GECO - IGM Discussion Circle

Coordinator: Debopam Som

http://wiki.lam.fr/geco/IgmDiscussionCircle

Intergalactic Medium Science

We are interested in:

Discussion in this circle is focused on the intergalactic medium, the gaseous medium on scales beyond the immediate boundaries of galaxies. This includes physical properties (metallicity, density, temperature, and ionisation) and the manner in which it traces the cosmic web. We discuss the interface with galaxies (known as the circumgalactic medium) through the characteristics of inflows, and the mechanisms of outflows. We consider the connection to star formation through inflow/ejection balance, and metagalactic UV background radiation. Observations are focussed on absorption towards bright background quasars and the potential for emission detection (though absorption towards background galaxies and gamma ray bursts are also of interest).

When and where we meet:

Wednesdays, 11:00 AM - 12:00 PM, once in every two weeks. ***Next Meeting: 15/06/2016***

Mistral, 2nd floor.

Agenda for next meeting: IGM: Jun 15 2016

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- **Gaseous medium surrounding galaxies: CGM - IGM**
  Inflow characteristics, outflow mechanisms, UV background

- **Cosmic Web**

- **Observations - in emission, absorption towards bright background quasars, galaxies, GRBS**

1st Meeting: 10/02/2016

9 meetings so far

Average attendance: 6-7

Past Meetings: IGM:Spring2016

Resources: *Calls and Conferences*

Agenda for IGM Discussion Circle Meeting: 10th Feb 2016

- News and Information (~5-10 mins.)

- Papers:

1. *Molecular Hydrogen Absorption from the Halo of a z~0.4 Galaxy* (Discussion Lead: H. Rahmani)
2. *Possible Signatures of a Cold-Flow Disk from MUSE using a z=1 galaxy--quasar pair towards SDSSJ1422-0001* (Discussion Lead: D. Som)

- AOB

Attendees: Cecile Gry, Isabelle Paris, Hadi Rahmani, Samuel Boissier, Olivier Ilbert, Matthew Pieri, Debopam Som

-- News and updates: Information on upcoming conferences/workshops was shared. The general consensus was that collecting such (conferences/workshops) information and placing it in a wiki page (as a resource page) would be a good idea. Samuel Boissier informed us that such a page already exists on the main GECO wiki page (*here*). All GECO wiki users should be able to edit this page.

1. *Observations of metals in the z ≈ 3.5 intergalactic medium and comparison to the EAGLE simulations* (Discussion Lead: D. Som)

2. *Mapping the low surface brightness Universe in the UV band with Lya emission from IGM filaments* (Discussion Lead: B. Milliard)

3. *The Stacked Lyman-Alpha Emission Profile from the Circum-Galactic Medium of z~2 Quasars* (Discussion Lead: Isabelle Paris)

4. *Element Abundances in a Gas-rich Galaxy at z ~ 5: Clues to the Early Chemical Enrichment of Galaxies* (Discussion Lead: D. Som)

5. *Probing the Cool Interstellar and Circumgalactic Gas of Three Massive Lensing Galaxies at z=0.4-0.7* (Discussion Lead: H. Rahmani)

6. *The ESO UVES Advanced Data Products Quasar Sample - VI. Sub-Damped Lyman-a Metallicity Measurements and the Circum-Galactic Medium* (Discussion Lead: S. Quiret)

7. *Molecular Hydrogen Absorption from the Halo of a z~0.4 Galaxy* (Discussion Lead: H. Rahmani)

8. *Possible Signatures of a Cold-Flow Disk from MUSE using a z=1 galaxy--quasar pair towards SDSSJ1422-0001* (Discussion Lead: D. Som)

- **Talk/Discussions/Conference Summary:**

- Gas/Galaxies On Top Quasars Meeting recently held in Pittsburgh (D. Som)

- Discussions in preparation for the UV prospective meeting (scheduled for Monday, 23/05/2016, 2:00 PM) (B. Milliard)

- Matthew Pieri summarized planned WEAVE activities towards IGM science off the back of the recent WEAVE-QSO CEFCA meeting (9-11 March, 2016)

Special Session: Monday (04/04/2016), 10:00 - 11:00 am, Tremontane.

