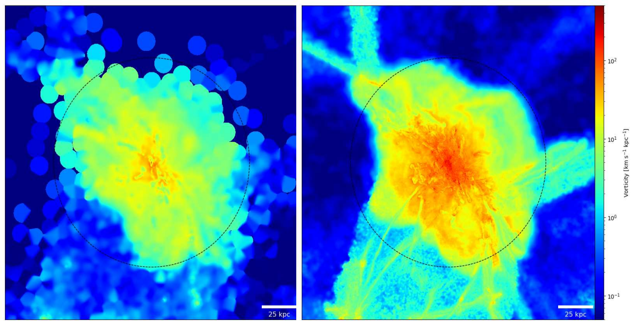
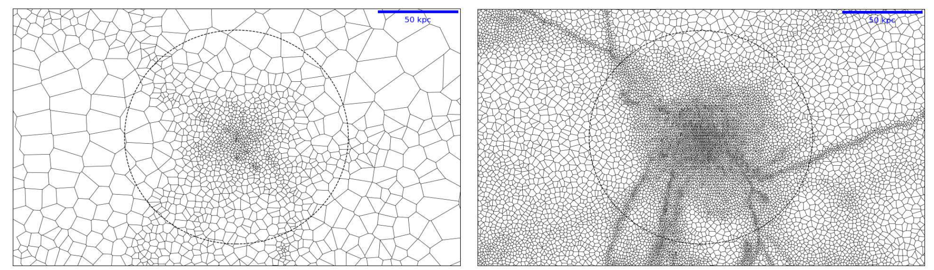
Resolving shock heating & turbulence in high-z massive galaxies

- Developed a new 'shock refinement' scheme
- Quantifying the impact of in-shock cooling in the CGM of accreting galaxies
- Investigating the energy stored in turbulent motions at different numerical resolutions





Jake Bennett
PhD Student with Debora Sijacki

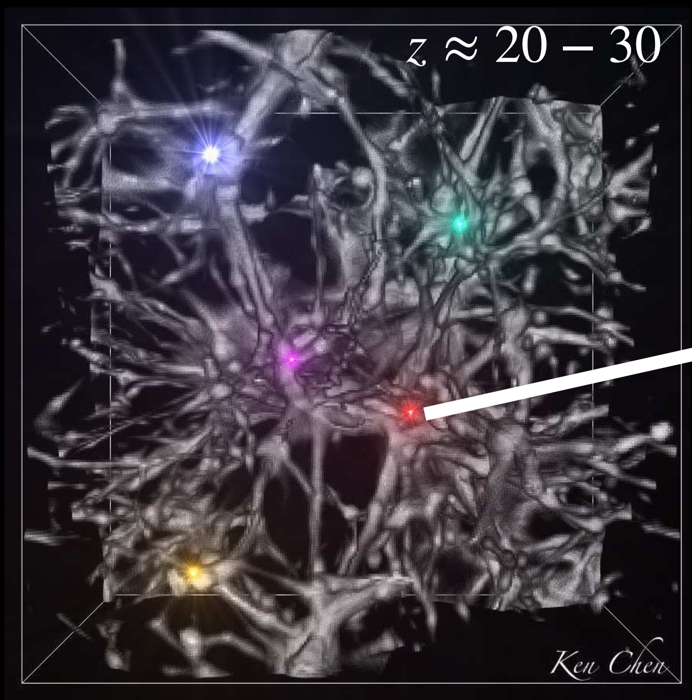
Institute of Astronomy & KICC, University of Cambridge

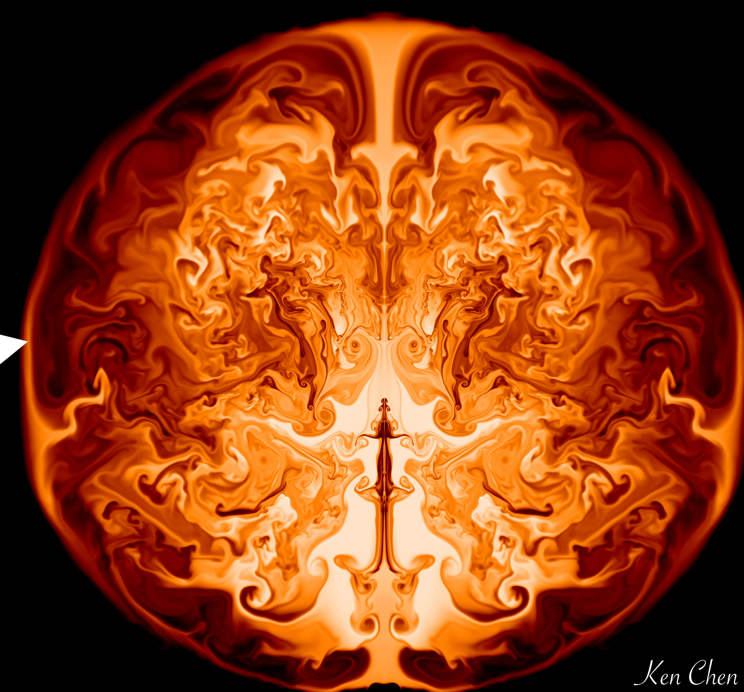
Contact: jsb210@cam.ac.uk

From the First Supernovae to Galaxies

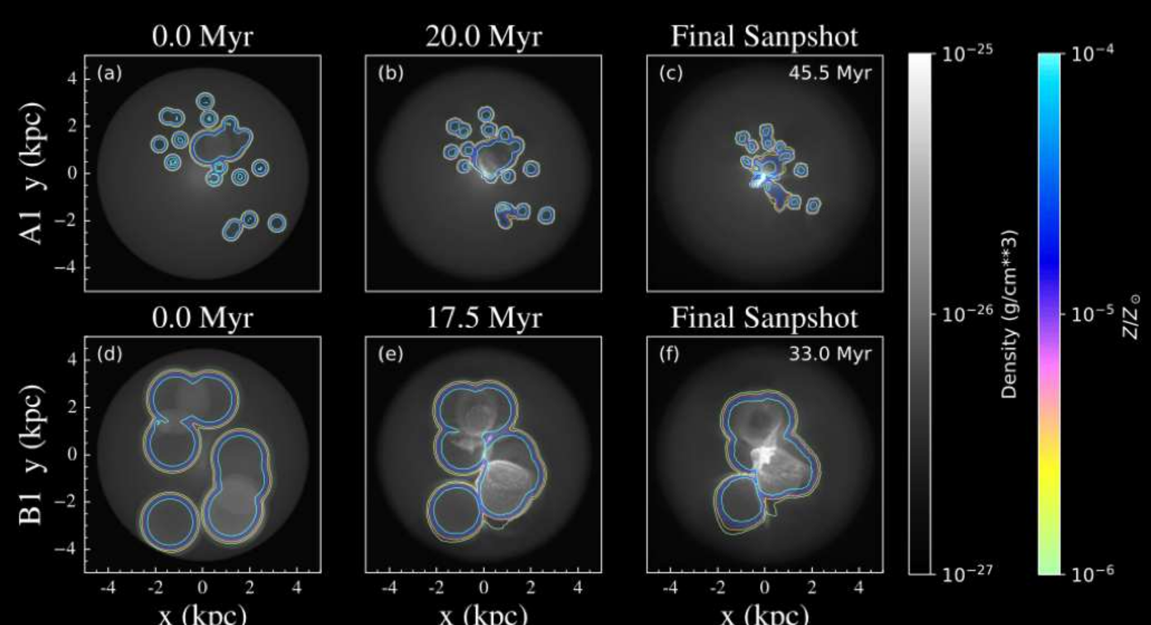
Ke-Jung (Ken) Chen and Li-Hsin Chen

Academia Sinica Institute of Astronomy and Astrophysics (ASIAA)

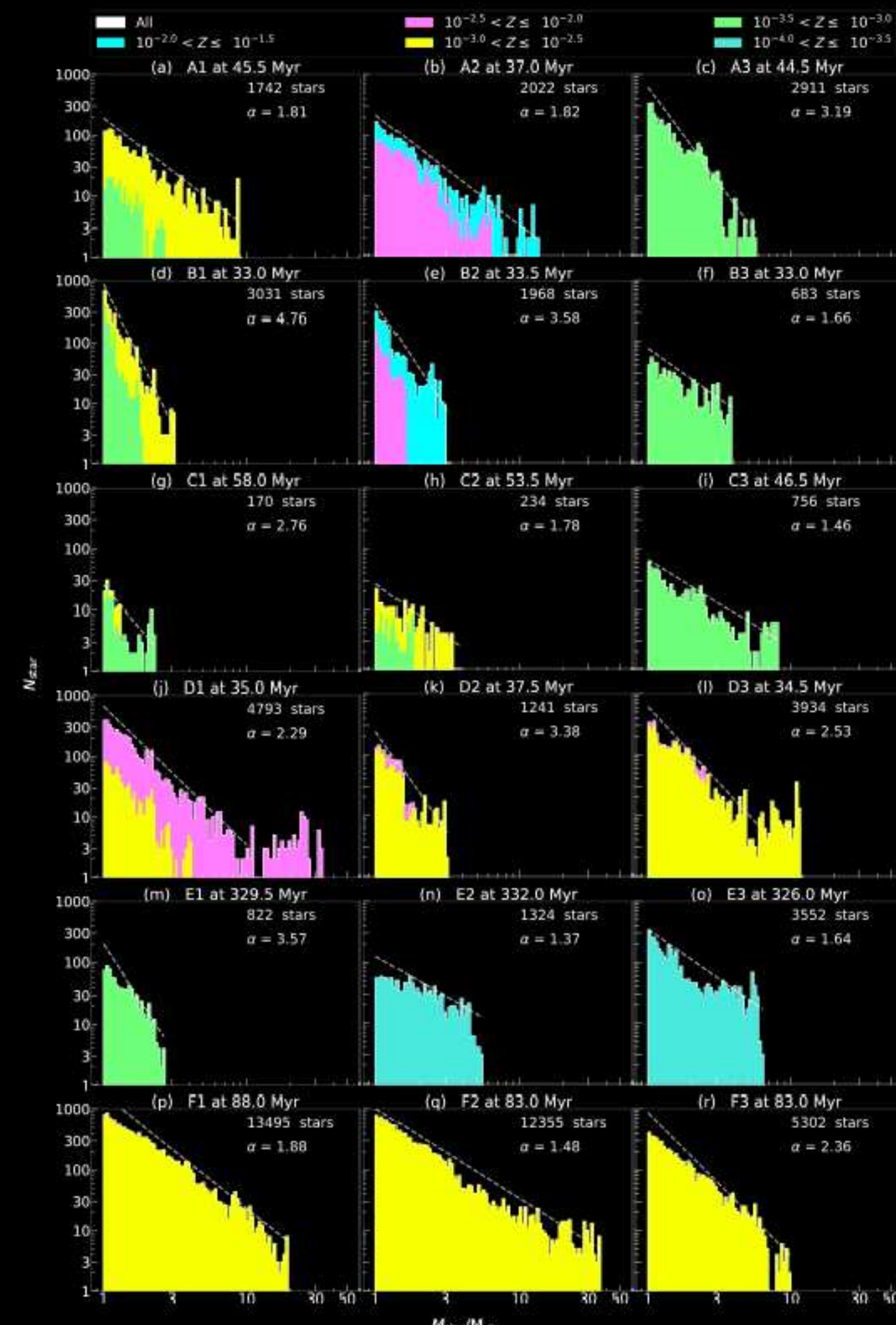




Pop III Stars (IMF?) > Supernovae (types, yields, energetics?)



