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## Constraints to the evolution of Lyman- $\alpha$ bright galaxies between $z=3$ and $z=6$

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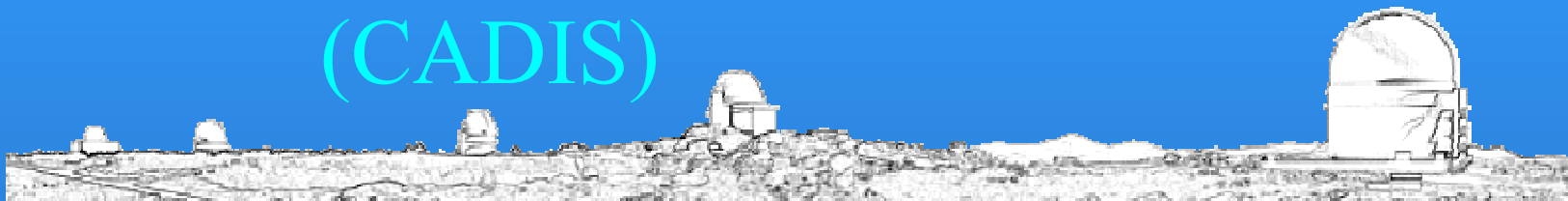
# Constraints to the evolution of Lyman- $\alpha$ bright galaxies between $z\sim 3$ and $z\sim 6$

Christian Maier  
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# Outline

- Selection of Lyman- $\alpha$  galaxy candidates from the CADIS (**C**alar **A**lto **D**eep **I**maging **S**urvey) emission line sample
- Spectroscopic follow-up with the VLT
- The abundance of Lyman- $\alpha$  galaxies at  $3 < z < 6$ , and implications for the epoch of reionization

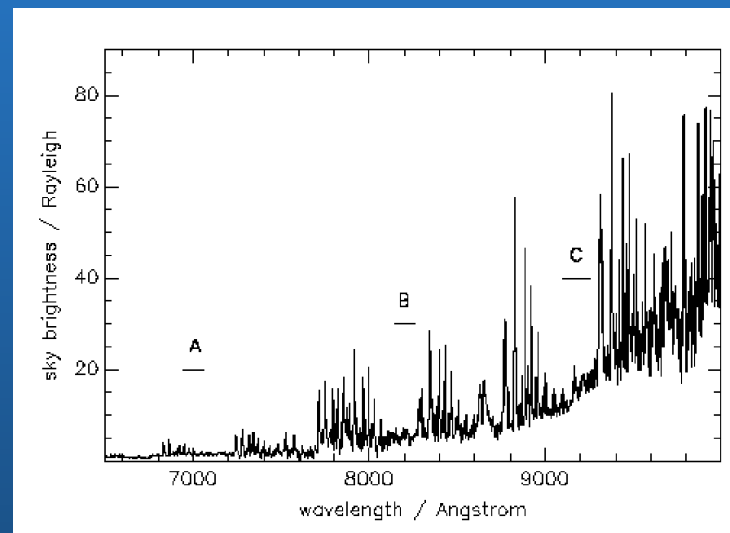
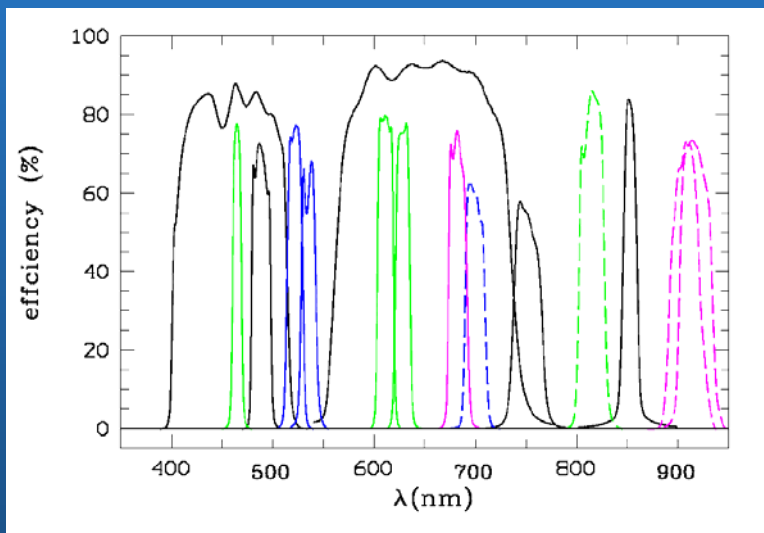
# The Calar Alto Deep Imaging Survey (CADIS)