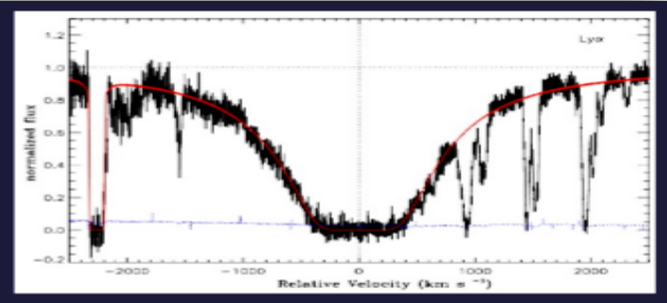
- Hadi Rahmani gave a seminar presentation titled "A study of the circumgalactic medium at low redshift"

Using UVES Archives to Probe the Metal Content of Galaxies

Samuel Quiret
LAM (Laboratoire d'Astrophysique de Marseille)

Sub-DLAs

$19.0 < \log N(H\,I) < 20.3$



Zafar+13

Contribute from **8% to 20%** to the <u>total neutral gas mass density</u>
(with increasing contribution with redshift)

But remain poorly studied in compared to DLAs (because require higher resolution for HI measurements)

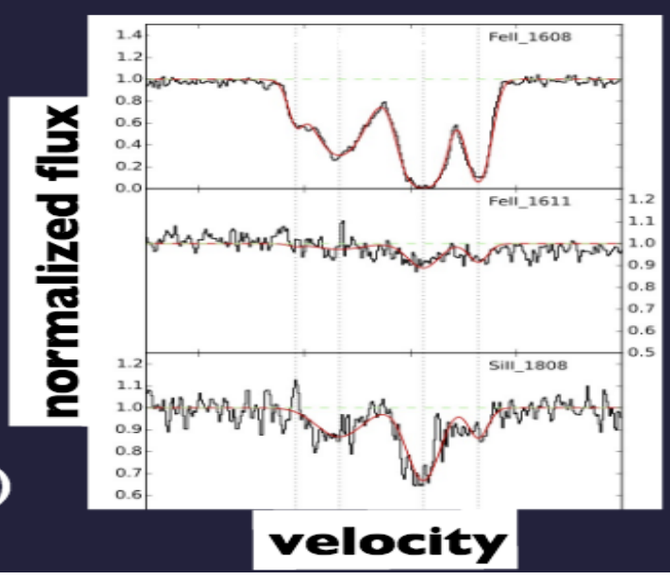
Sample

Zafar+13

ESO UVES Advanced Data Product (EUADP) sample:
250 QSOs w/ UVES VLT => <u>high resolution</u> (R~42000)
from ESO archives

<u>15 new sub-DLA metallicity measurements</u>
+ metallicity measurements from literature