Controlled simulations of Pop III SNRs+DM halos



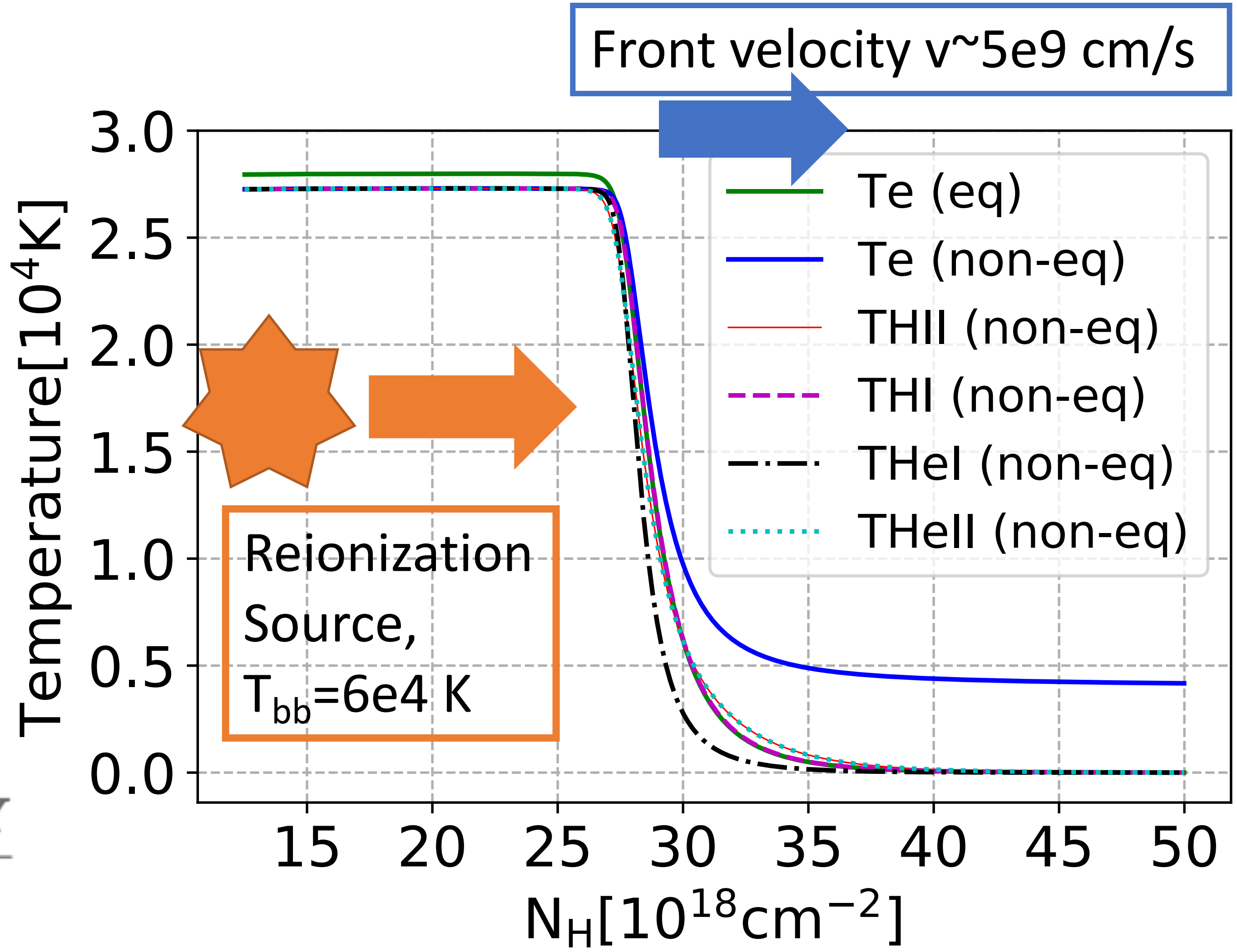
IMFs of the first galaxies and the observability for JWST

Temperature evolution of the IGM species with baryon interactions during the EoR

Chenxiao Zeng & Chris Hirata

The Ohio State University

Center for Cosmology and Astroparticle Physics

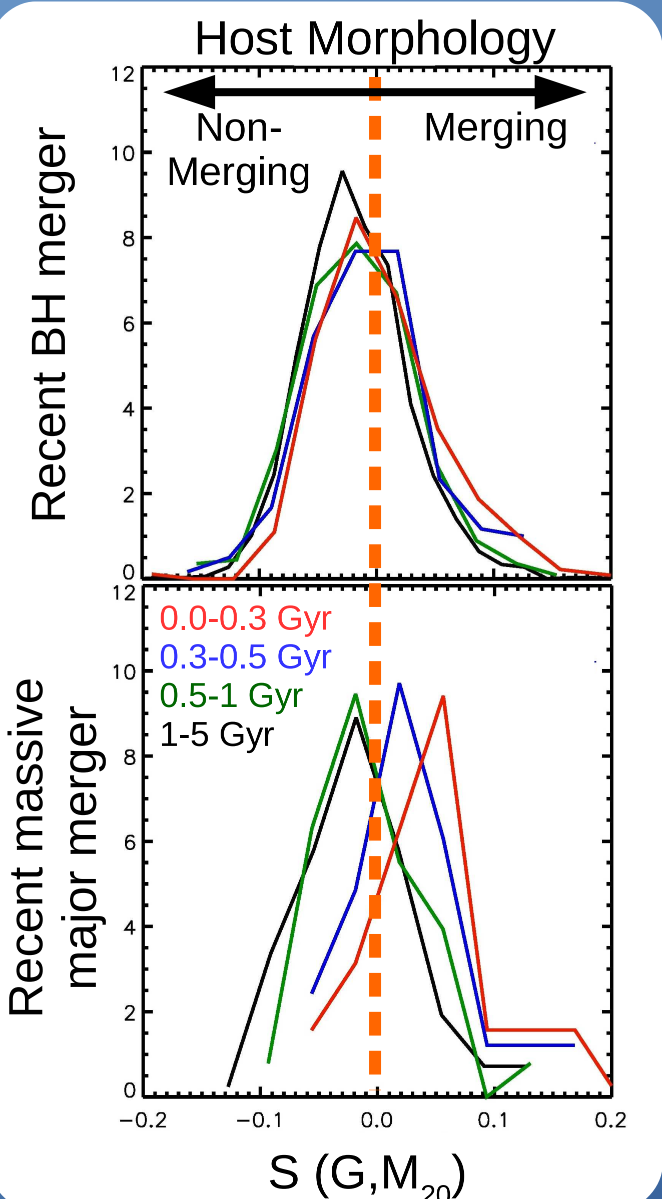


THE OHIO STATE UNIVERSITY

CENTER FOR COSMOLOGY AND ASTROPARTICLE PHYSICS

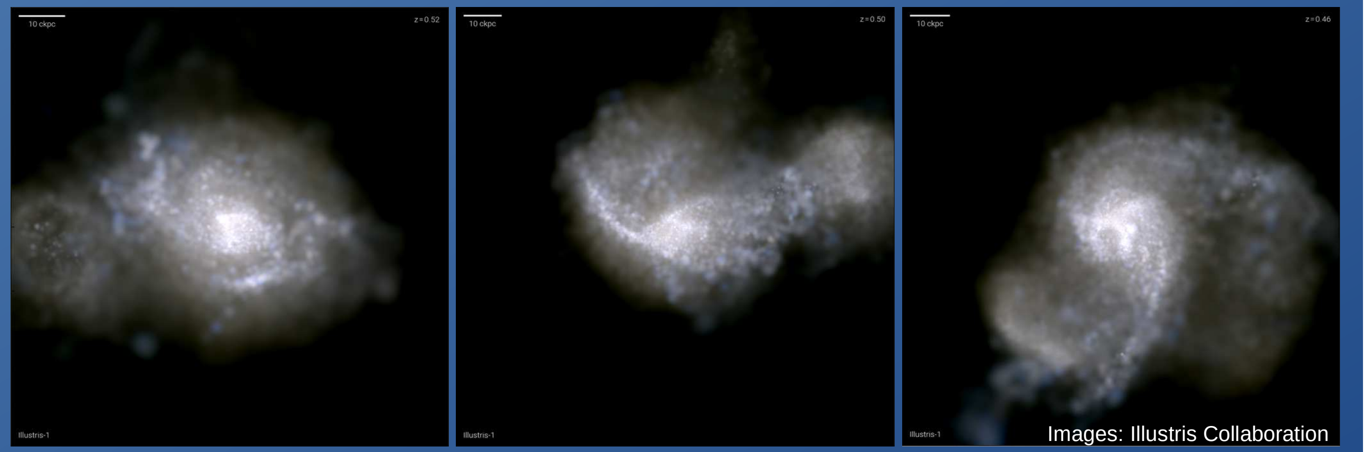
Multi-messenger predictions for supermassive black hole mergers

Colin DeGraf & Debora Sijacki
Institute of Astronomy & Kavli Institute for Cosmology, University of Cambridge



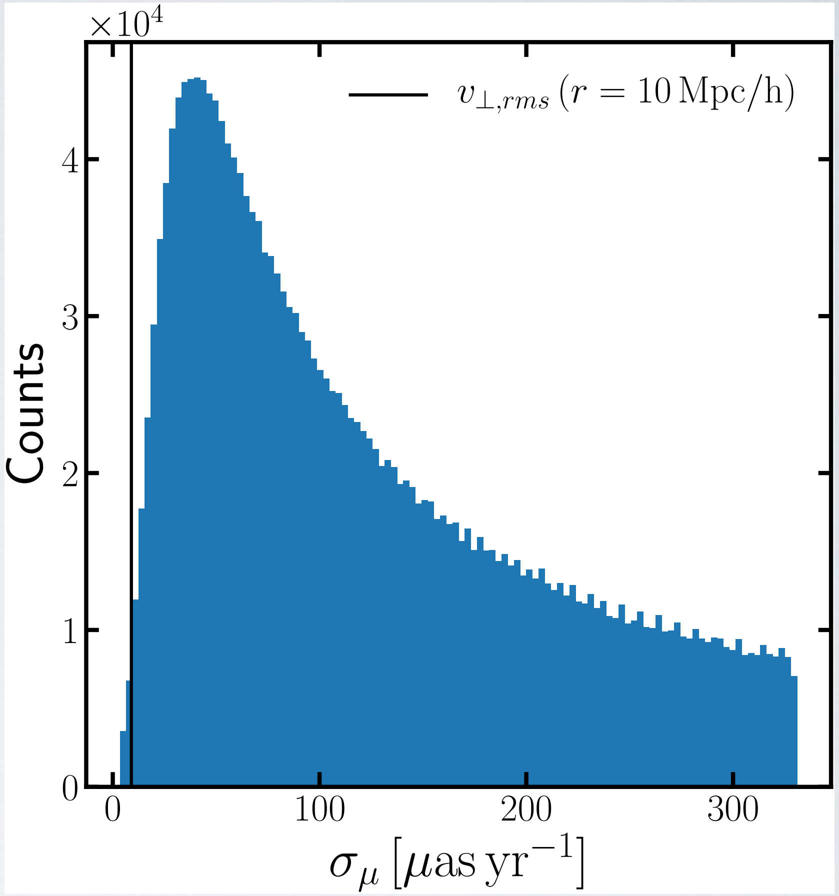
-150 Myr | During BH merger | +470 Myr

-20 Myr | +130 Myr | +430 Myr

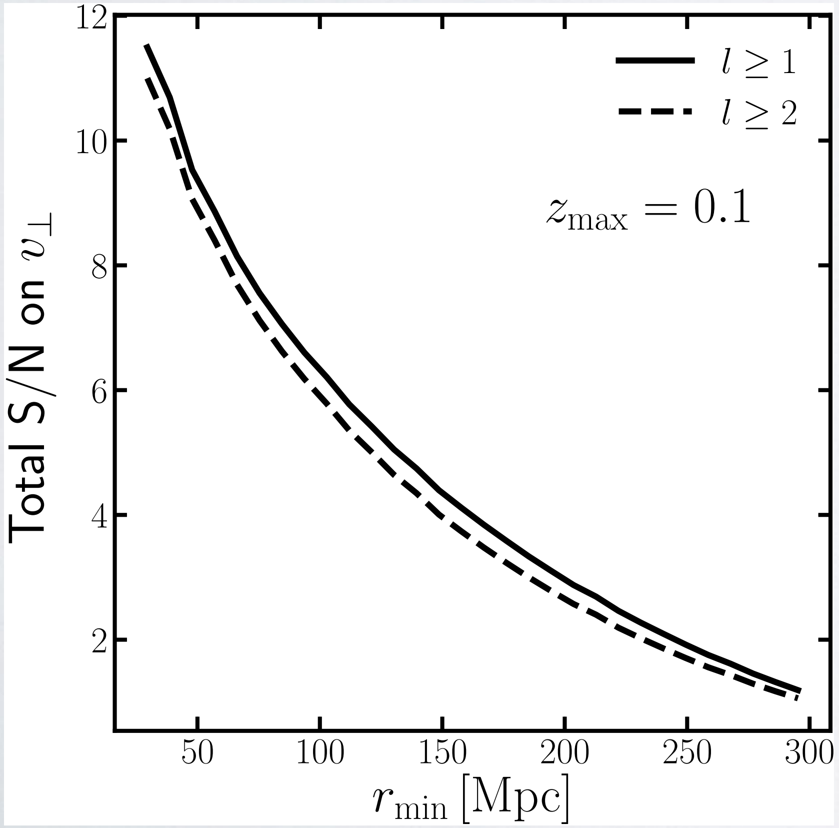


Transverse velocities of galaxies from astrometry

Alex Hall
Royal Observatory Edinburgh



- Full-sky astrometric surveys like Gaia will measure galaxy proper motions in the local Universe.
- Astrometry nearing sensitivity to get statistical precision on traverse velocities at cosmological distances.