4 CADIS fields (field size  $\sim 100\text{arcmin}^2$ )

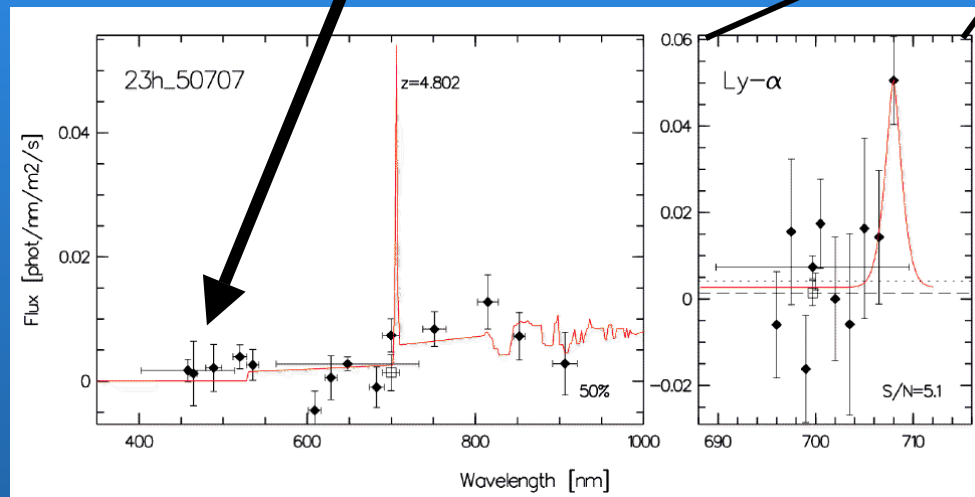
14 optical filter (+2 NIR)

3 Fabry-Perot Windows



# Selection of Lyman- $\alpha$ candidates

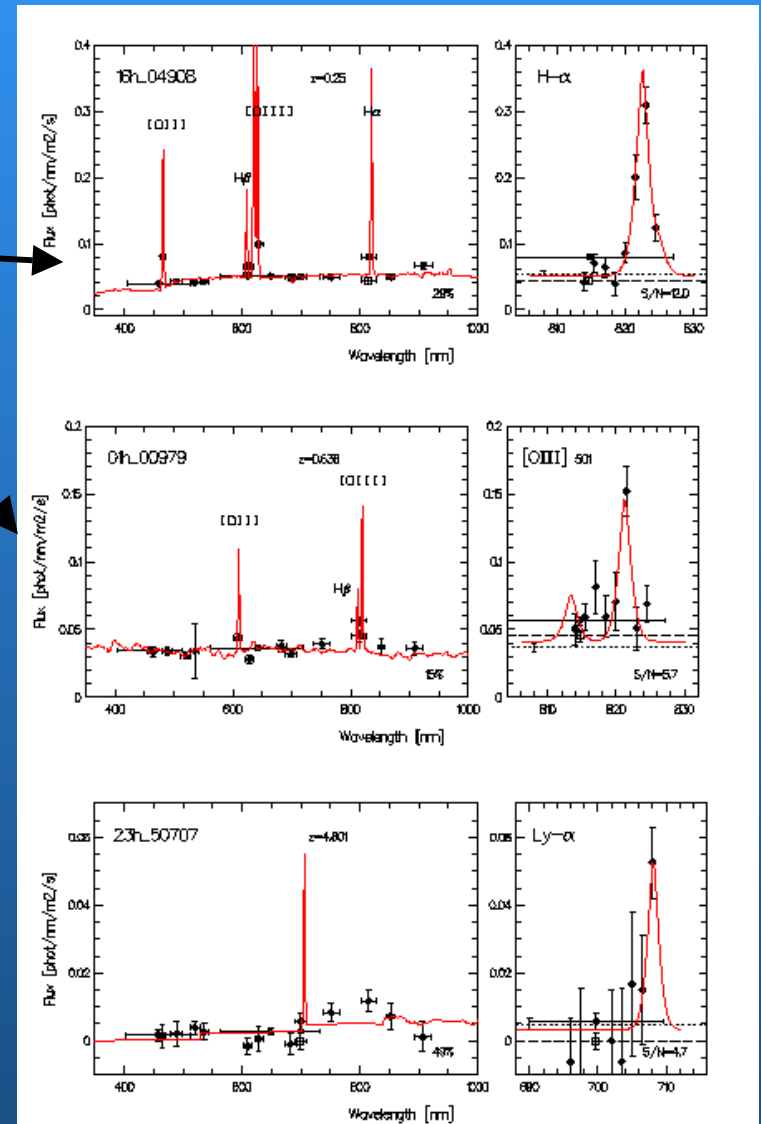
- 845 emission lines detected by the Fabry-Perot
- No flux in CADIS-B filter