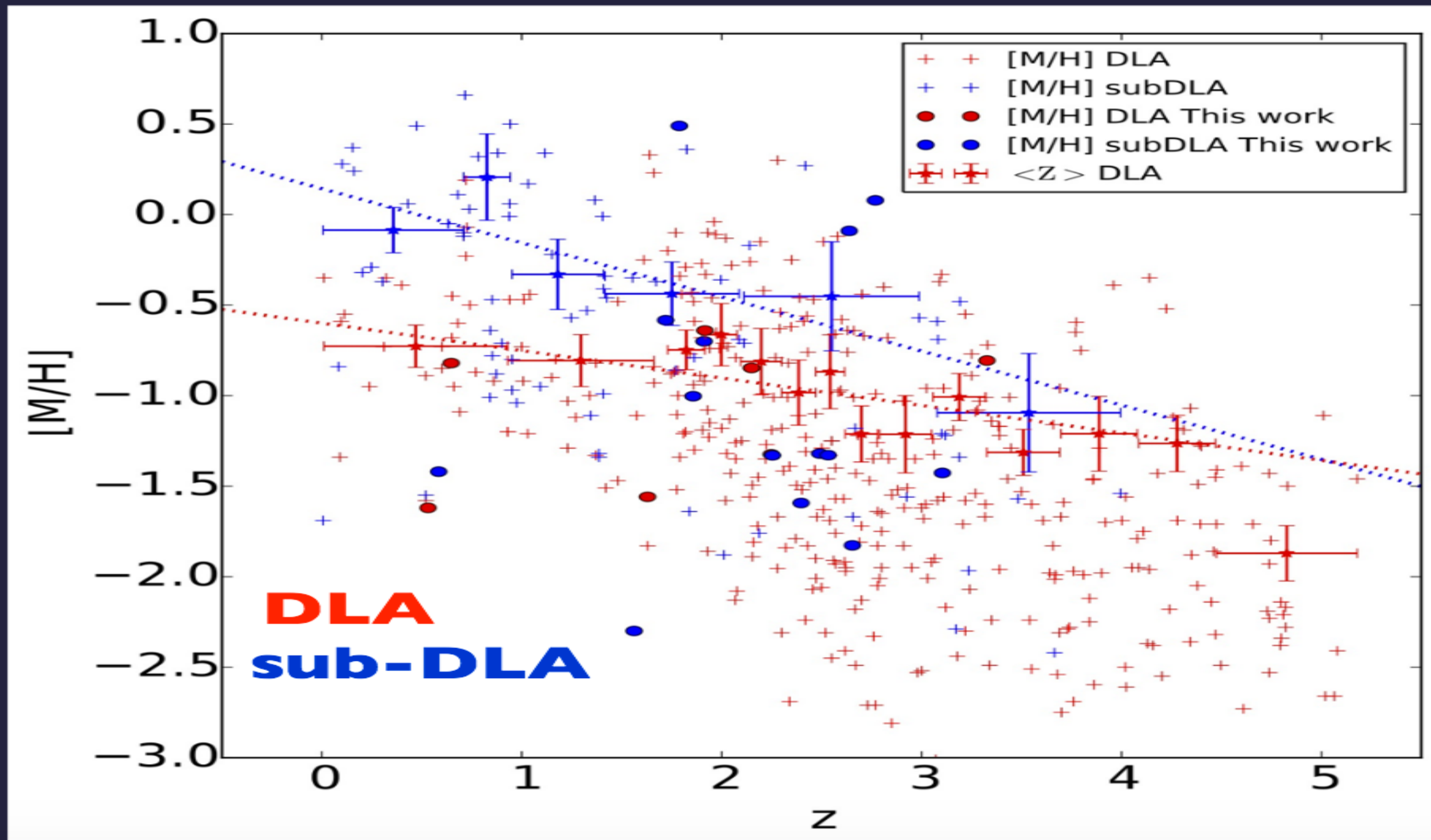
=> EUADP + **92 sub-DLAs**
362 DLAs
(with <u>metallicity measurements</u>)