- Allows the study of cosmic flows, bulk motion, and measurement of the growth rate of large-scale structure - valuable cross-check on ΛCDM.
- Statistical measurement promising - warrants significant further investigation.

AH 2019, MNRAS 486 145-165

Kinematics of z~4-6 Lyman Break Galaxies in ALPINE

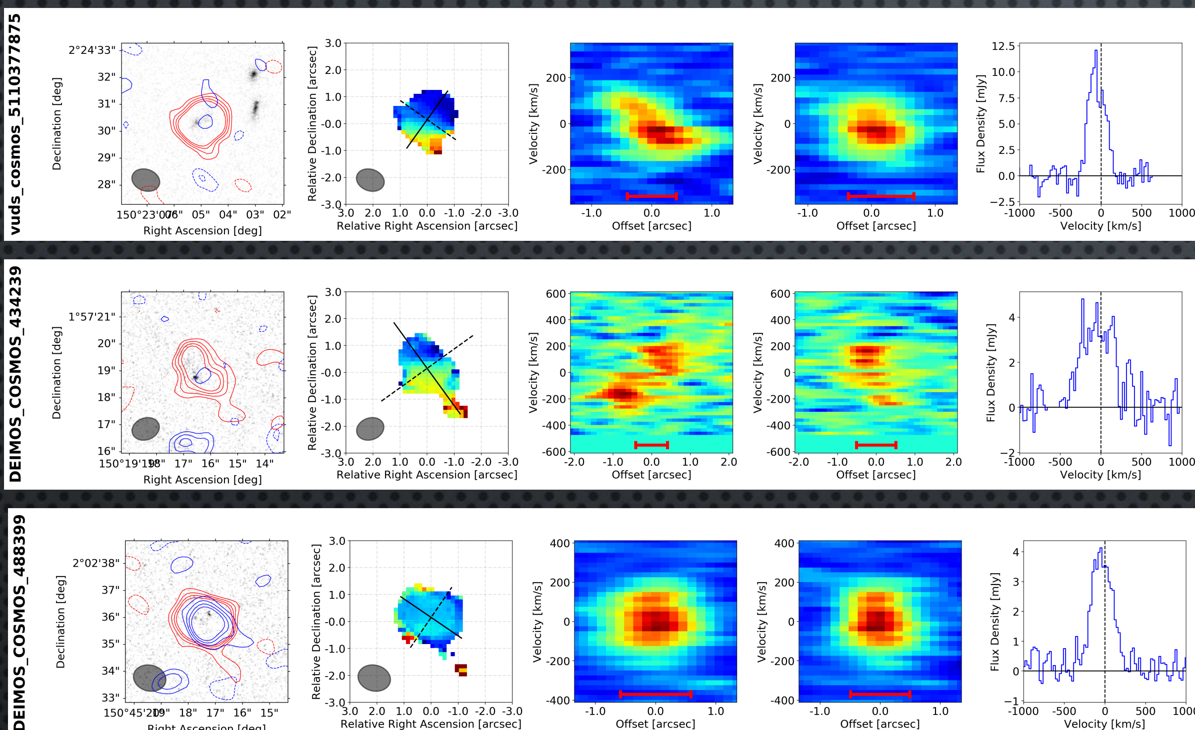
Gareth Jones, ALPINE Collaboration

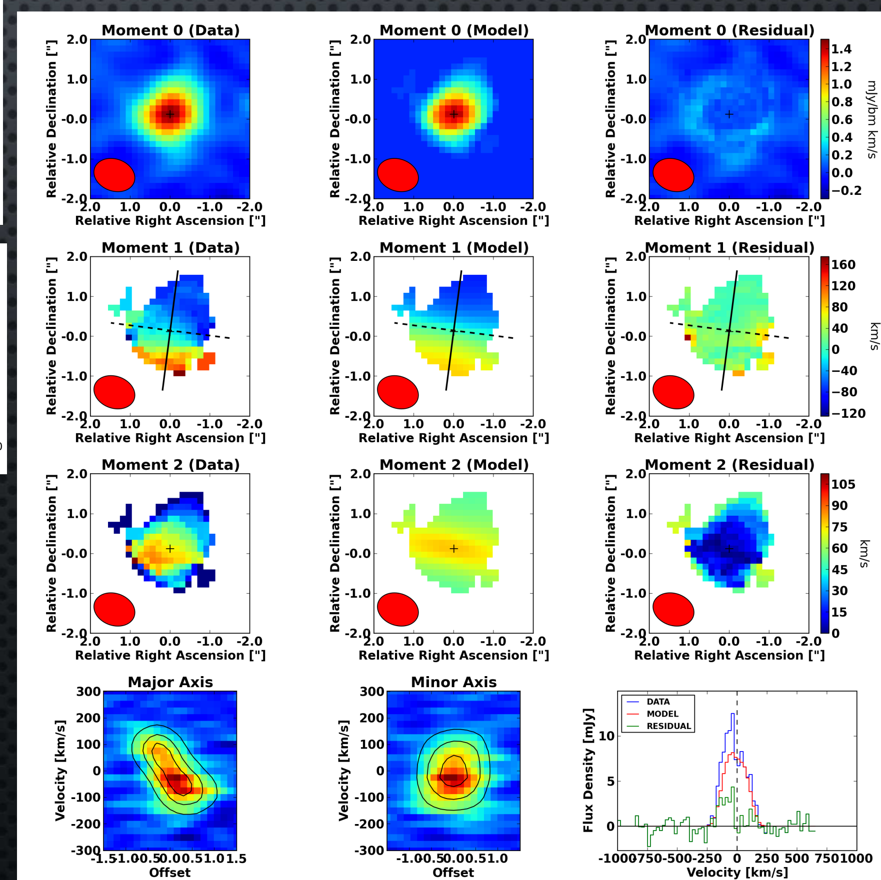
A2C2S | ALMA ALPINE [CII] Survey

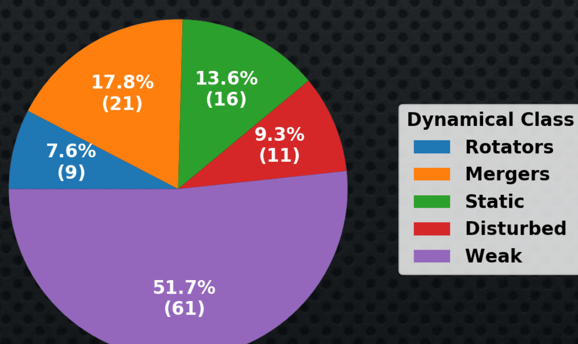
Kavli Institute for Cosmology Cambridge

KICC

UNIVERSITY OF CAMBRIDGE



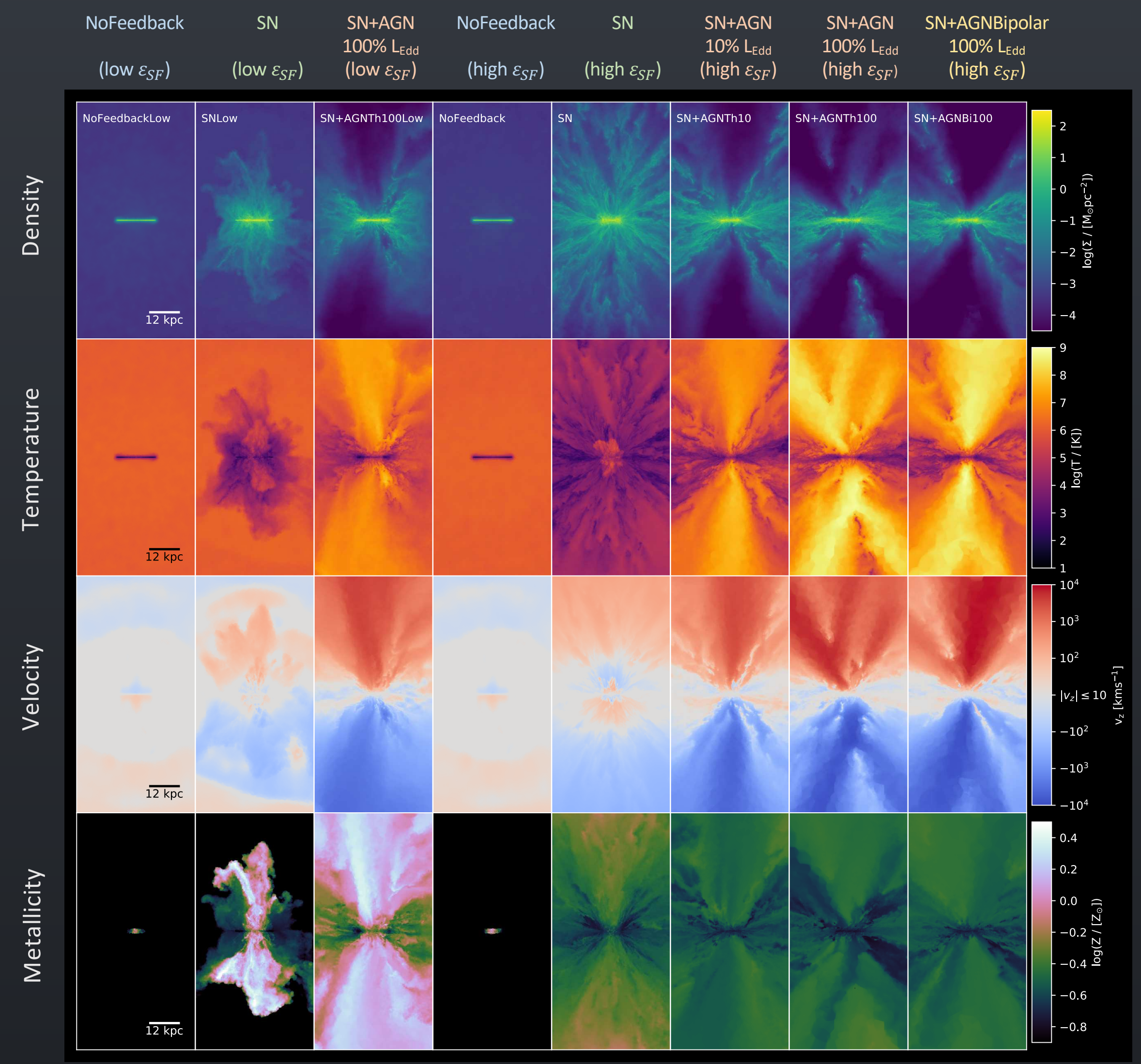




Fast and Energetic AGN-driven Outflows in Simulated Dwarf Galaxies

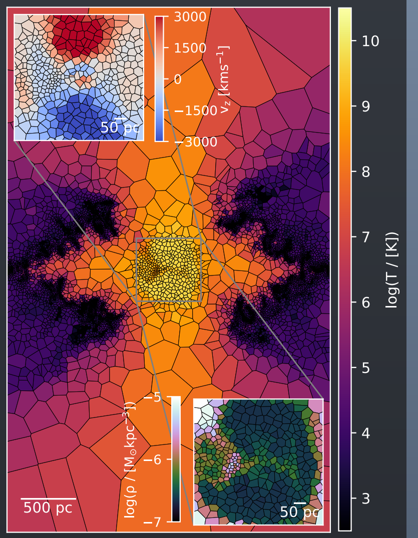
Sophie Koudmani*, Debora Sijacki, Martin A. Bourne, and Matthew C. Smith
*skoudmani@ast.cam.ac.uk

MNRAS, Volume 484, Issue 2, April 2019, Pages 2047–2066



Motivation: Observations show dwarf galaxies hosting AGN, and evidence for AGN-driven outflows!

Can AGN activity affect dwarf galaxy evolution?

