Y-NBS: HAWK-I in the recent Universe, exploring z < 2 line emitters

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Background

- The **star formation history of the Universe** is fundamental to understand when studying the physics of galaxy evolution

- Star formation seems to have **peaked at z~2** (see figure below) but there are still many open questions regarding **galaxy evolution and formation**

- **Wide area, narrowband surveys** are ideal to find line emitting galaxies while to overcoming **cosmic variance** and to **study extreme sources**

Khostovan+2015
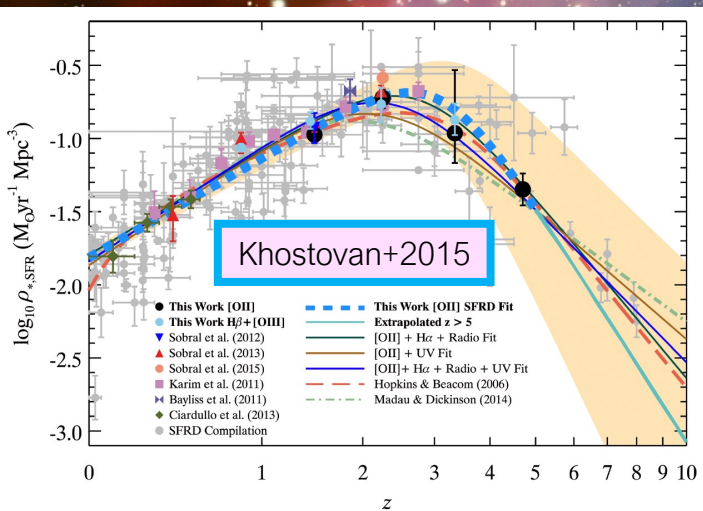
Like your redshifts a little higher?

This work also includes a higher redshift component, **Y-NBS at z>7**, where we search for Lyα emitting galaxies using the same data to study **the epoch of reionisation and the z=7.7 Lyα luminosity function**. See conference talk via **QR code** or see the **FLARE session Tues AM**.

This Work – Y-NBS at z<2

- Studying **Hα, [OIII] and [OII] line emitters** at **different cosmic times** is ideal to paint the larger picture of galaxy evolution

- We observe the **COSMOS** field with a **narrowband survey** with **HAWK-I/VLT**

- We observe z=0.62 Hα emitters, z=1.12 **[OIII]** emitters and z=1.85 [OII] emitters using the **NB1060 filter**

- We construct **luminosity functions** to compare the evolution against other results – understanding LFs is necessary for upcoming studies such as **WFIRST and Euclid**

References

Sobral+2009, Sobral+2015, Khostovan+2015, Khostovan+2020, Matthee+2017, Laigle+2015, McCracken+2012

Y-NBS: Survey & Data

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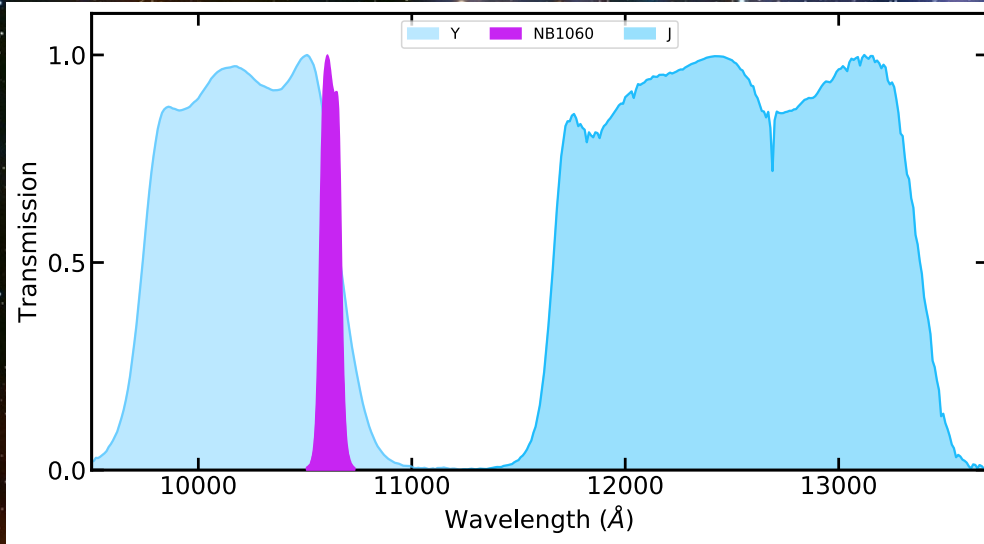
- The data for Y-NBS was collected with **HAWK-I/VLT**