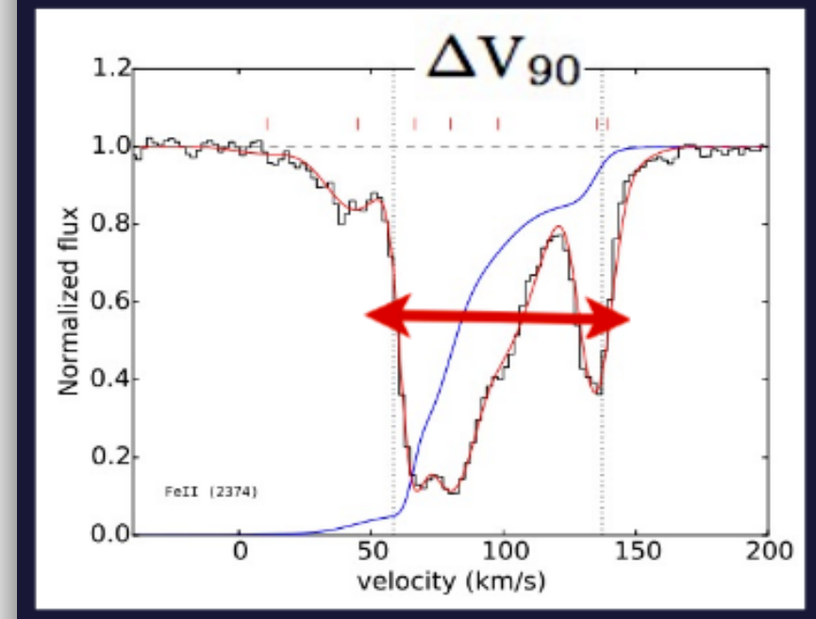
Quiret et al. 2016, MNRAS, 458, 4074

Dust Content

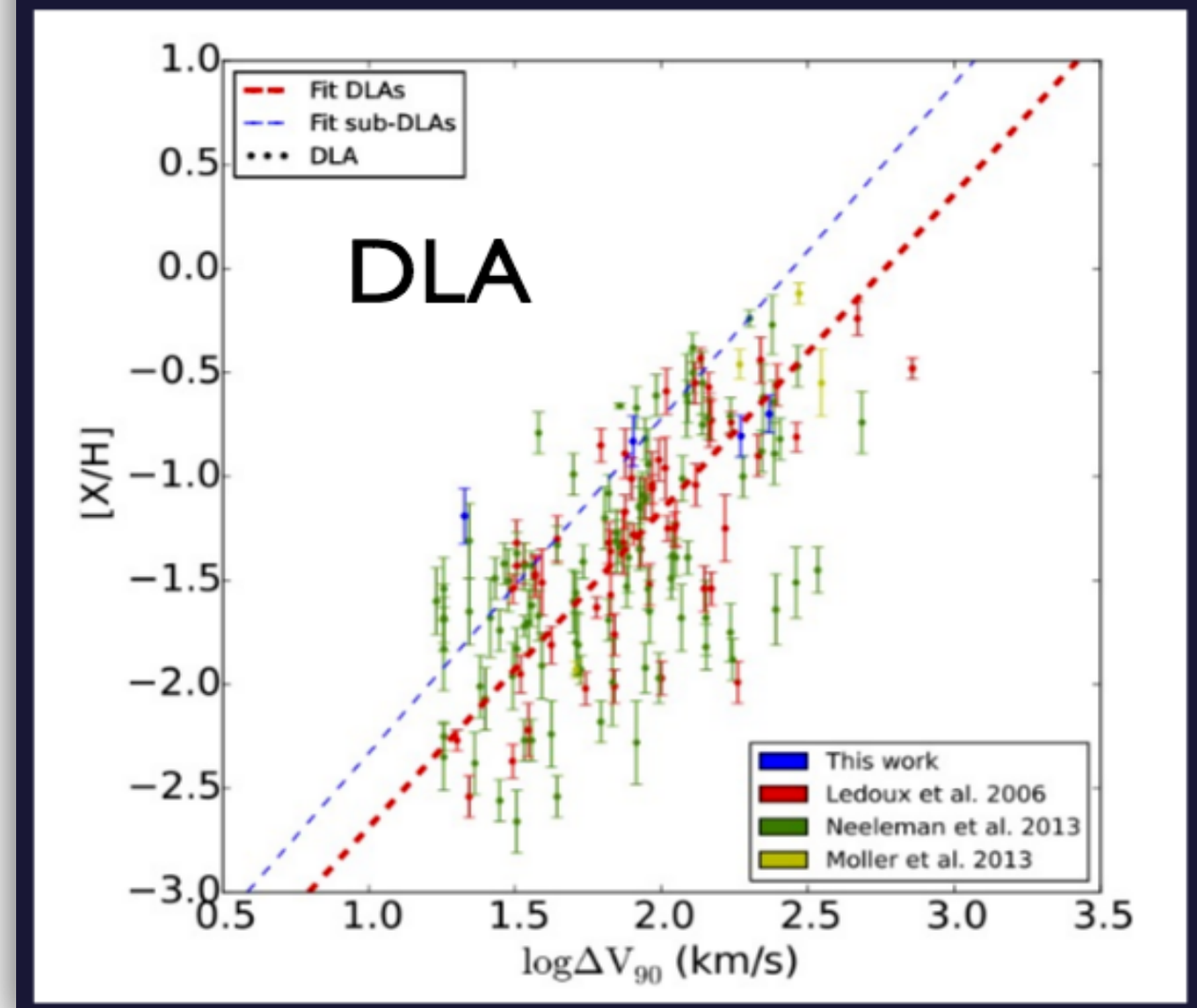
Metallicity evolution

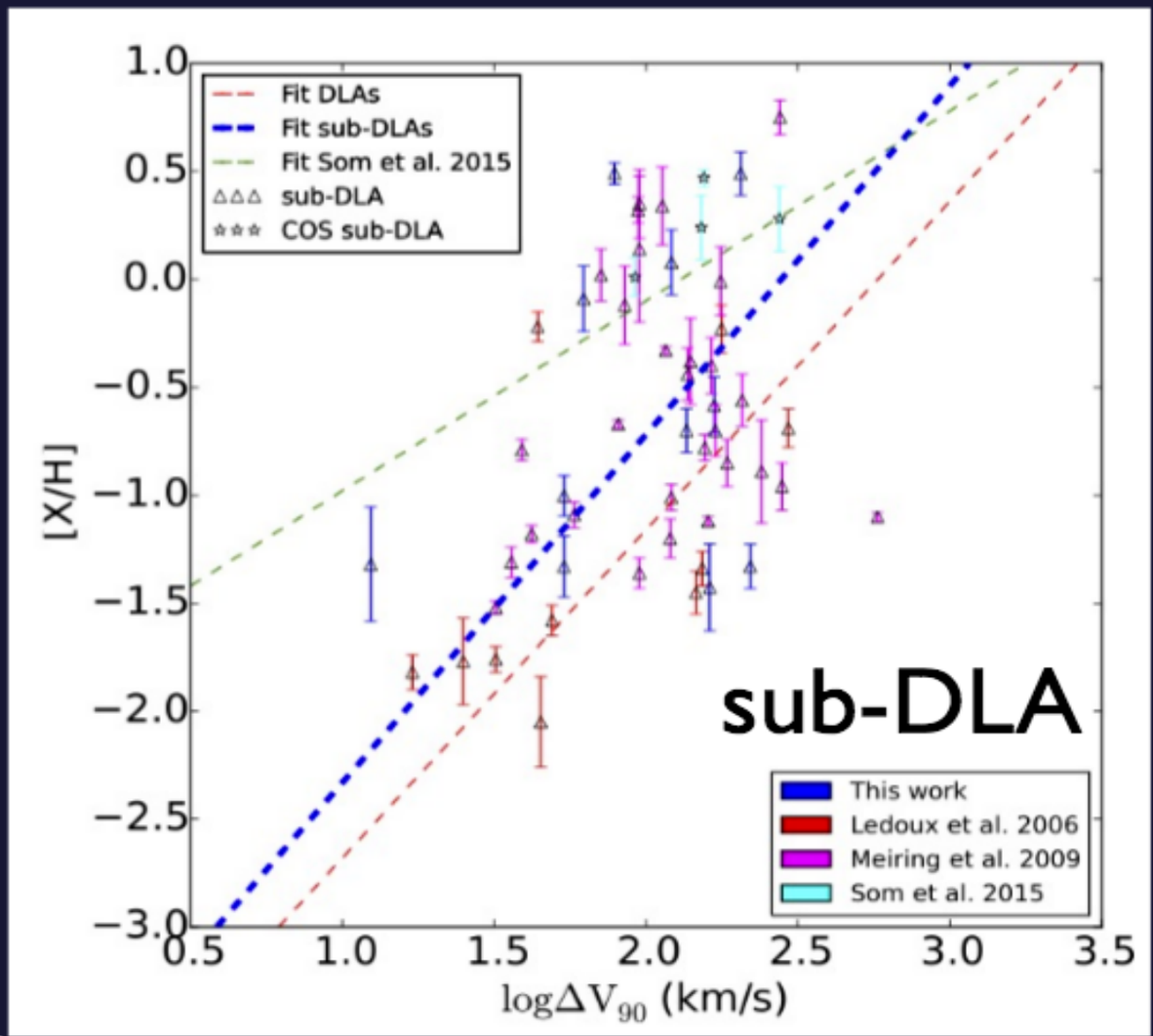


Kinematics



Use VP model to derive Delta_V 90
use many lines simultaneously
prevent blending and saturation effects





POSSIBLE SIGNATURES OF A COLD-FLOW DISK FROM MUSE USING A $z \sim 1$ GALAXY–QUASAR PAIR TOWARD SDSS J1422–0001*

N. Bouché[1], H. Finley[2,3], I. Schroetter[2,3], M. T. Murphy[4], P. Richter[5,6], R. Bacon[7], T. Contini[2,3], J. Richard[7], M. Wendt[5,6], S. Kamann[8], B. Epinat[2,9], S. Cantalupo[10], L. A. Straka[11], J. Schaye[11], C. L. Martin[12], C. Péroux[9], L. Wisotzki[5], K. Soto[10], S. Lilly[10], C. M. Carollo[10], J. Brinchmann[11,13], and W. Kollatschny[8] Hide full author list