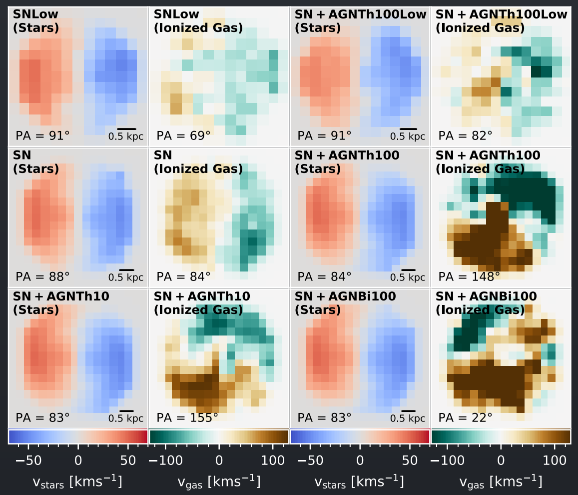


Simulations:

- AREPO
- Isolated dwarf galaxies
- Different AGN models

Results:

- Systematic effect on central SFRs in all cases
- No significant effect on overall SFRs in majority of cases
- Significant enhancement of outflows to much higher temperatures and velocities



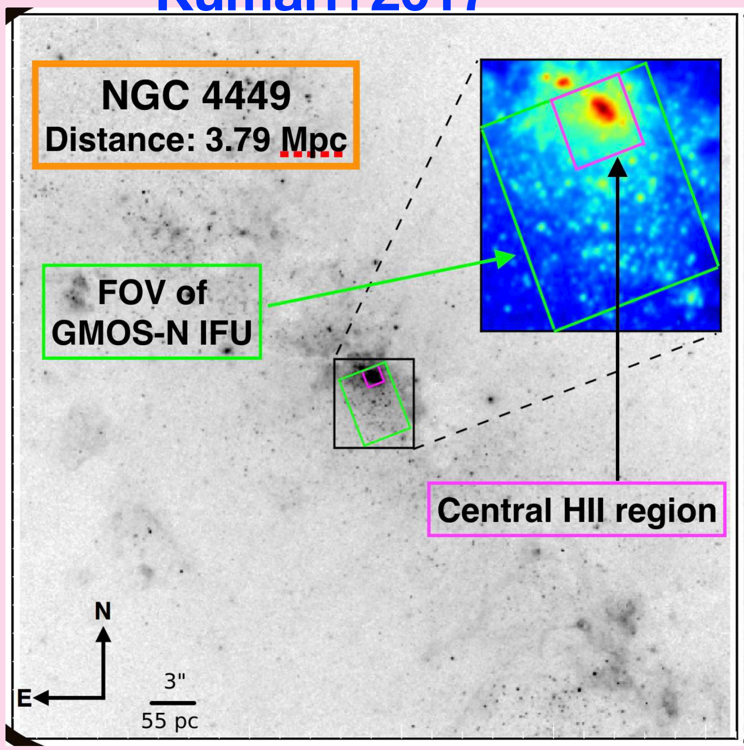
In agreement with MaNGA!

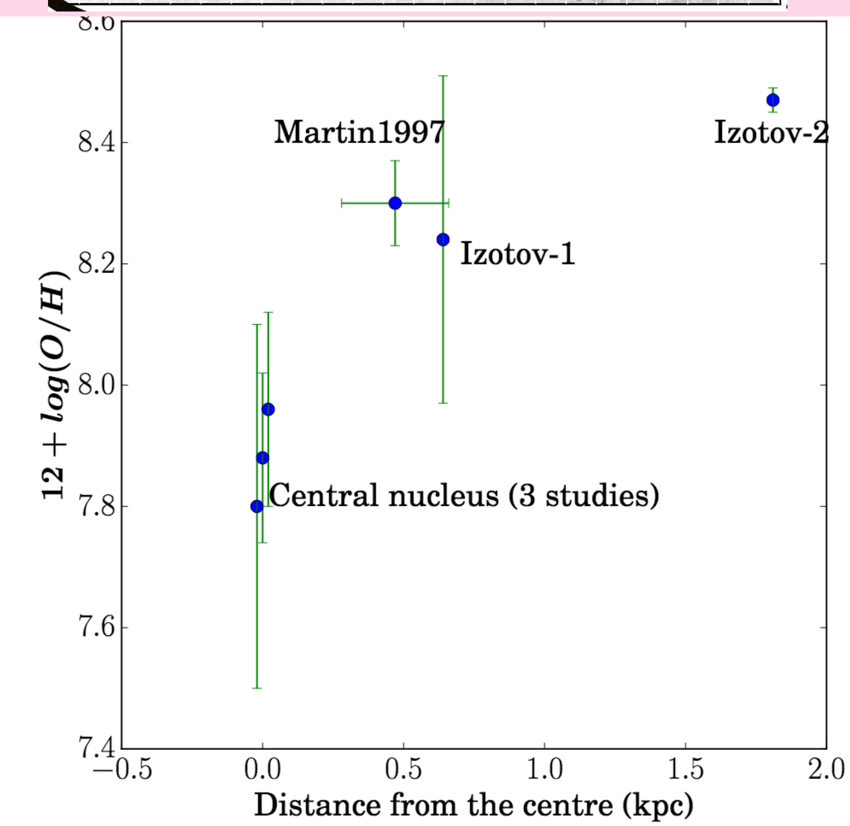
Future work: Cosmological zoom-ins

Chemical properties of Blue Compact Dwarf Galaxies: Local Analogues of High Redshift Galaxies

Nimisha Kumari, Cambridge

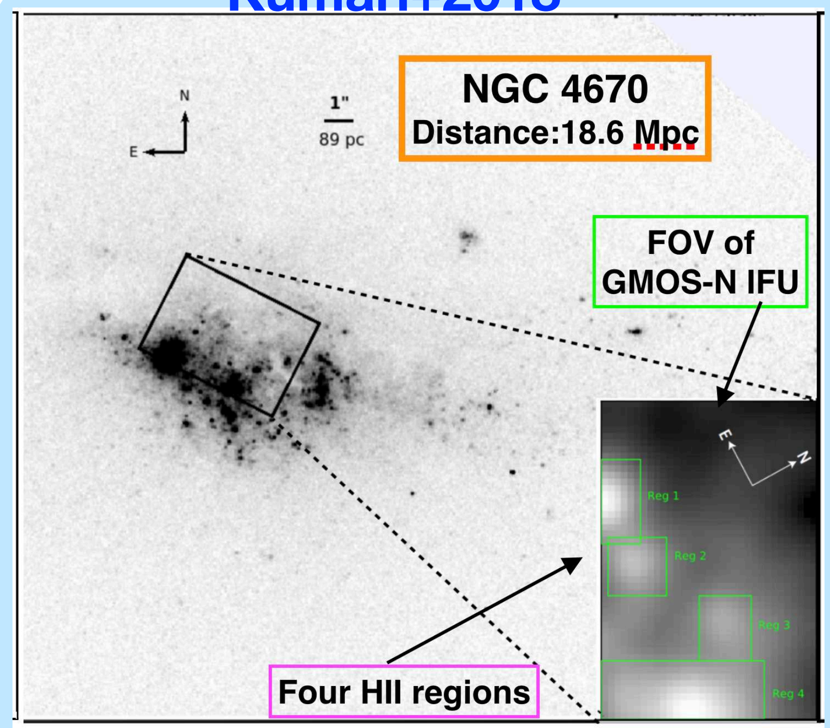
Kumari+2017

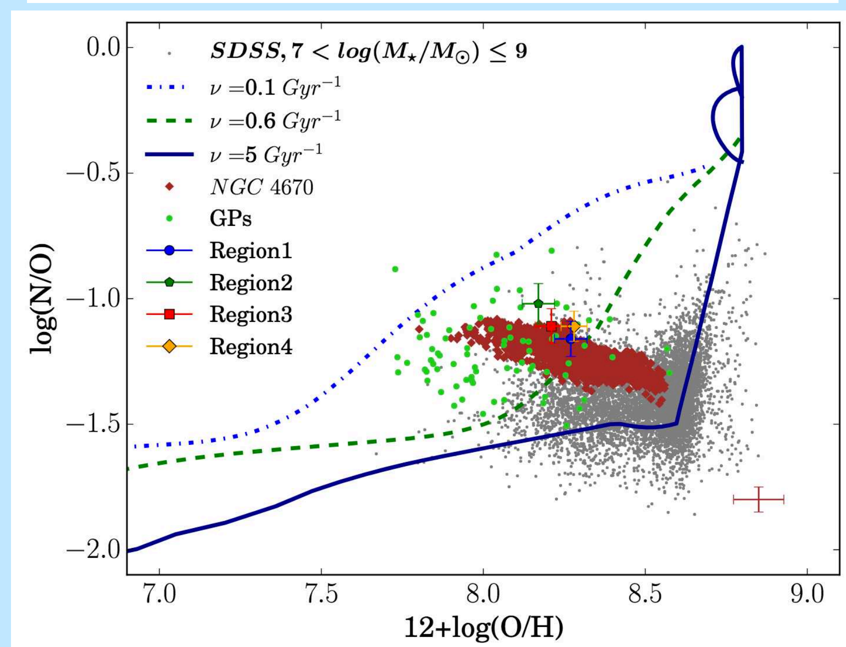




Metal-poor central HII region: gas-accretion

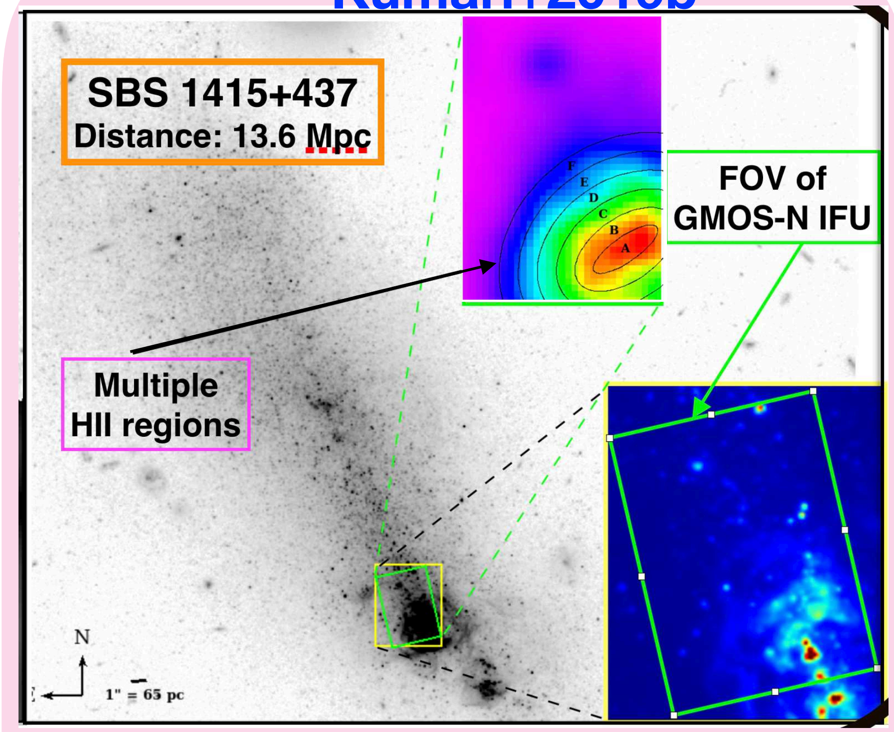
Kumari+2018

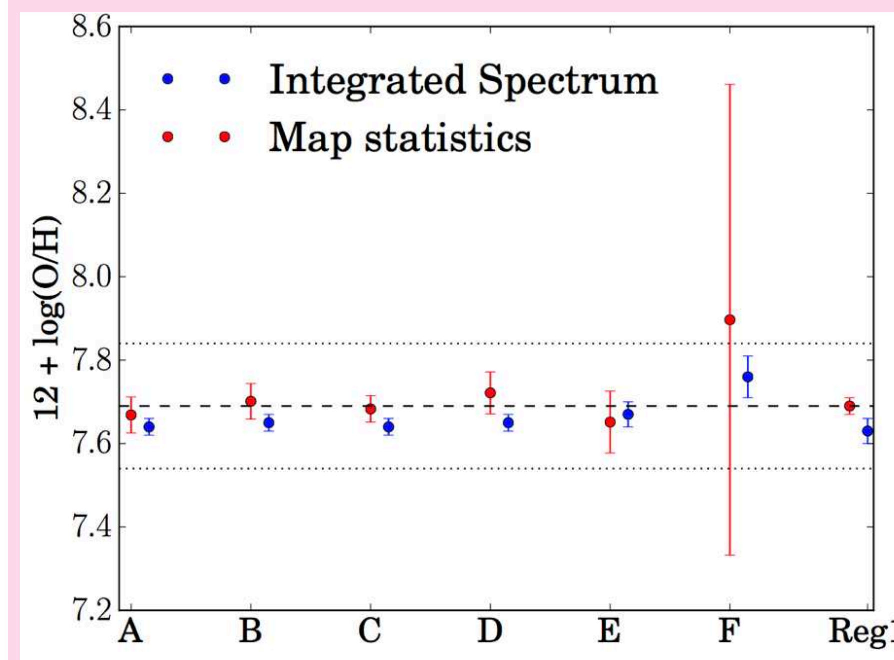




O/H-N/O: Unusual negative relation Local pollution, Hydrodynamical effects, Spatially-varying SFE

