Reionization: When – How - What is left ?

CMB : T and polarisation – large and small scales

Transmission of flux in high-z objects (z=6 qsos and GRBs)

Direct HeII observations (lower z than HI)

Sources of ionization

The IGM: Temperature and Metals

Galaxy formation

# Discussion : Astro-constraints of Re-ionization

## Metals from low to high-z:

R. Srianand : Cosmological evolution of the gas : Galaxy/Absorption pairs low-z
DLA Lya emission high-z; Dust and 21cm absorption

George Becker : OI-CIV at z>5 : Decrease of OmegaCIV and large OmegaOI
+ T and HeII reionization

Sowgat Muzahid : Sample of OVI in the IGM (collision vs photoionization)

## Ionizing Background; TIGM– Transmission of IGM:

Alex P. Calverley : UVB from proximity effect at z>5

Claude-André Faucher-Giguère: Gamma from Mean decrement in highish-res data

Antonella Maselli: Getting xHI at z>6 from apparent shrinking criterion (Delta and LT)

Tomonori Totani (+Lya em) : Using GRBs to detect Damped wings from ISM

Simona Gallerani : Model of reionization vs QSOs (gaps) and GRB spectra

Sebastiano Cantalupo: HII regions around re-ionization sources (emission – RT)-> C + sigmaT

## The Forests:

James Bolton : What is left by re-ionization in the Lya forest -> Temperature z=6

Gabor Worseck : HeII reionization – New COS obs (Galex selection)

## CMB:

Gil Holder : Reionization scenarios and CMB : 3 point-information pb; small scales: did you say difficult ?

Marian Doupis : Planck and EoR:

QSOABS: Galaxy-QSO pairs :

What about the gas outside the disk of galaxies ?

SFR integrated ? : why should you see a correlation between W(MgII) and SFR because « in principle » not selected on absorption criteria but SFR (except it must be inside the fiber) ?

Lya emission from DLAs : relation with CII* ?

What about the prospect of performing 21cm absorption blind surveys ?

Metals at high-z :

OI: Is SDSS1148+52 representative ? (QSO ex

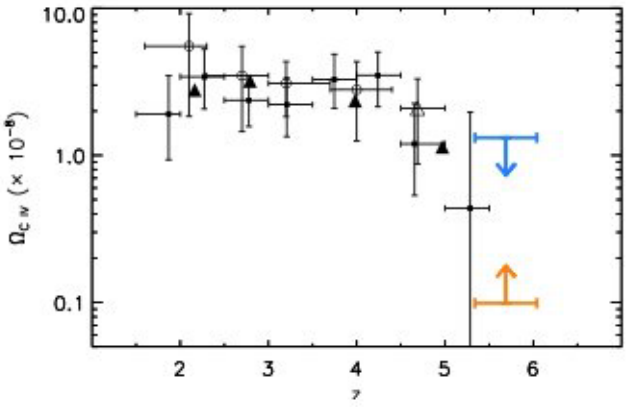
Not far away from QSO + QSO in front

Omega_CIV / OVI ? Still large ?

Change in ionization ? May be but Z ?

-> No HeII photons: What about 100Ms stars ?

-> Future ? Increase nb of observations (X-shooter)

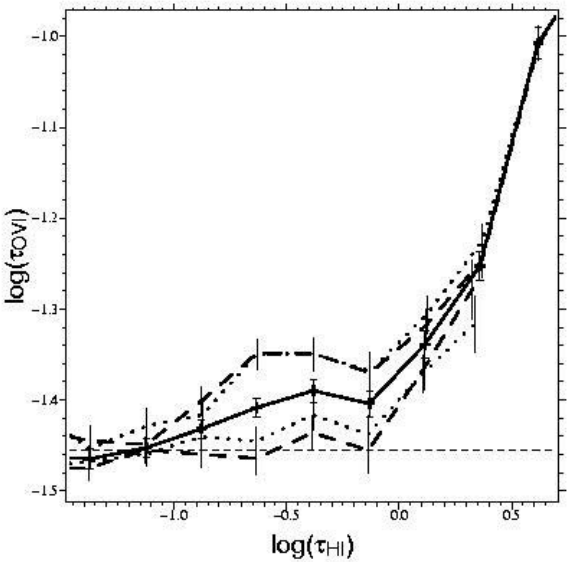



What is the metallicity of the IGM ?

OVI : collisional – photoioinization ?

CIV and OVI are not from the same phase

-> Large amount of metals in hot gas ?




Aracil et al. (2004)

Lya forest : T must be important (energy input during reionization) ->

see Theuns et al. and Schaye et al.

What about blending at high-z because of the steep part of the absorptions (=>low-T) ?

