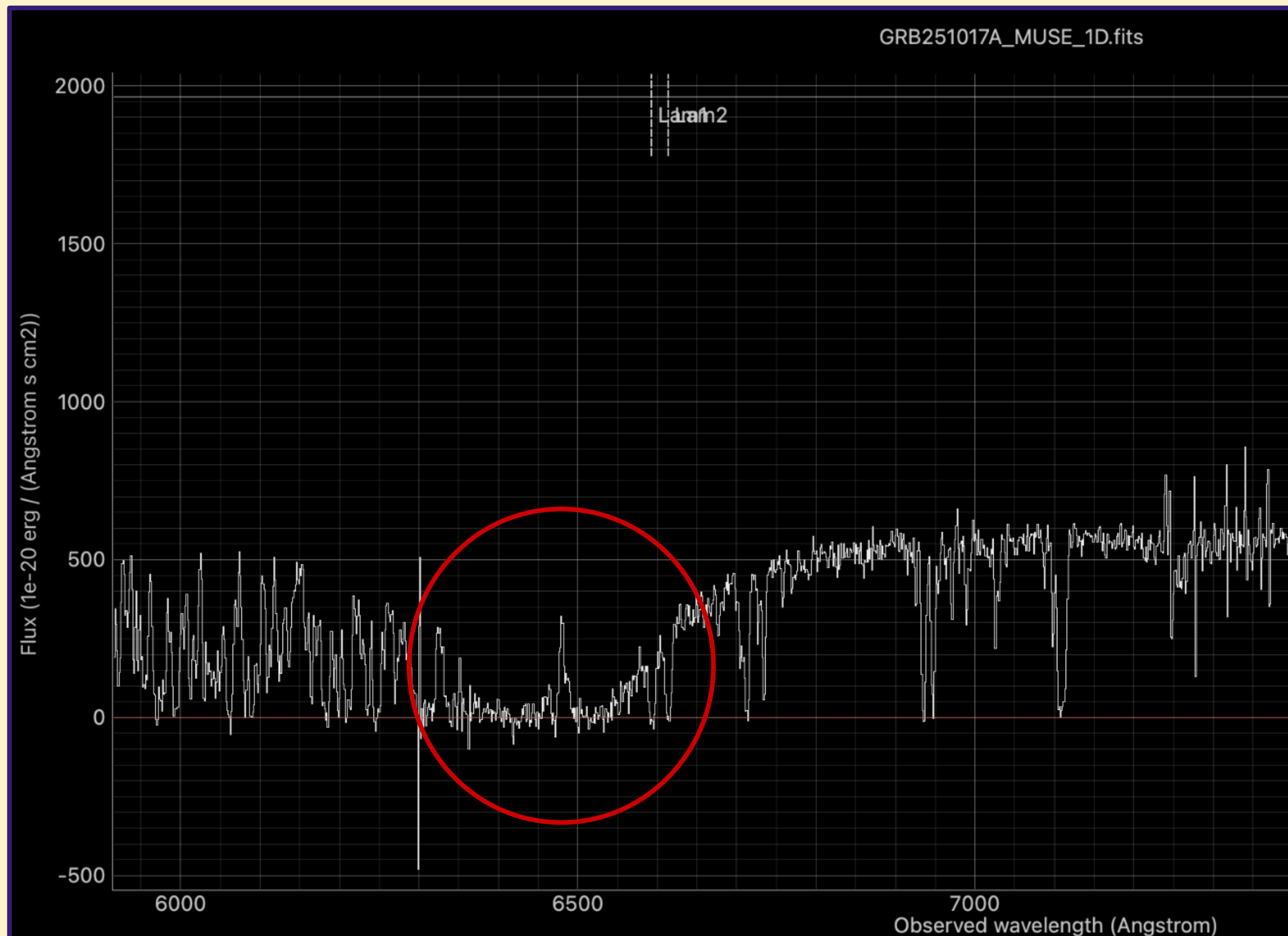
Reproduce Lyman alpha line observations

GRB 251017A $z=4.327$