- Observing in the **COSMOS** field

- Narrowband, near-infrared survey – **NB1060 filter** used

- A total of **69 pointings** were observed covering **0.8deg^2** – follows **UltraVISTA** stripes

- We created a **dedicated pipeline** to reduce the data ourselves – following Sobral+09

- Archive HAWK-I data for **GOODS-S field** to **deepen** our search

Y-NBS: Line Emitters

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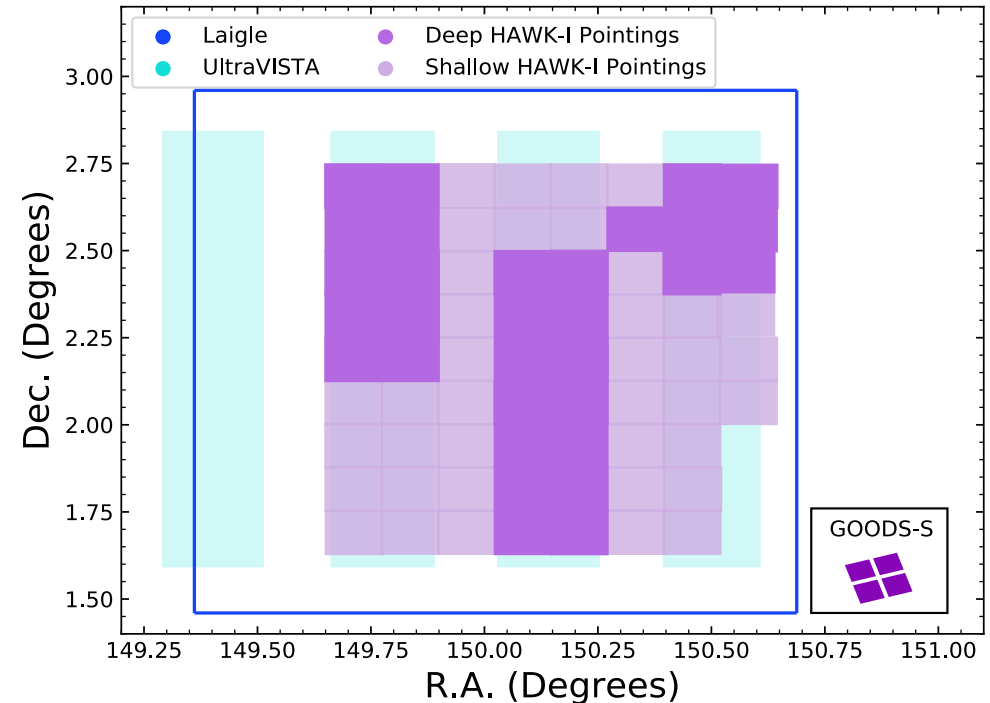
- **Select line-emitters** using cuts on a colour-magnitude diagram
  - Equivalent width > 30Å
  - Excess significance > 3