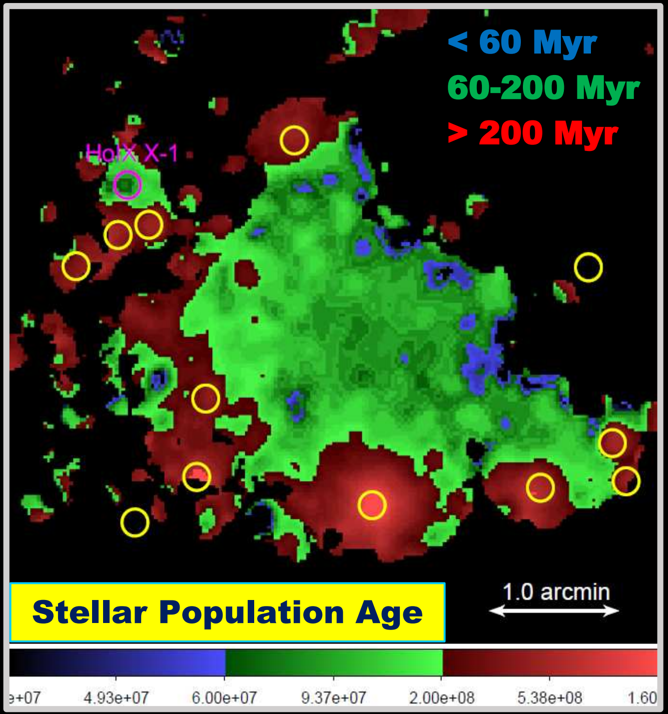
Kumari+2019b

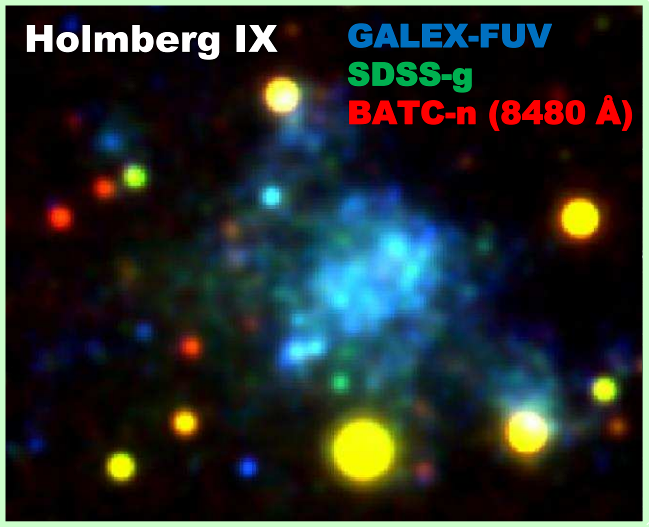


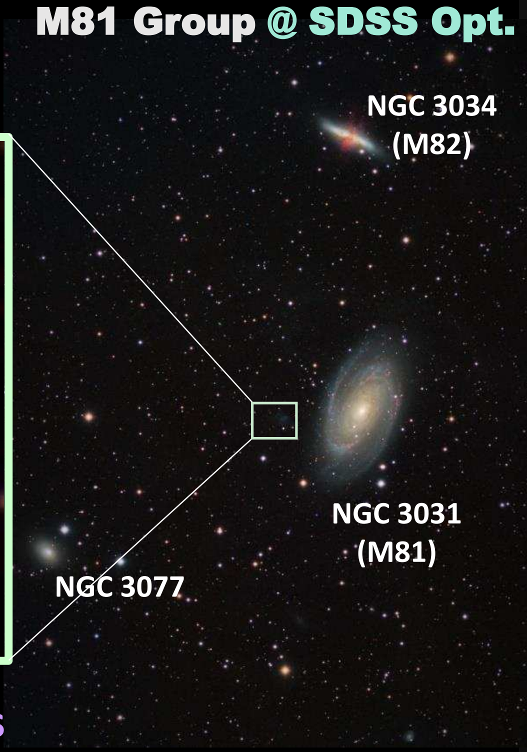


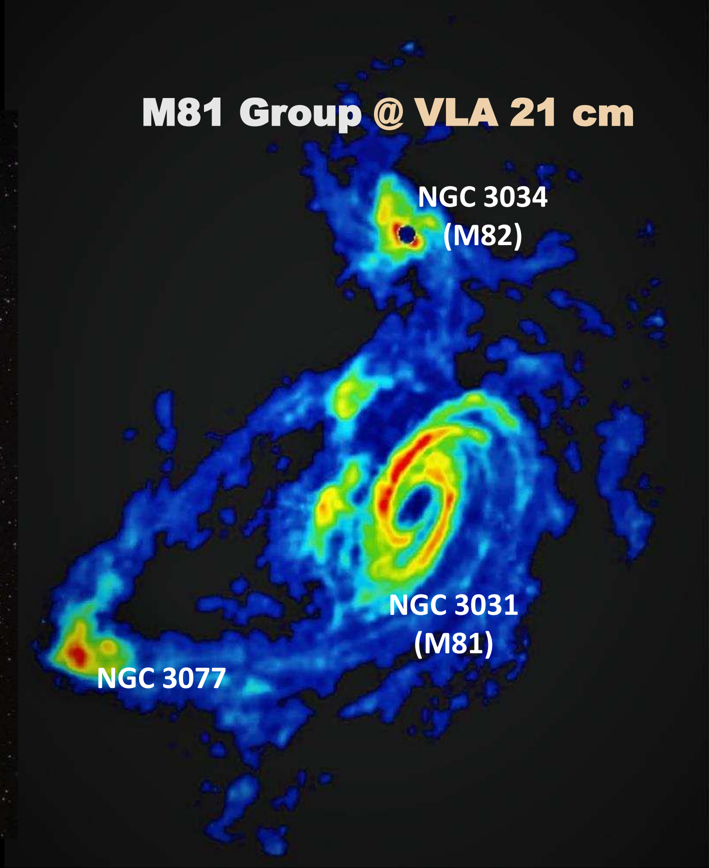
Spatially-resolved abundance agrees with integrated abundance: confidence to high-z

Poster 29 —— Ye-Wei Mao



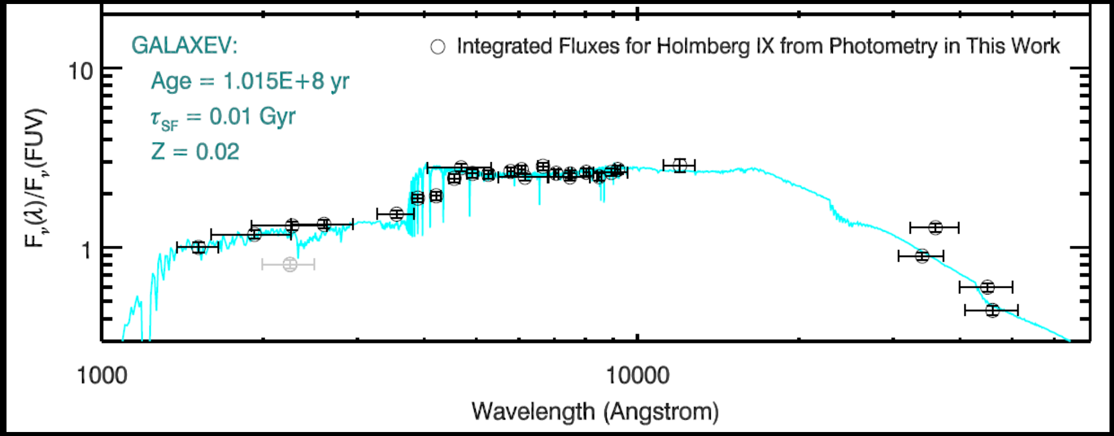


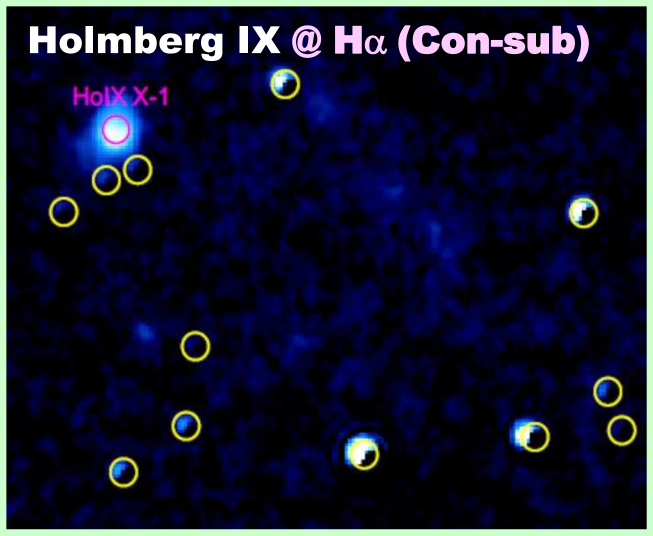




30-band Images

SED Fitting





Holmberg IX :

A Young Galaxy with No Current SF

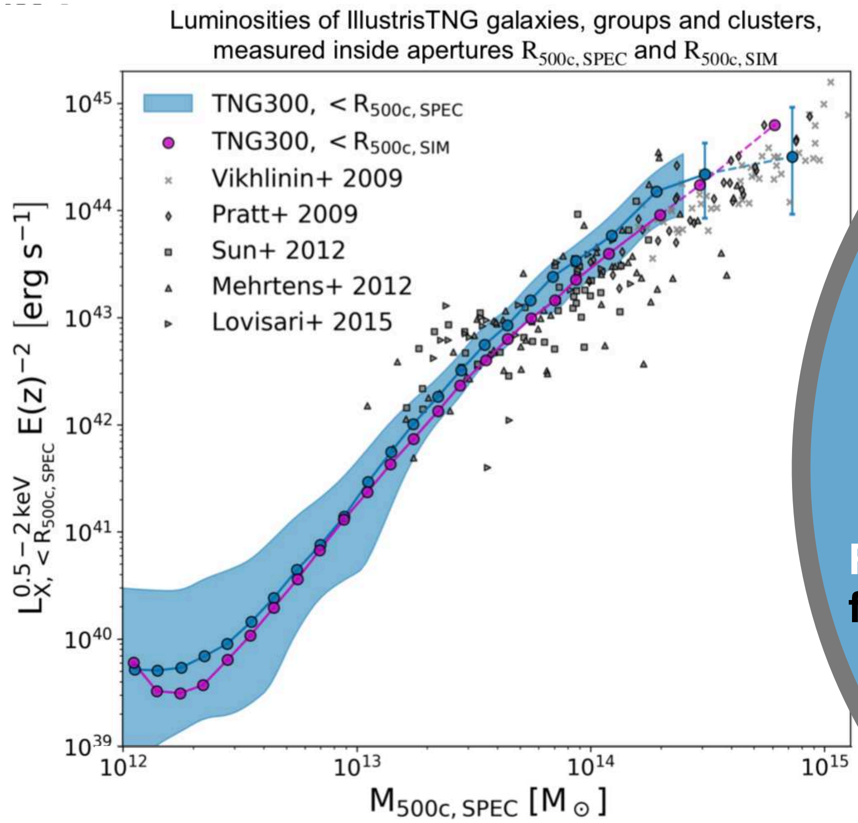
Q : Why did the SF stop in such a *gas-rich* environment

?