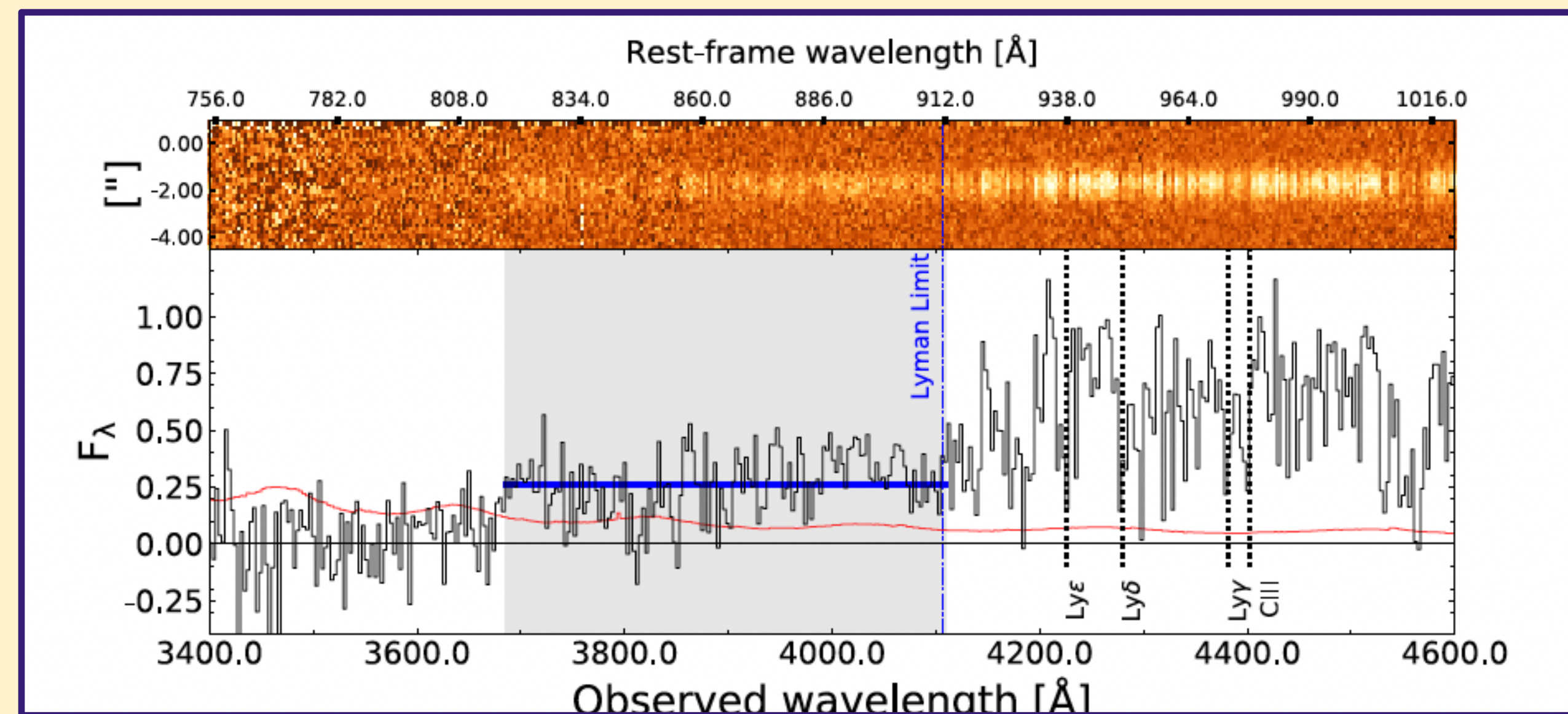
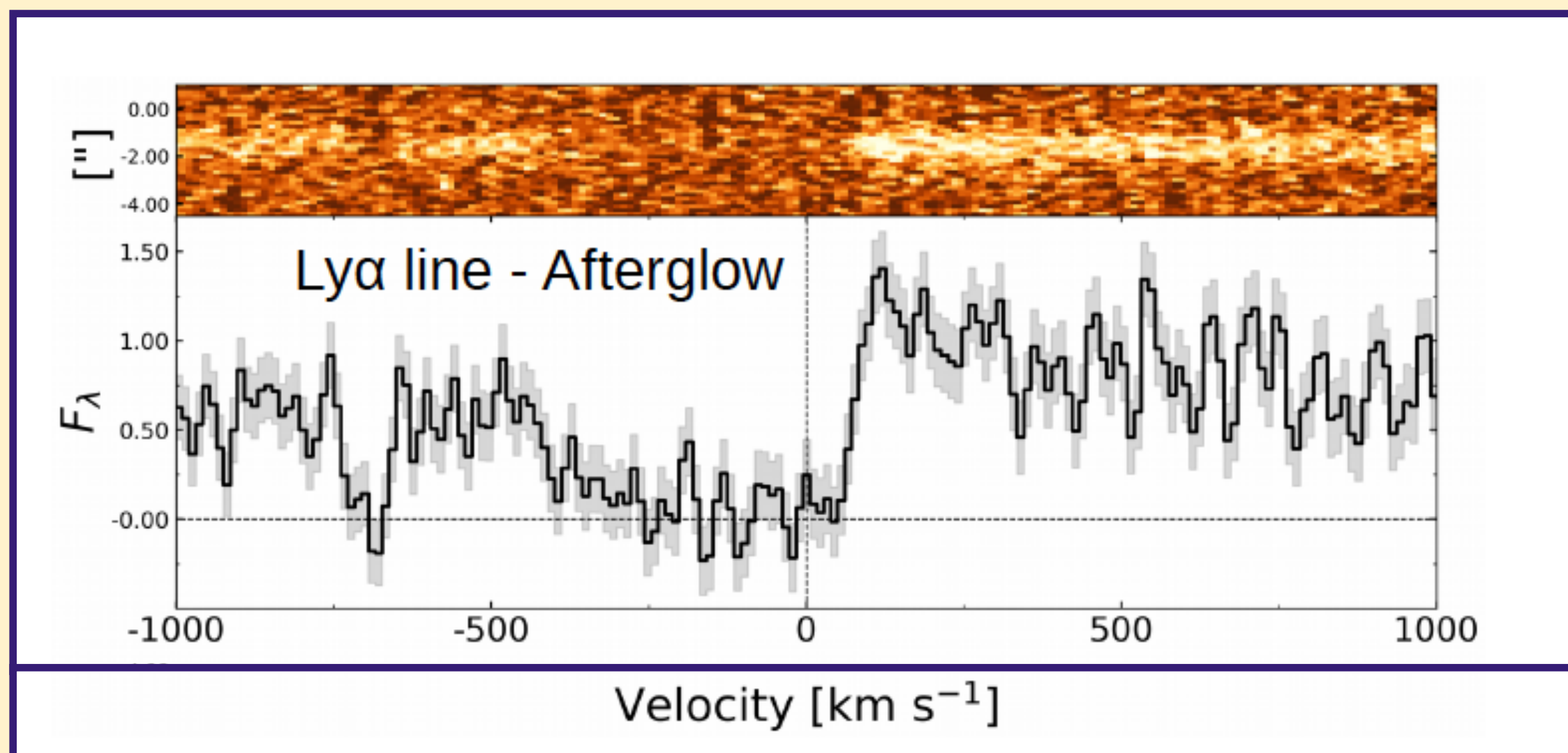
Reproduce Lyman alpha line observations