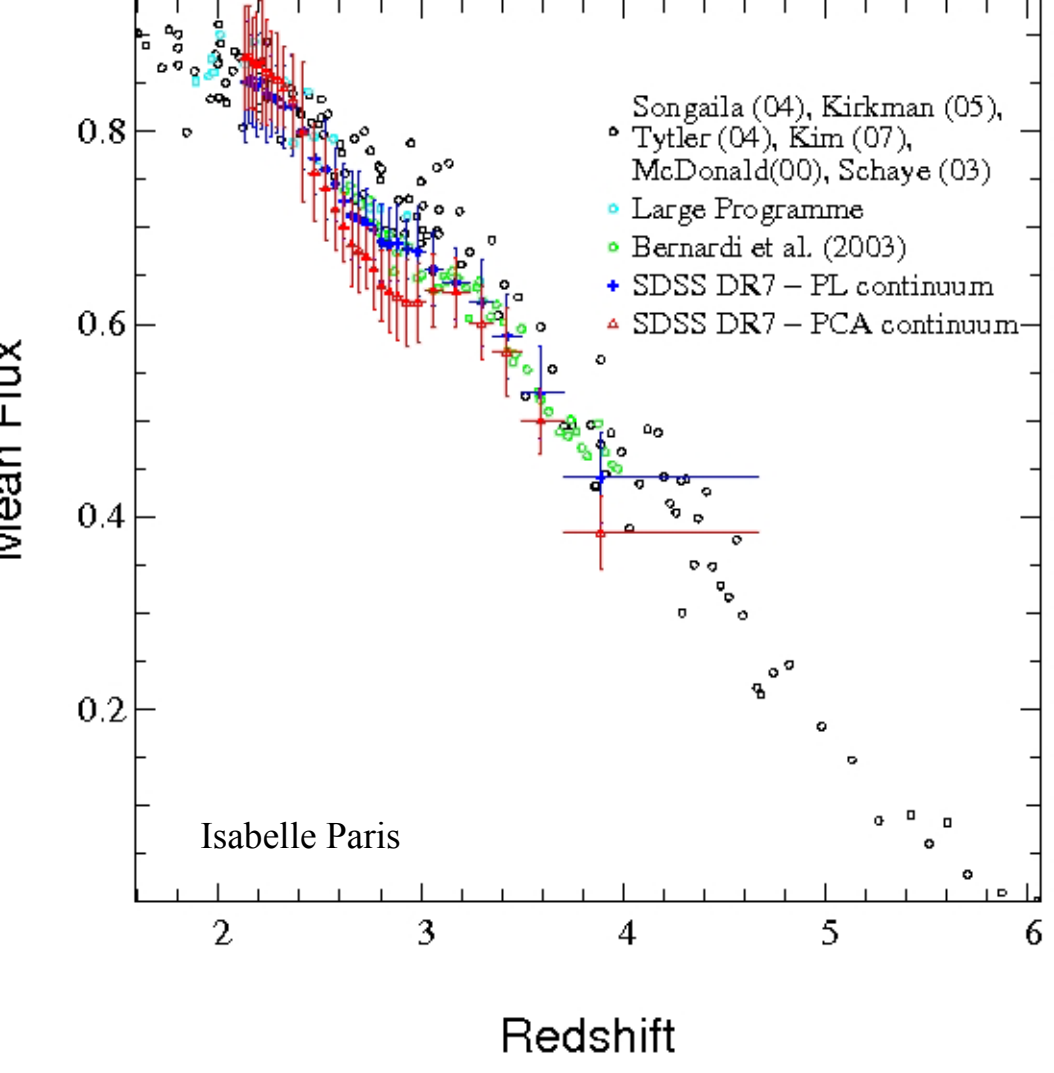
Simulations: Temperature: What about sigmaT ?
Instantaneous reionization ?
Degeneracy… What about equation of state ?
RT?

Nb of ionizing photons in the IGM: break at z=6 between Lya and Lya emitters : High f; alpha=1; large nb of unseen sources – Suspicious break ?

Clumpiness factor : RT models: what about sigmaT – what about resolution ?

Z=6: link with reionization ? Is not there degeneracy in gap models ?

Transverse proximity effect: what about orientation ?




Mean flux decrement

Continuum bias ?

eII reionization : Very important; Are there enough photons by z=3.2 ?

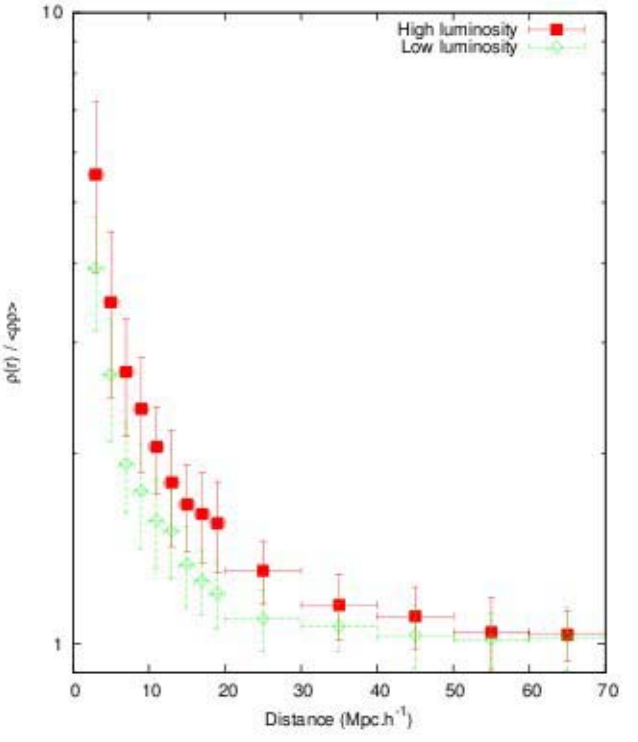
Direct observation

Ionizing flux : Do we know how to count sources ? Escape fraction ?

Proximity effect at high-z:

What about overdensities ?  zem ? Continuum ?

Do not use one los only.




GRBs : Very important -> Future mission SVOM

How to deconvolve ISM (10**22) and IGM ?

=> can argue from OI/CIV that NHI gets larger

ELTs : fast enough ?

Guimaraes et al.

CMB and reionization

Large scale: 3 useful pieces of information

Small scale: South Pole telescope -> Prospect ?

Simulations