X-ray and Sunyaev-Zel'dovich Scaling Relations in the IllustrisTNG Simulations

Ana-Roxana Pop, David J. Barnes, Lars Hernquist + IllustrisTNG Collaboration

CENTER FOR ASTROPHYSICS HARVARD & SMITHSONIAN

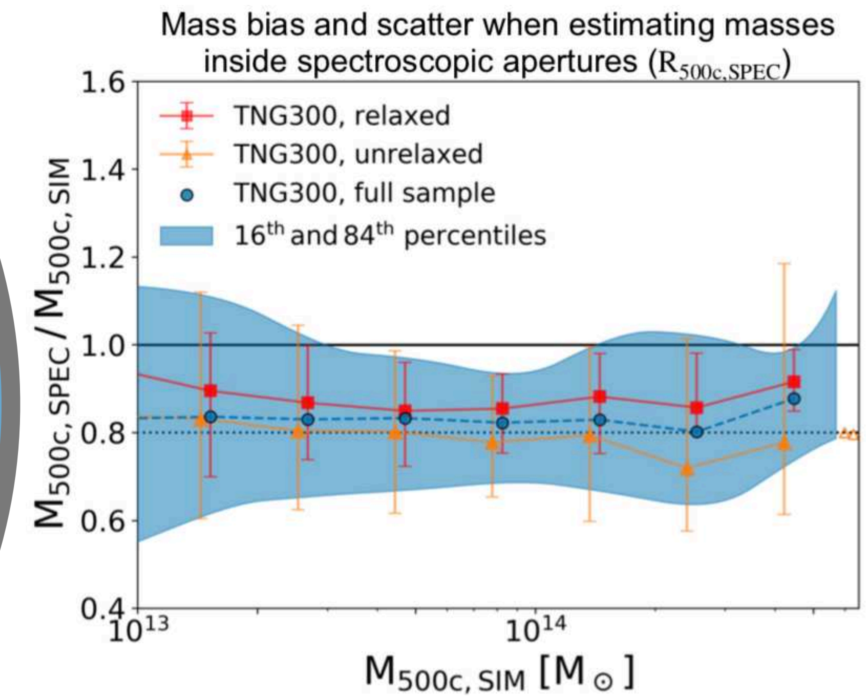


Cosmological simulations like IllustrisTNG provide valuable predictions for upcoming surveys and cluster cosmology.

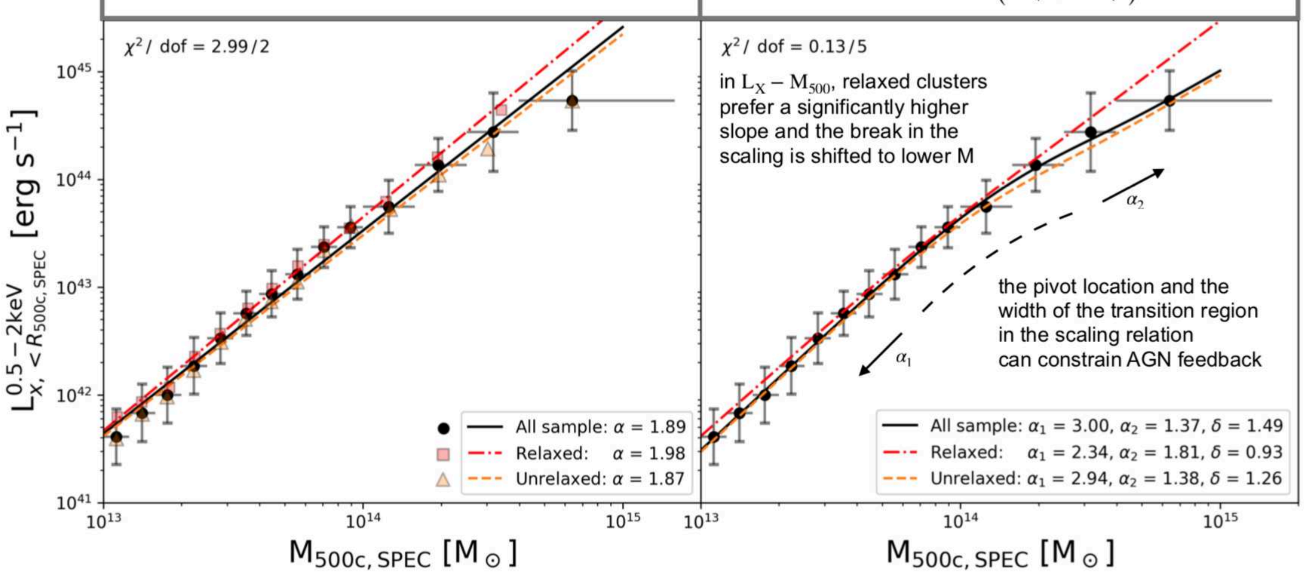
We produce mock X-ray observations accounting for the bias and scatter introduced by estimated halo masses. Our pipeline also includes the contribution of emission lines to the soft-band spectrum.

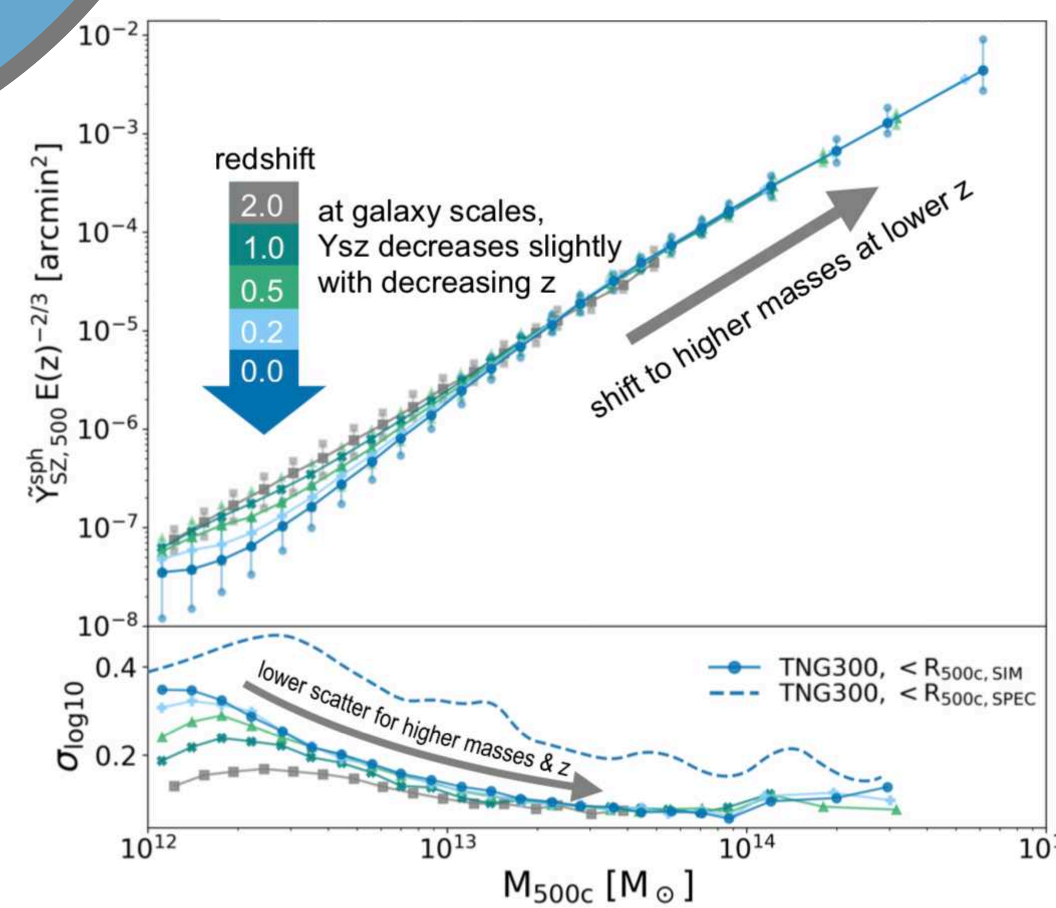
Redshift evolution of scalings such as Lx & Ysz for over 30,000 galaxies, groups & clusters.

Gradual break in the scaling relations: a smoothly broken power law provides a better fit and predictions for the highest mass clusters.



Single power law	**Smoothly broken power law with free pivot**
$Y = 10^A \left(\frac{X}{X_{norm}}\right)^{\alpha}$	$Y = 10^{A_{SBPL}} \left(\frac{X}{X_{norm}}\right)^{\alpha_{SBPL}}$ $\alpha_{SBPL} = \frac{d \log Y}{d \log X} = \frac{\alpha_2 - \alpha_1}{2} \tanh\left(\frac{1}{\delta}\left(\frac{X}{X_{piv}} - 1\right)\right) + \frac{\alpha_2 + \alpha_1}{2}$



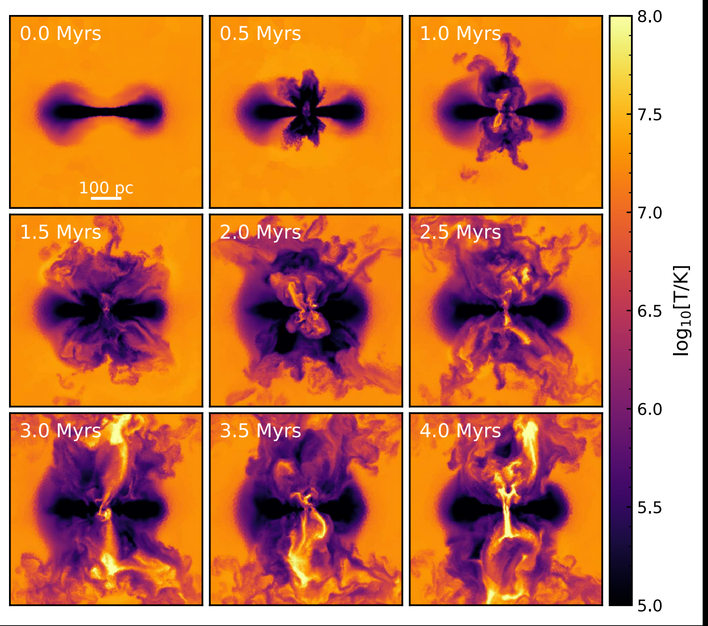


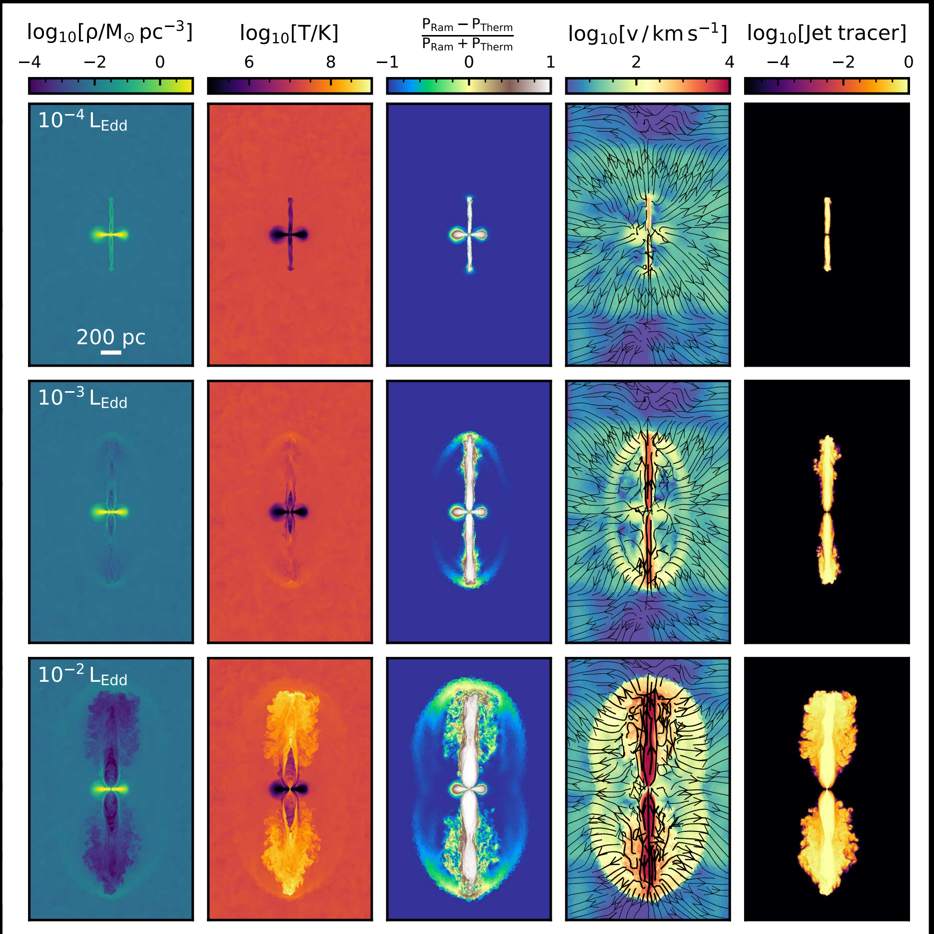
BLANDFORD-ZNAJEK JETS IN GALAXY FORMATION SIMULATIONS