GRB 251017A $z=4.327$



Reproduce Lyman alpha line observations

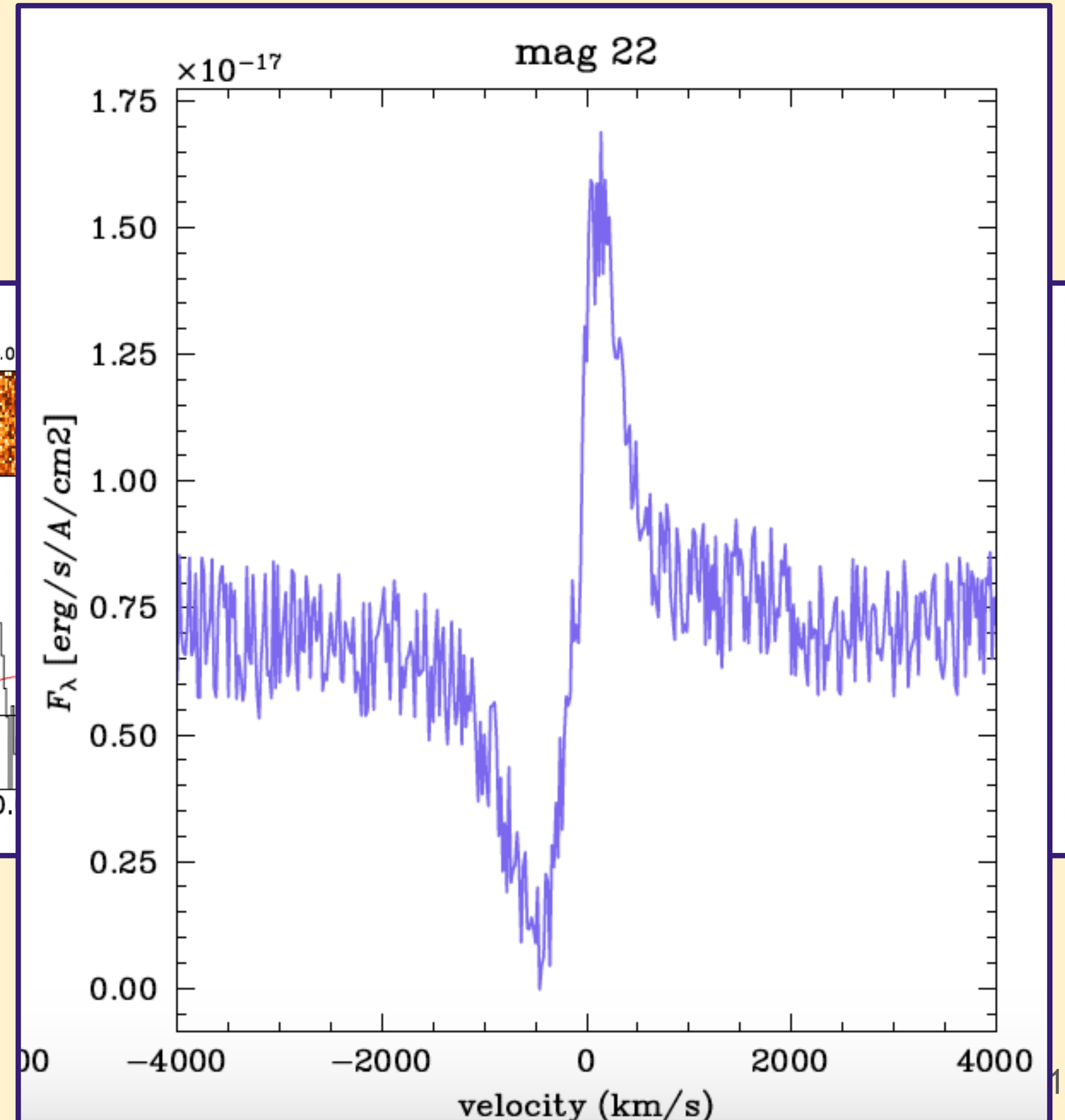