- We find **1000s of line emitters** in our data

- But which line are they emitting?
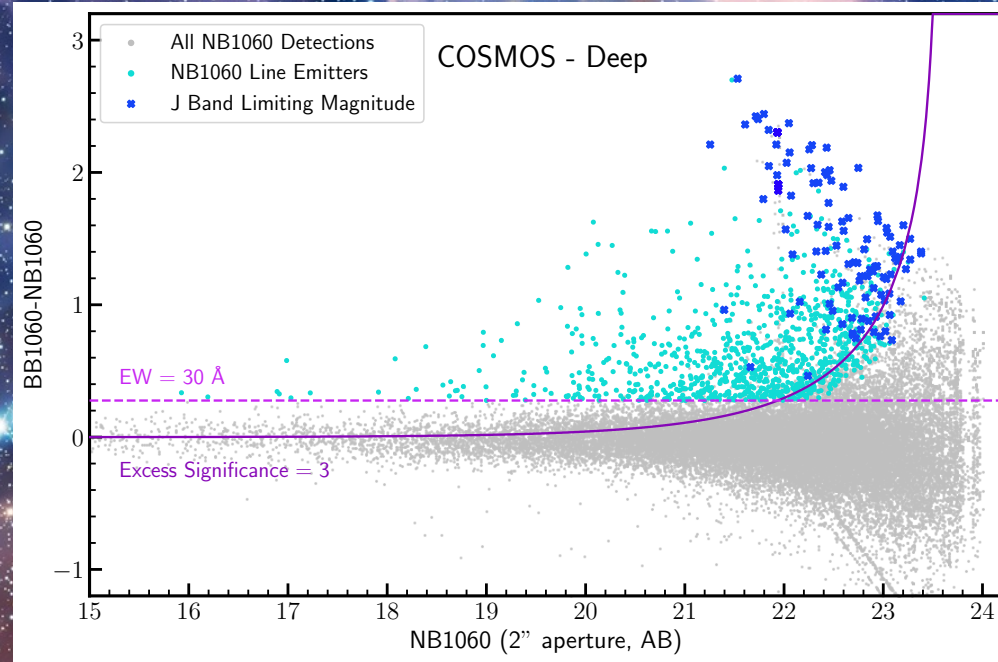
- We cross-match to **known photometric redshift values** – Laigle+2015

- See an **excess** of sources at the redshifts of the emission lines – **Hα, [OIII], [OII]**