- No bright objects closer than 3 arcseconds
- No signal in veto-filters

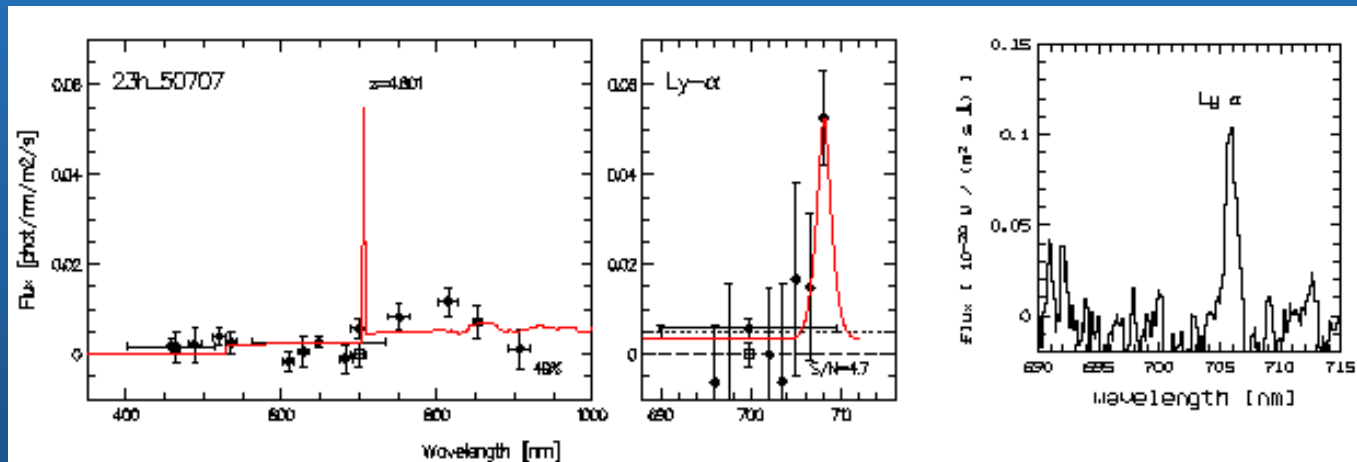
# Selection of Lyman- $\alpha$ candidates

- Signal in veto-filters  $\rightarrow$  Low redshift galaxies
- Continuum step across the emission line or no continuum detected
- 16 likely [OII] $\lambda$ 3727 lines
- 21 Lyman- $\alpha$  candidates  
~3% of the ELGs



