
21cm - optical surveys LSS correlation meeting - 14 June 2012
----- Meeting (teleconf) summary R. Ansari -----

The slides and this eating summary can be found at :
<http://indico2.lal.in2p3.fr/indico/conferenceDisplay.py?confId=1871>

Presentations :

- 1/ Presentation by Ana-Sofia Torrento
ALFALFA <> SDSS correlation analysis / Toribio et al 2011
- 2/ Presentation by Jaswant Kumar Yadav
HI content of galaxies : semi analytical simulation results
- 3/ Comment by Xuelei Chen
Discussion of Neutral Hydrogen distribution in the universe by Xin Wang

Discussion summary :

Two parallel tracks are considered for the work

A/ a fast track work to compute the expected correlation of 21 cm intensity mapping surveys with optical surveys (SDSS , DEEP2 ...). The aim is the use simple model of HI mass distribution as function of optical properties in order to compute expected correlation which could be measured by an intensity mapping survey, with a publication draft ready in fall 2012 (referred to as Paper I)

Possible contributors in France:

R. Ansari, J.E. Campagne, J.M. Martin, A.S. Torrento
and possibly C. Magneville

Possible contributors in NAOC - Beijing :

X. Chen, Jaswant Kumar (?- TBC), Yidong XU (?- TBC)

B/ A more in depth work to understand HI distribution in galaxies and the intergalactic medium, evolution with redshift, galaxy types and optical properties, galaxy environment ... can be performed using simulations and existing data. J.M. Martin mentions also the possibility of using the results from the "NIBLES" 21 cm survey of SDSS galaxies at Nançay. J.M.M is member of the NIBLES consortium and the data should be made public soon. We will probably need more time to organize this second track and produce interesting results (Paper II). J.M.Martin would be the lead person on the french side for this work, who suggests also to contact and discuss with other french groups (simulations groups at LUTH & AIM/IRFU-CEA, NGVS (Virgo) survey ...

Paper I plan & work packages :

1/ Introduction :

Intensity mapping, CRT, BAORadio & Tianlai projects
paper aim & organization

2/ Method

- 2.a Start from the optical catalog (SDSS, DEEP2) { $\alpha, \delta, z, \text{mag} \dots$ }
- 2.b Use a model for M_{HI} = function (optical properties - magnitude/color)
- 2.c Produce a 3D data cube of m_{HI} distribution
- 2.d Convert m_{HI} to $T_{21}(\alpha, \delta, \text{frequency})$
- 2.e Add radio foreground contribution

2.f Apply instrument response & noise (T_{sys})

2.g Compute the correlation signal

3/ $M_{\text{HI}} = \text{fct}(\text{optical properties})$ models

Description of the models used and uncertainties

$M_{\text{HI}} = L^{\alpha}$, $\alpha \sim 0.6$

How can we estimate the contribution of low mass, low luminosity objects which can contain a significant fraction of the total H_{I} mass

4/ Instrument response :

- Define 2 or 3 instrument configurations , for example a single dish such as the Nançay radio telescope (NRT) , and ~ 20 element interferometer with $\sim 500 \text{ m}^2$ collecting area

- Describe the survey strategy (transit ?) and how to apply the instrument response

5/ The results :

Define the correlation measure, presentation & discussion of the results

6/ Conclusion

We need to discuss the work organization and distribution of work packages. On the french side, we should be able to provide most of the software modules to perform the different steps defined in section 2

(2.a ... 2.g). The software stack would mostly use the FITS files as input/output data format.