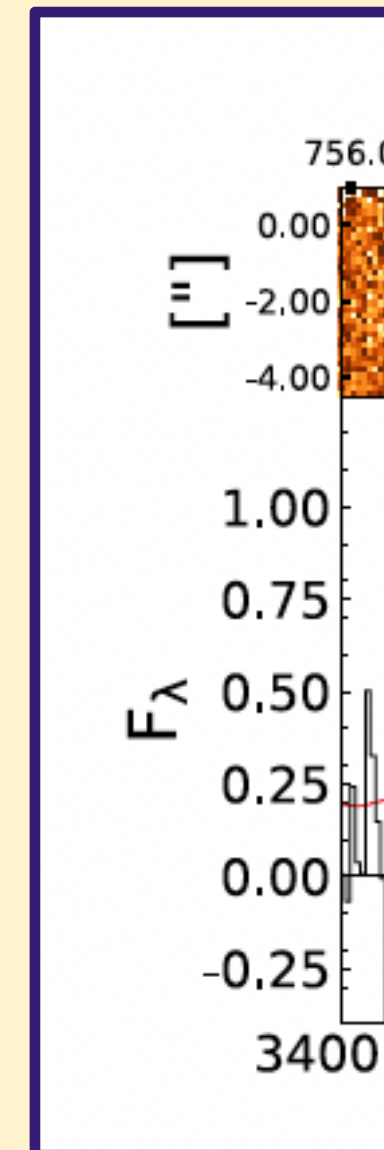
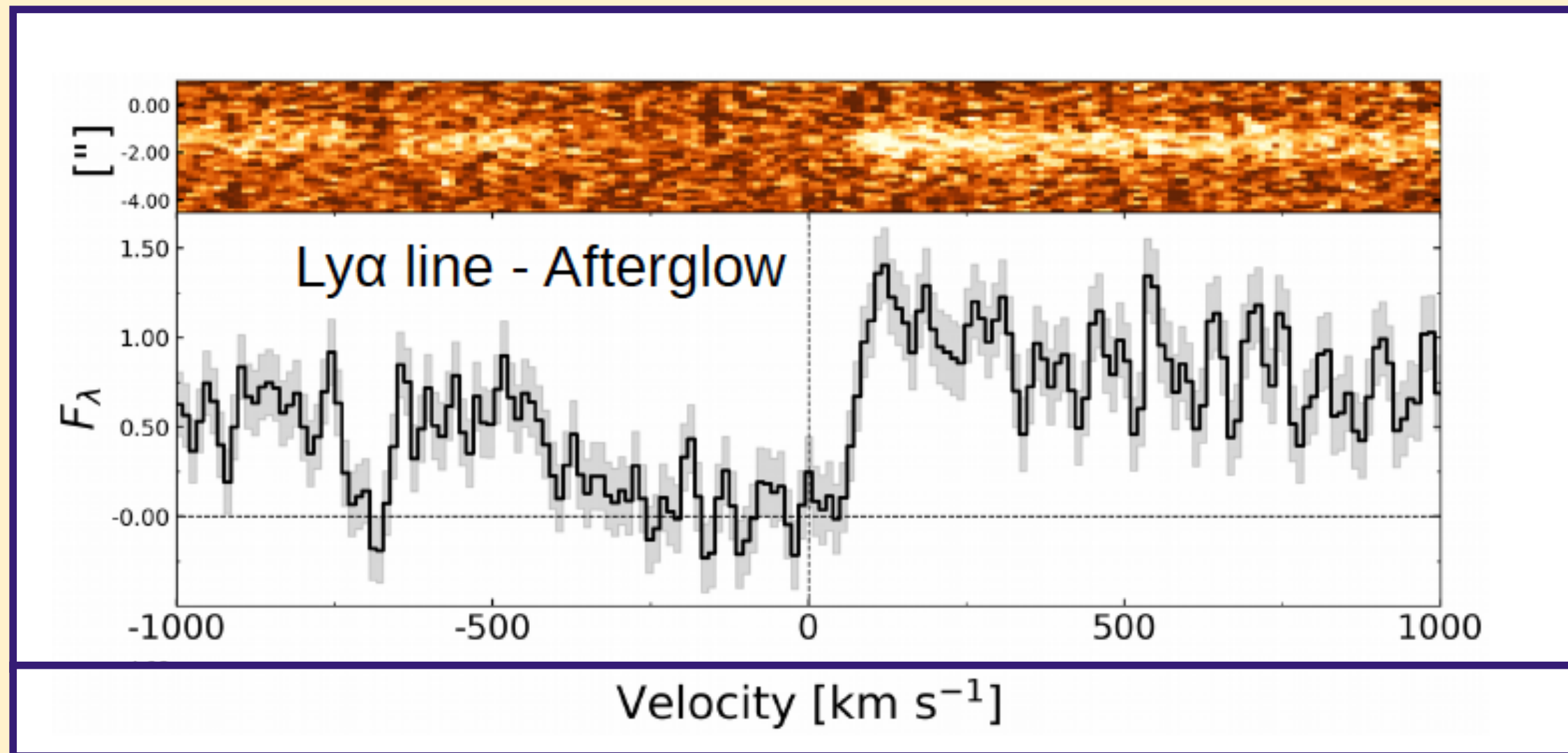
GRB 191004B $z=3.5053$