- Select unmatched sources using **colour-colour diagrams** - see Sobral+15, Matthee+17
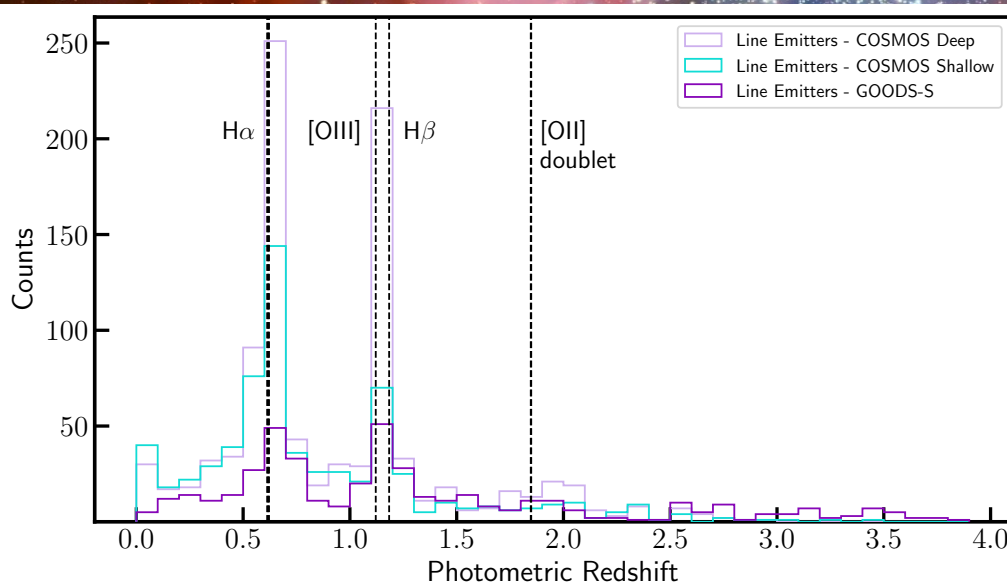
Y-NBS: Luminosity Functions
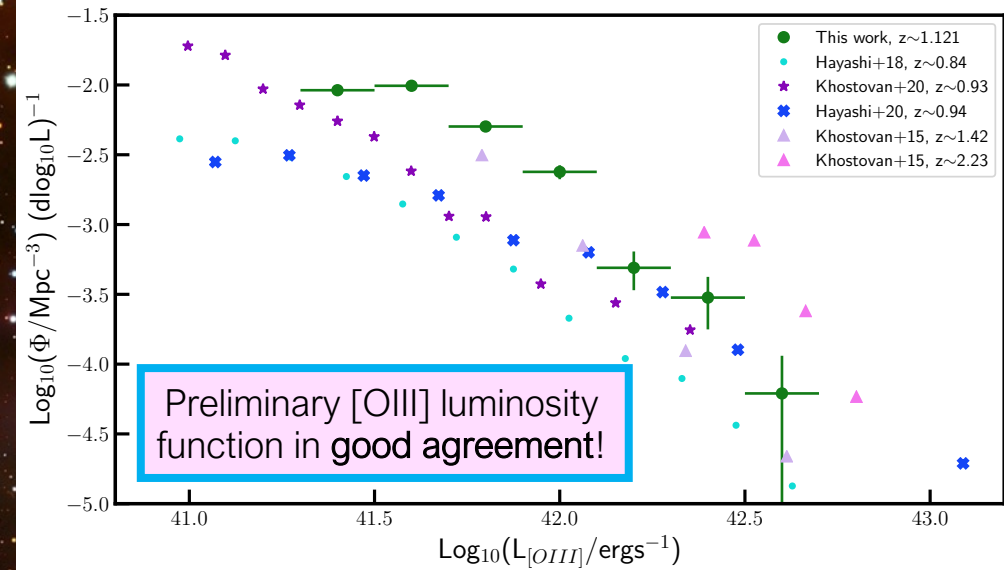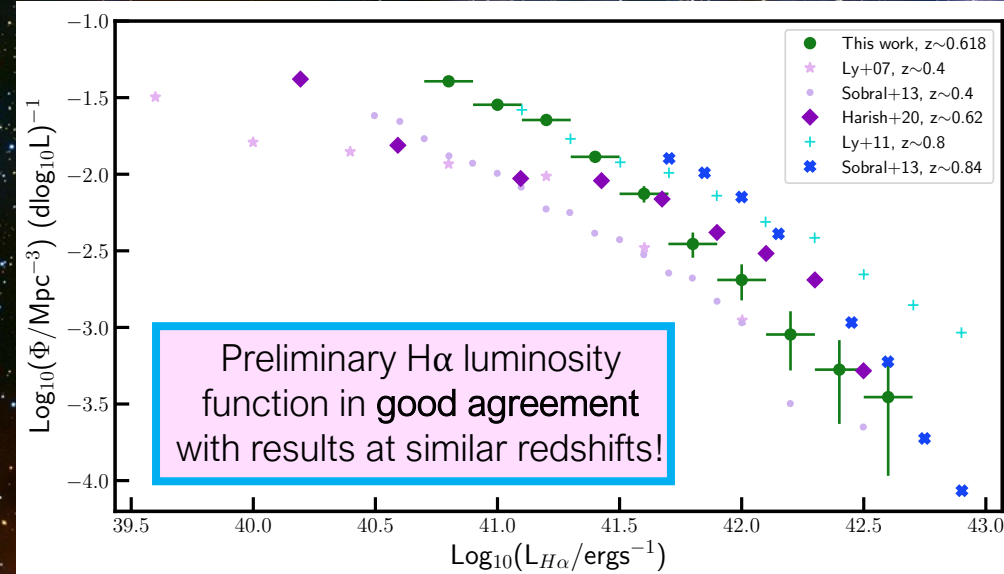
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Preliminary Hα luminosity function in **good agreement** with results at similar redshifts!

Preliminary [OIII] luminosity function in **good agreement**!

Table 1:
Preliminary numbers for each emission line and each field

	Hα	**[OIII]**	**[OII]**
COSMOS	657	478	182
GOODS-S	77	74	39

Summary

- **Y-NBS** is a **wide, narrowband survey** designed to find **line emitters** through different redshifts in the **COSMOS** field

- We find 100s of **Hα, [OIII] and [OII] emitters** – see Table 1

- We find that our preliminary results are looking promising – **look out for the paper on ArXiV very soon!**

- See https://youtu.be/mx8IRf7WmPs or the FLARE session on Tues AM for more about how we also use this data to search for Lyα emitters in the epoch of reionisation

- Please feel free to contact me: @heatherphoenixx h.wade@lancaster.ac.uk