# Spectroscopic follow-up

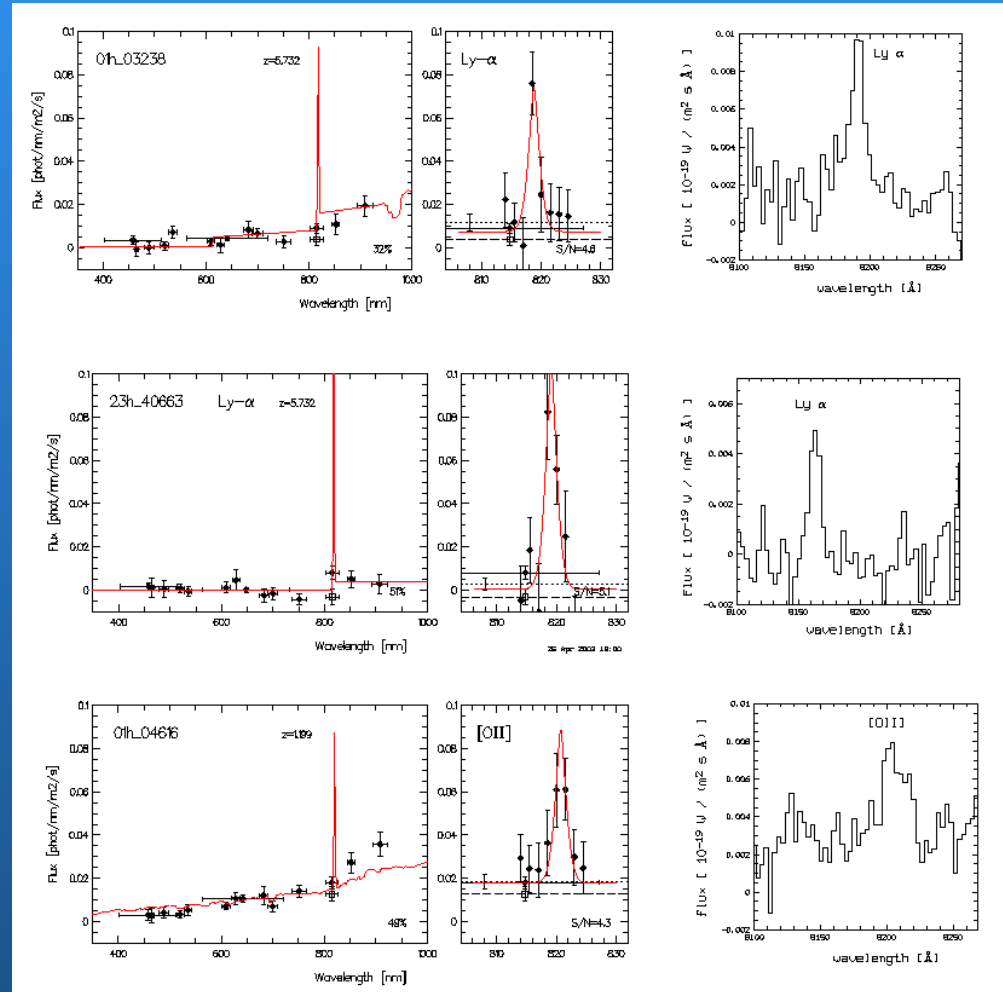
- spectroscopic follow-up of 8 Lyman- $\alpha$  candidates with the VLT
- 4 verified emission lines
- 1 likely Lyman- $\alpha$  galaxy at  $z \sim 4.8$