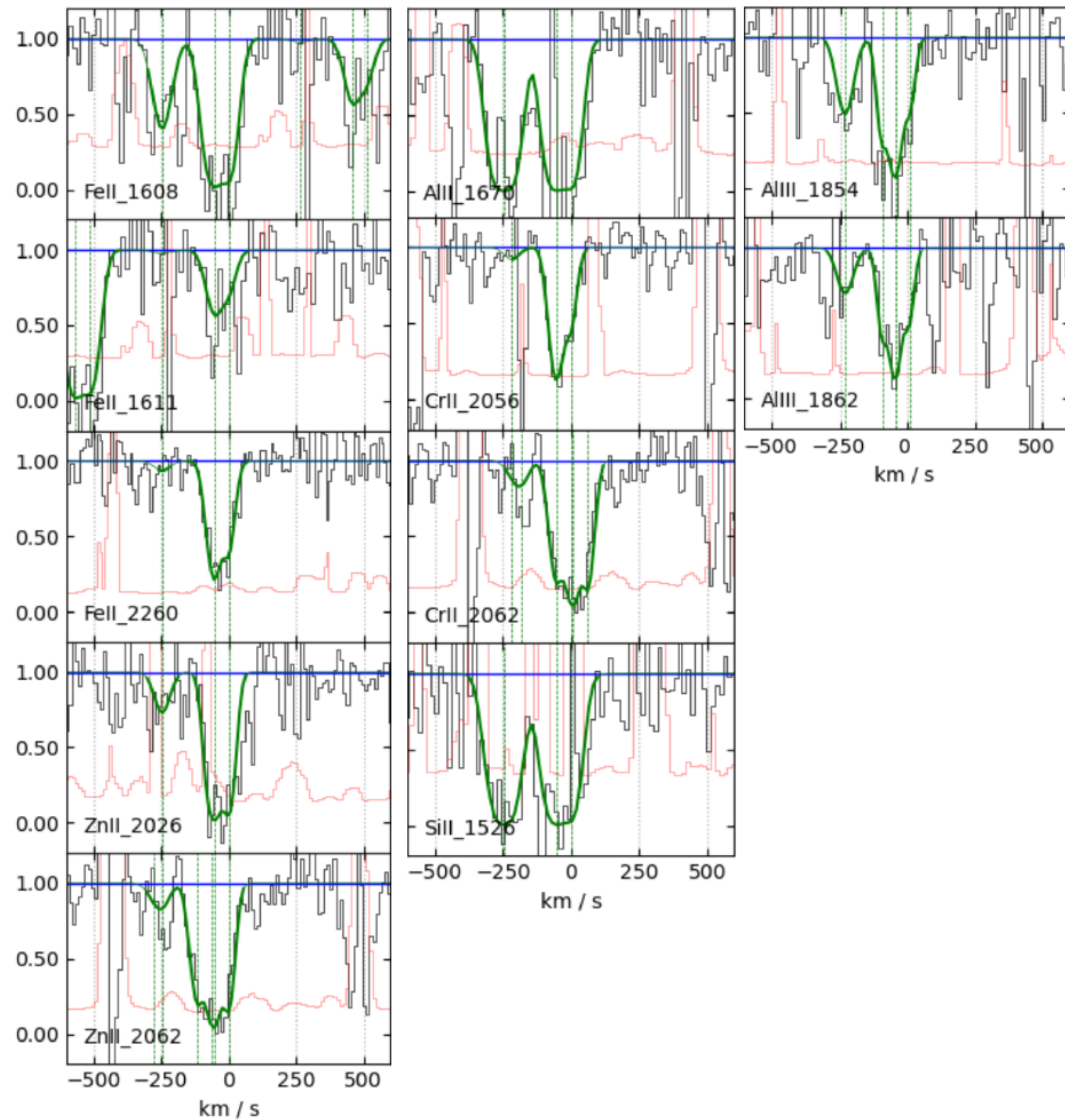
Credits: Vielfaure et al. 2020

Reproduce Lyman alpha line observations