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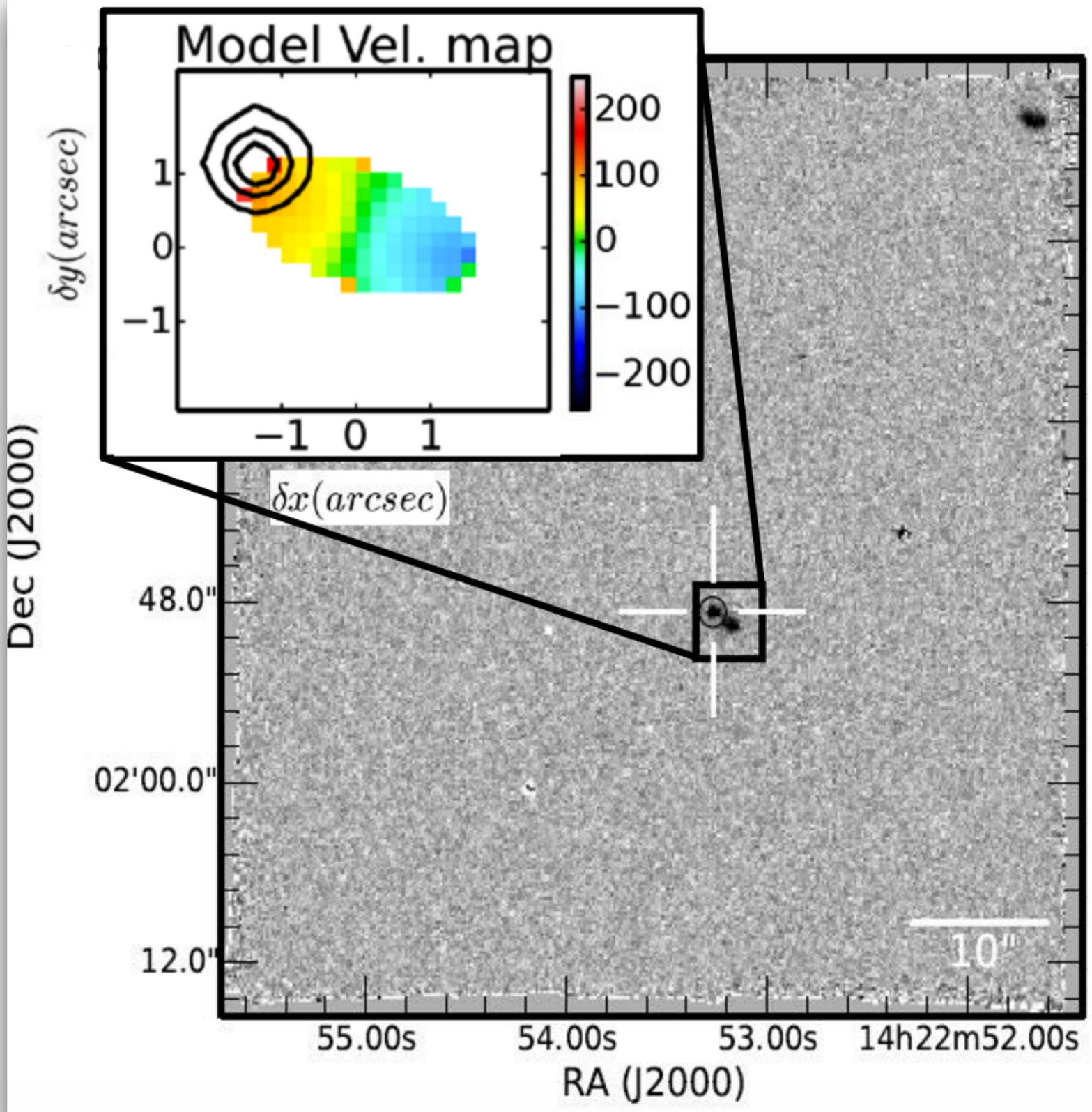


- Modeled with GalPaK3D
  Bouché et al., 2015
- Deconvolved galaxy parameters:

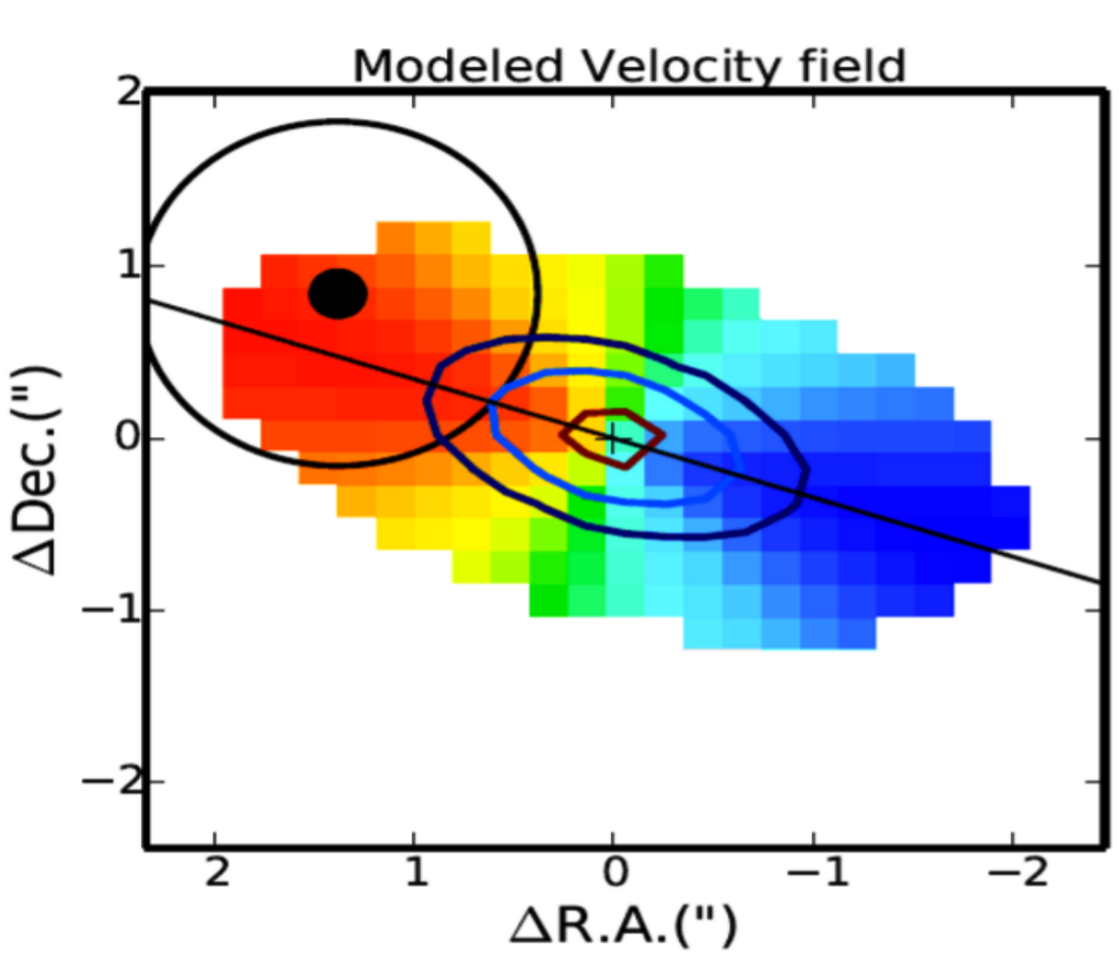
gal. P.A.(°)	71 ± 3
α (°)	15 ± 2
gal. incl. (°)	60 ± 2
$V_{\rm max}$ (km s^{-1})	110 ± 10
$M_{\rm h}$ (10^{11}M$_\odot$)	1.9 ± 0.5
$R_{\rm vir}$ (kpc)	90 ± 5
$\rm SFR_{[O\,II],0}$ (M$_\odot$ yr^{-1})	4.7 ± 2.0