# Spectroscopic follow-up

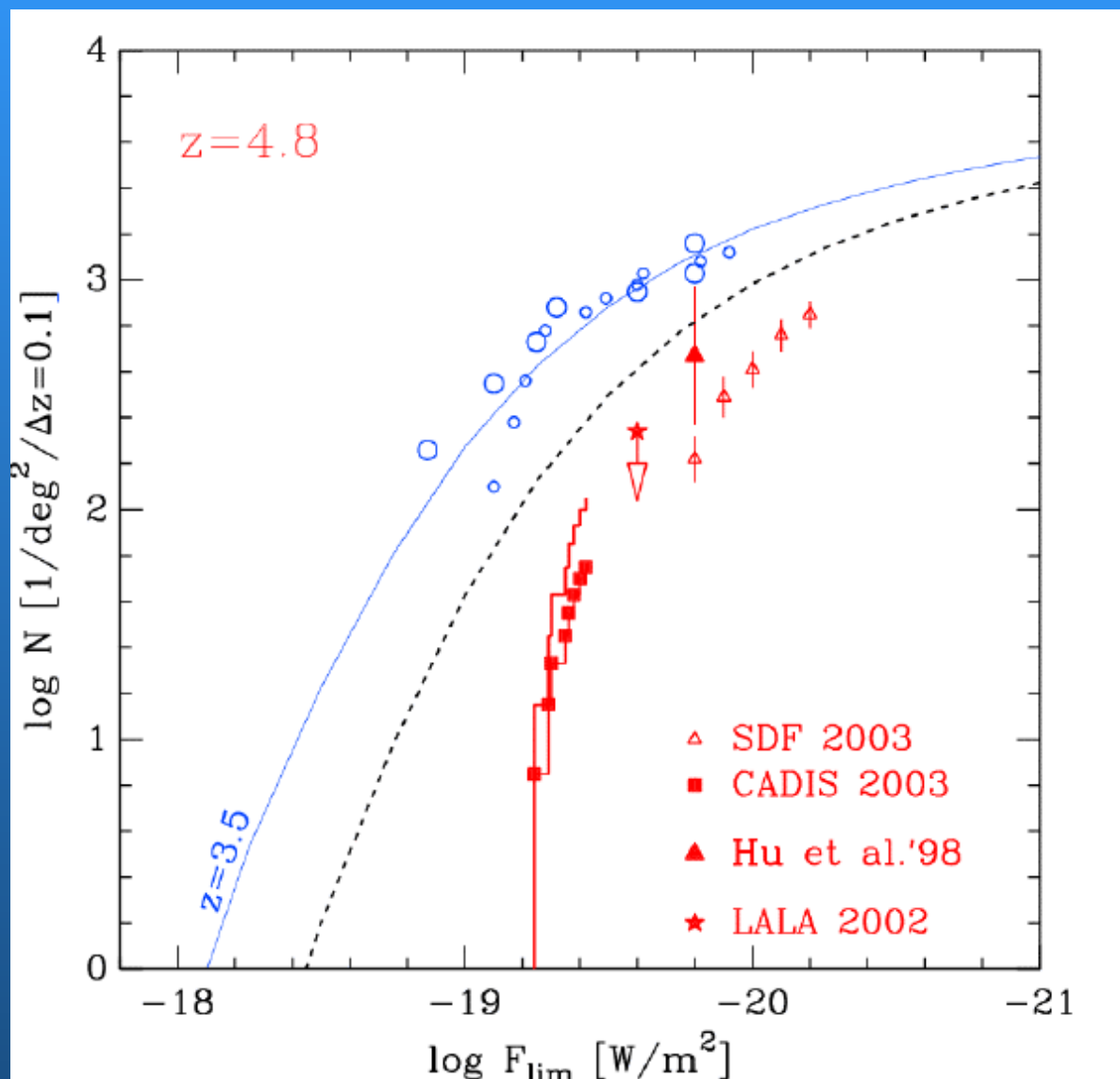
2 likely Lyman- $\alpha$  emitting galaxies at  $z \sim 5.7$