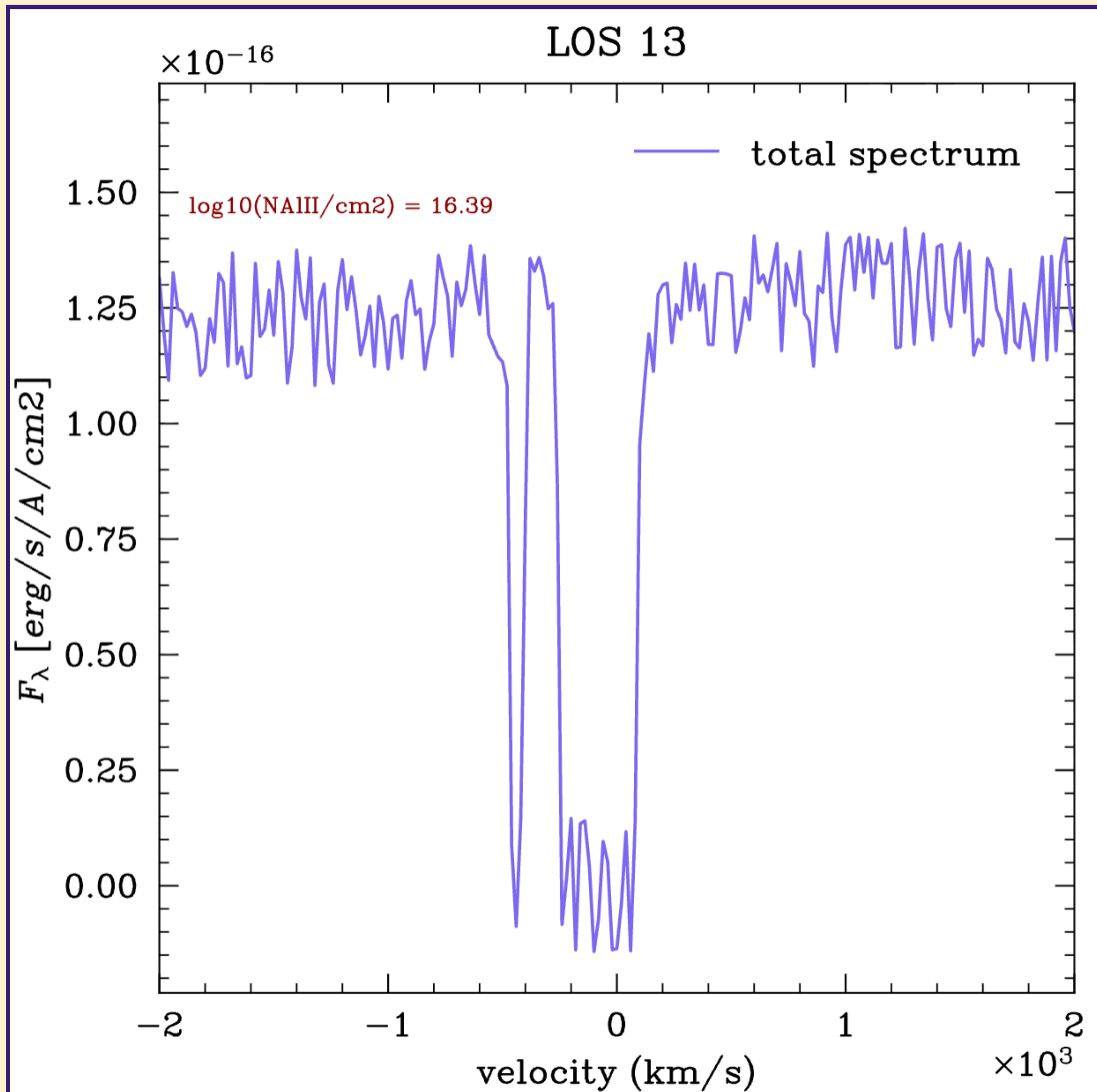
GRB 191004B $z=3.5053$



Credits: Vielfaure et al. 2020



**Reproduce metal line
from GRB afterglow
spectra**



**Reproduce metal line
from GRB afterglow
spectra**

Thank you