Salpeter IMF with E(B-V) = 0.1

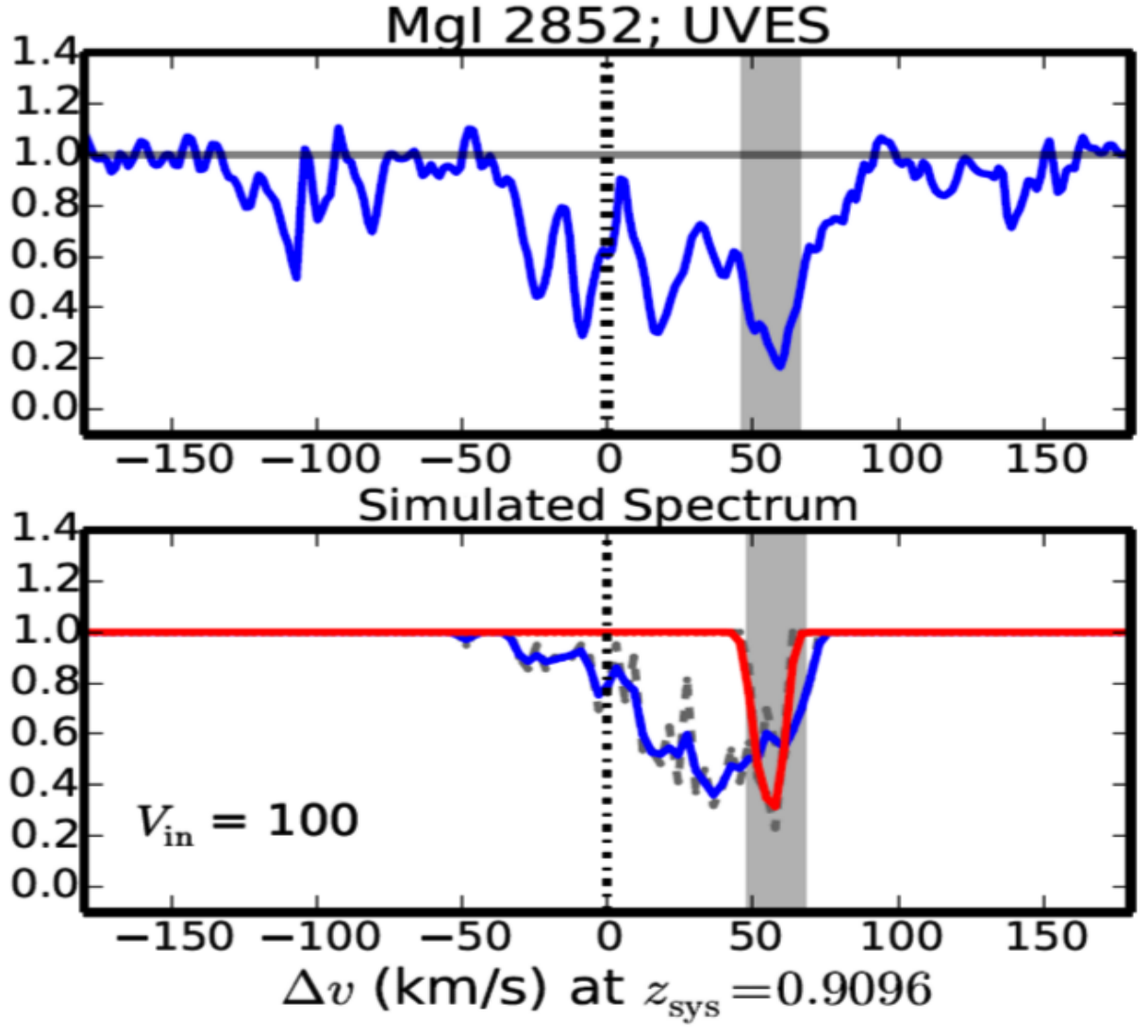
From the presentation of Hayley Finley, GOTOQ, 2016

Evidence of a cold-flow disk

- QSO LOS ~15º from galaxy major axis with b = 12 kpc
- Galaxy metallicity ~ solar, abs sys metallicity ~ ½ solar
- Model of inflowing gas + galaxy disk recreates observations
- Mass infall rate > 8 $M_\odot$ yr^{-1} (~2 – 3 times the SFR)



Contours show flux profile at
50, 150, 500 x 10^{-20} erg s^{-1} cm^{-2} $arcsec^{-2}$



From the presentation of Hayley Finley, GOTOQ, 2016

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