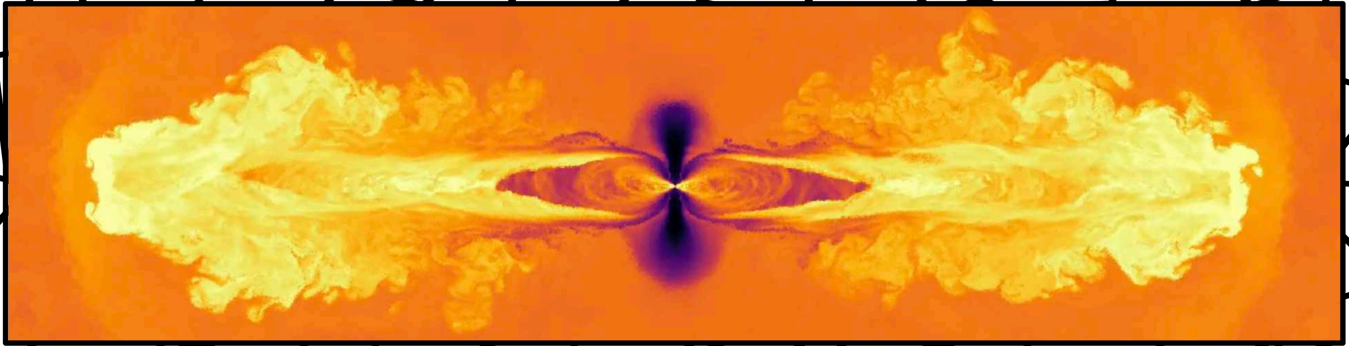
ROSIE TALBOT (IOA, UNIVERSITY OF CAMBRIDGE)
DEBORA SIJACKI, MARTIN BOURNE, CHRISTOPHER REYNOLDS.

UNIVERSITY OF CAMBRIDGE

- New sub-grid model for black hole accretion and **BZ jet launching**
- Accurately tracks the BH **angular momentum evolution**
- Self-consistently predicts the **jet power and direction**







The importance of redshift-space distortions for angular power spectra of galaxy number counts [arXiv:1902.07226]

Konstantinos Tanidis [1,2 *], Stefano Camera [1,2]

1 Dipartimento di Fisica, Università degli Studi di Torino, via P.Giuria 1, I-10125 Torino, Italy

2 INFN – Instituto Nazionale di Fisica Nucleare, Sezione di Torino, via P.Giuria 1, I-10125 Torino, Italy

We study the effect of RSD on the tomographic angular power spectra galaxy clustering (linear regime). In particular to what extend the information encoded in the RSD term can affect the cosmological analysis. We validate our Limber approximated code (modified version of Cosmosis) with the full code CLASS and set multipole ranges.

$$C^{g,den+RSD}_{l\gg 1}(z_i,z_j) = \int dx\, \frac{W^i(\chi)W^j(\chi)}{\chi^2} P_{lin}\left(k=\frac{l+1/2}{\chi}\right)$$

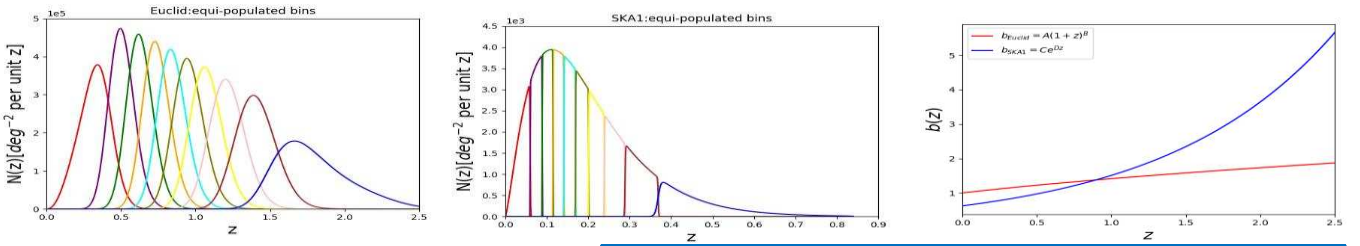
$$W^i(\chi) = W^i_b(\chi) + \frac{2l^2+2l-1}{(2l-1)(2l+3)}W^i_f(\chi) - \frac{l(l-1)}{(2l-1)\sqrt{(2l-3)(2l+1)}}W^i_f\left(\frac{2l-3}{2l+1}\chi\right) - \frac{(l+1)(l+2)}{(2l+3)\sqrt{(2l+1)(2l+5)}}W^i_f\left(\frac{2l+5}{2l+1}\chi\right)$$

$$W^i_b(\chi) = n^i(\chi)b(\chi)D(\chi) \qquad W^i_f(\chi) = n^i(\chi)f(\chi)D(\chi)$$

In order to do so, we construct mock observables including density fluctuations and RSD within a ΛCDM model . Then we fit it with two theory vectors:

- A vector with the same information as the mock data
- A vector ignoring RSD

We adopted two planned galaxy surveys: optical/NIR Euclid-like (15.000 sq.deg) and HI-line SKA1 (5.000 sq.deg).



For the Bayesian analysis we consider three scenarios:

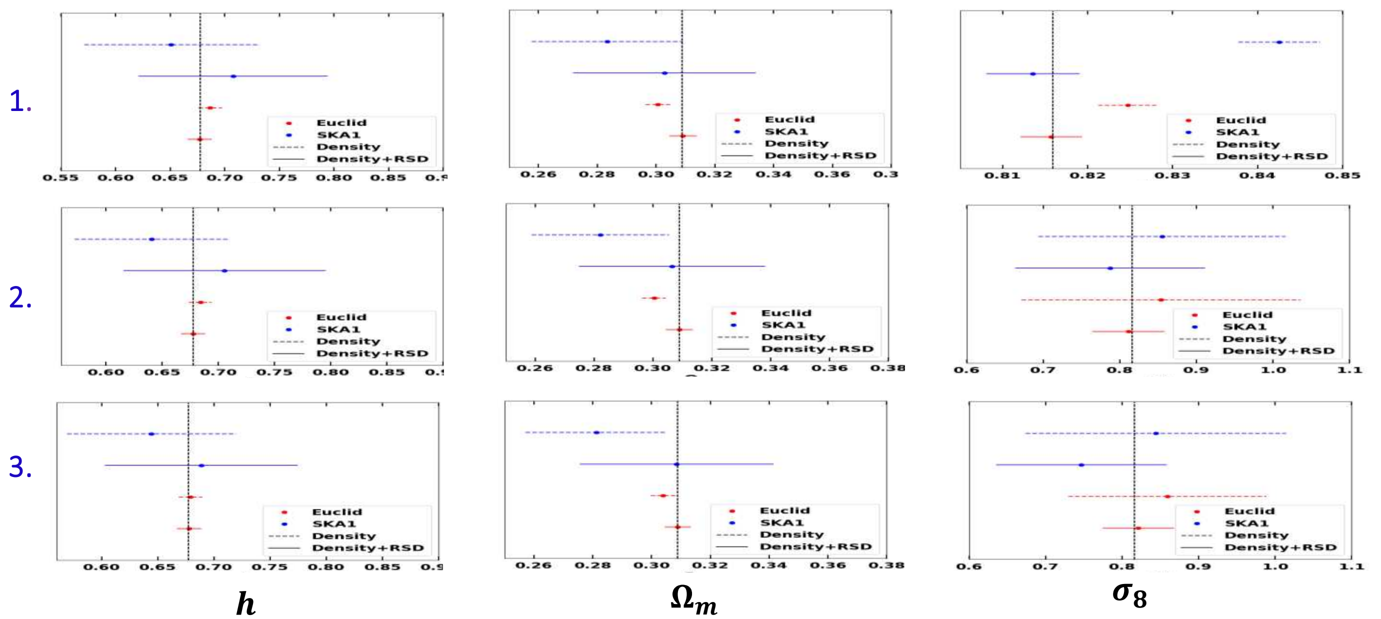
1. An Ideal scenario: No nuisance parameters to model the bias
2. A pessimistic scenario: An overall normalization and a redshift dependence to account for a certain ignorance of the bias
3. A conservative scenario: The bias evolves freely in each redshift bin

Results

I. Biased parameter estimates with the wrong theoretical model for the ideal, the pessimistic and the conservative scenario

II. This incomplete model also yields degenerate results on σ_8 with the realistic scenarios. That is because the normalization of the power spectrum is degenerate with the galaxy bias. We lift it with the RSD which are insensitive to the galaxy bias

III. SKA1 is less informative than Euclid due to the lower SNR (shorter multipole range and sky coverage)



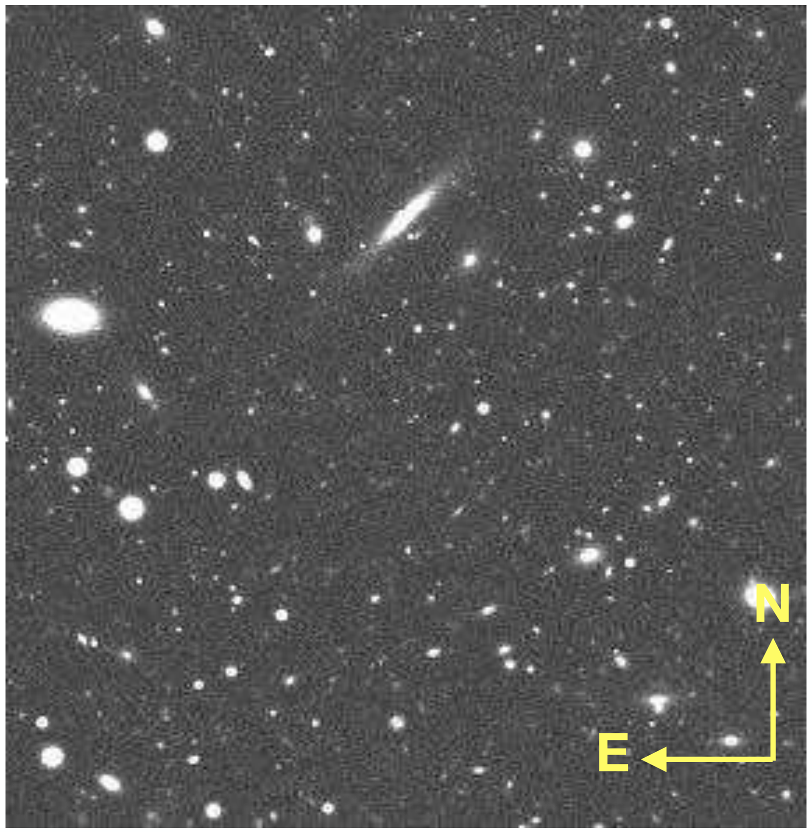
*E−mail: tanidis@to.infn.it

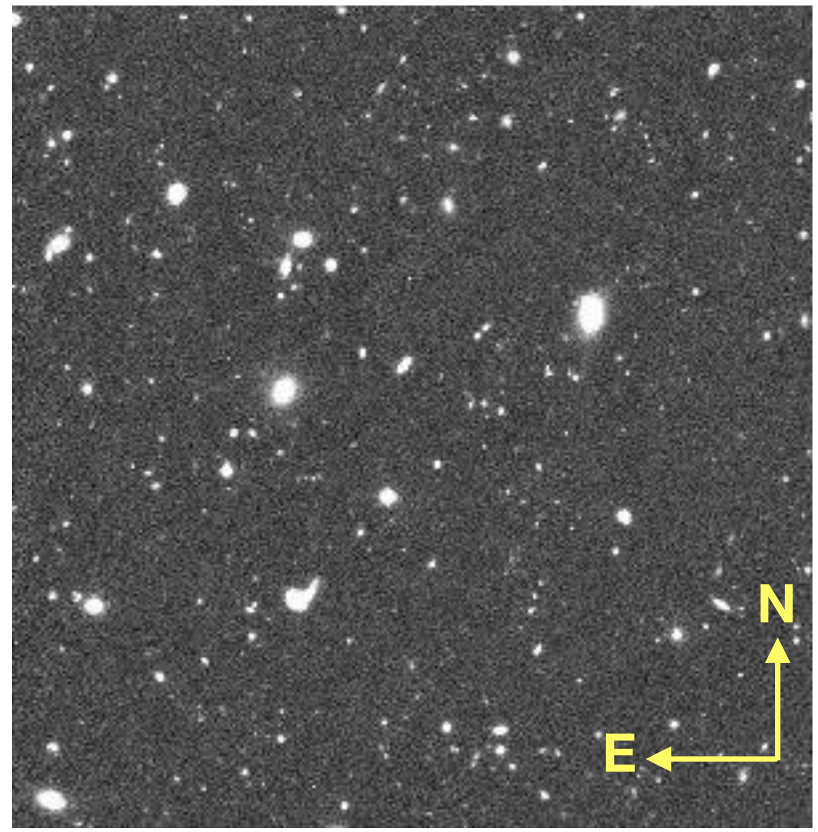
The Luminosity Function Measurement with Approximate Bayesian Computation