1 probable [OII] emission line at  $z \sim 1.2$

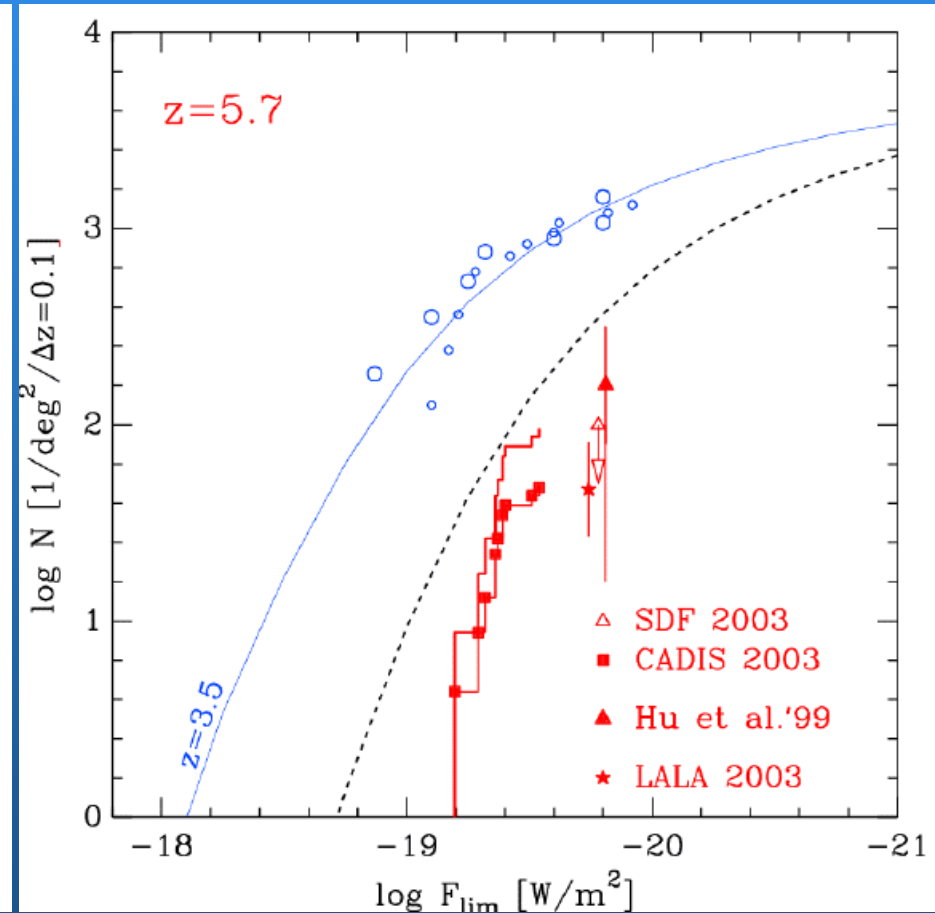
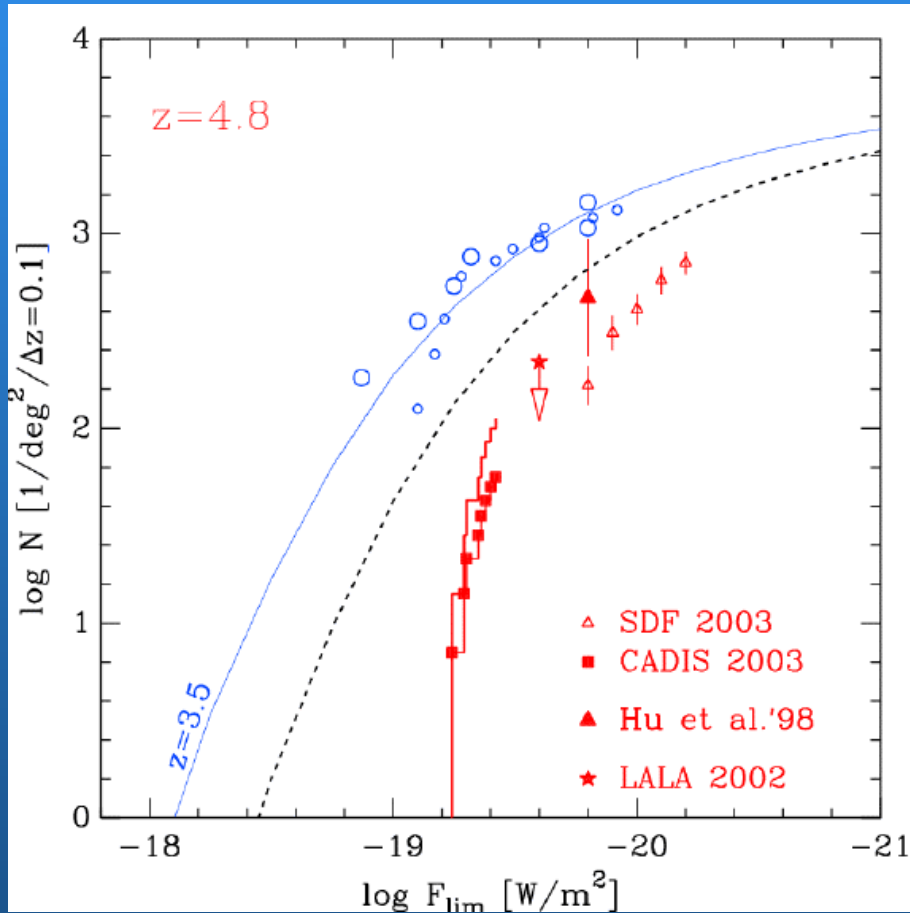




# Abundance of Lyman- $\alpha$ galaxies



# Abundance of Lyman- $\alpha$ Galaxies



# Conclusions

- Bright Lyman- $\alpha$  galaxies are significantly rarer at  $z > 5$  than at  $z \sim 3.5$
- Decrease in density for galaxies with  $\text{SFR} \sim 11 M_{\text{sun}}/\text{yr}$  between  $z \sim 3$  and  $z \sim 6$
- Peak of the Lyman- $\alpha$  bright phase (i.e., the peak of the first formation of massive stars) is reached after  $z \sim 6$
- Consistent with reionization of the universe does not occur long before  $z \sim 6$