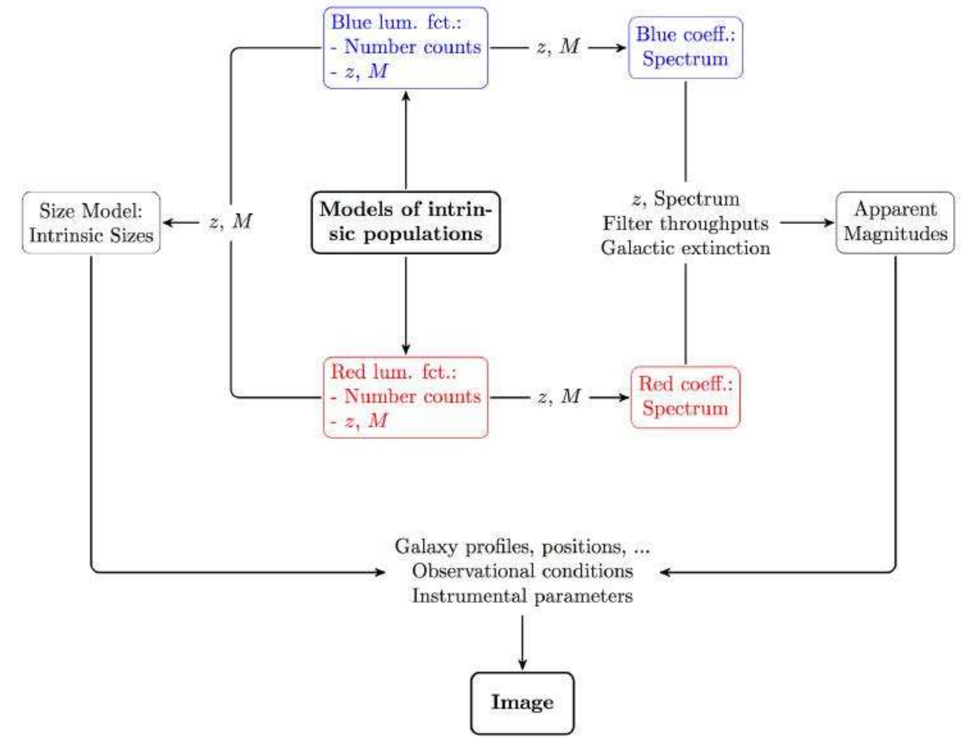
IPA

Luca Tortorelli

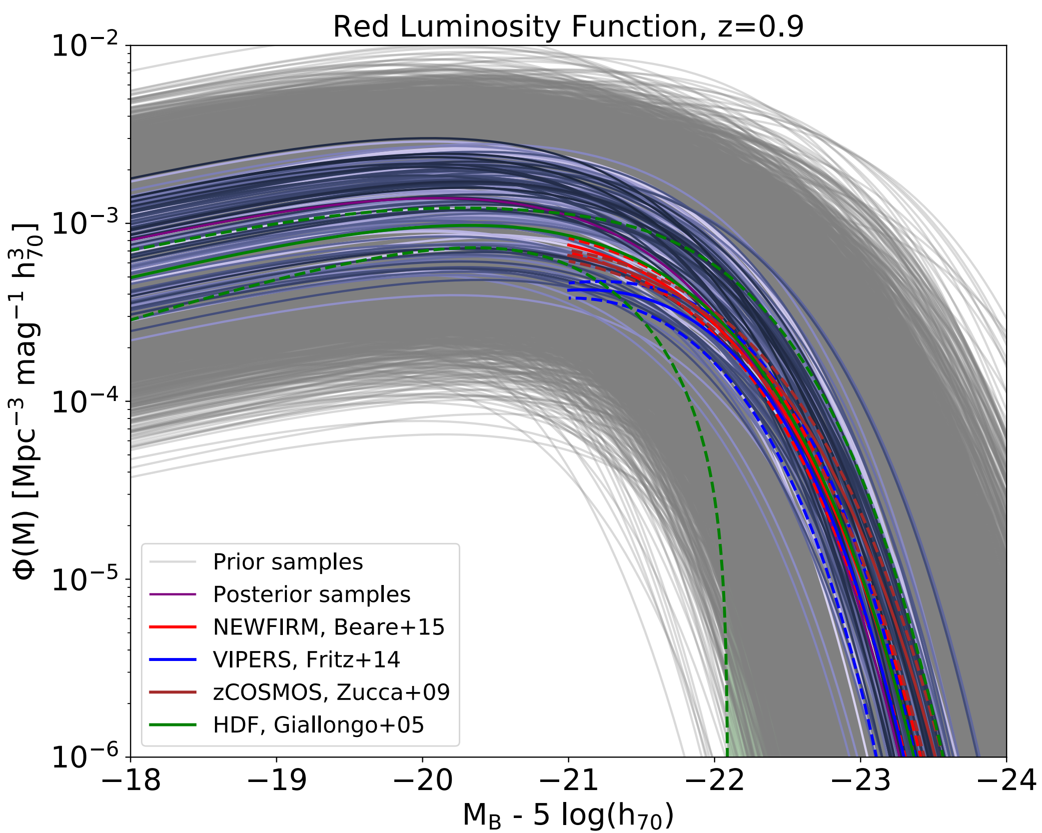
ETH zürich

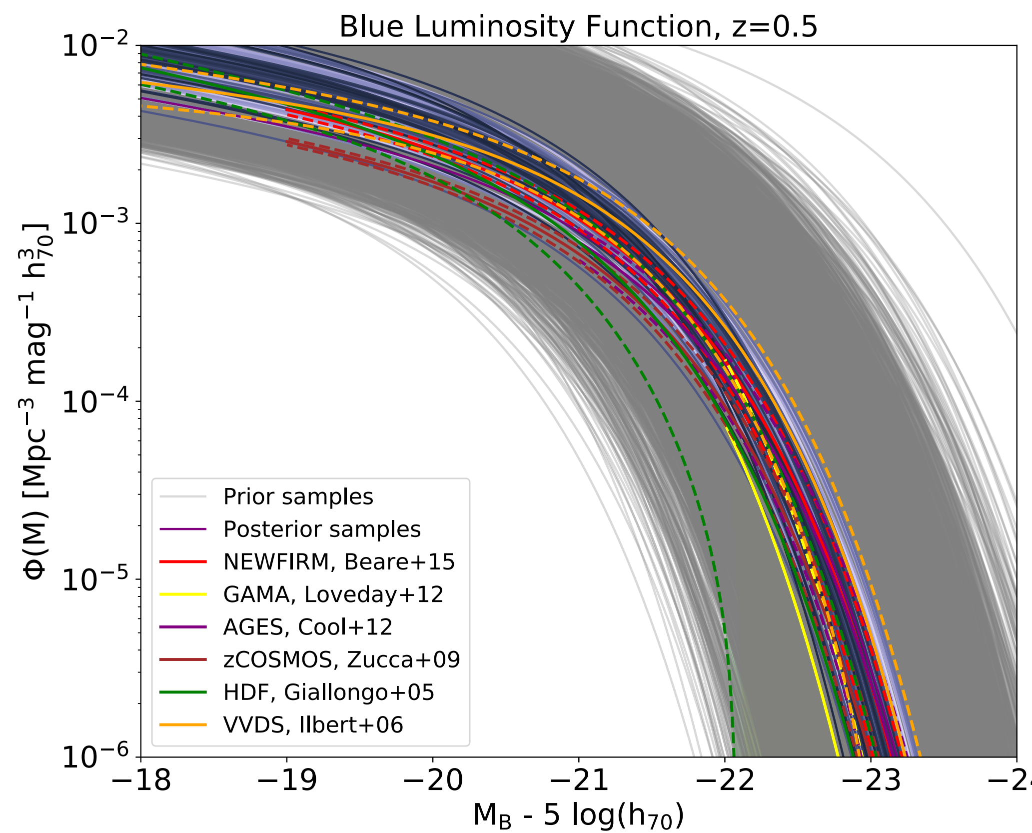






$$p\left(\theta|y\right) \simeq p\left(\theta|\rho\left(S(x), S(y)\right) \leq \epsilon\right)$$





Uspec: Forward Modeling of Spectroscopic Galaxy Surveys

Martina Fagioli (ETH Zurich), A. Refregier, A. Amara, Luca Tortorelli

martina.fagioli@phys.ethz.ch

arXiv:1803.06343

Fagioli et al. 2018

$\sum$(templates $\times$ coefficients) $\times (10\,\mathrm{pc}/d_L)^2 \,/\, (1+z)$
wavelength $\times (1 + z)$

continuum + emission lines + pollution

galaxy model $\times$ atmospheric transmission

sky model $\times$ atmospheric transmission

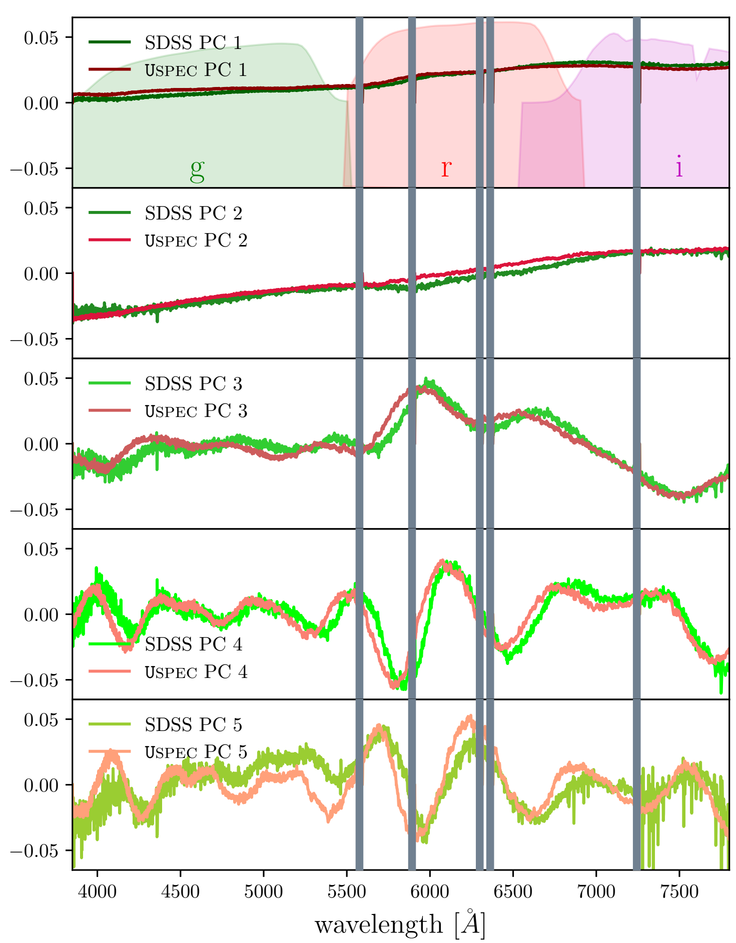
total spectrum = poisson(galaxy model[photons] + sky model[photons]) + read-out noise

sky-subtracted spectrum = total spectrum[photons] − poisson(sky model[photons])

sky-subtracted spectrum / atmospheric transmission

observed spectrum

Results: Principal Component Analysis (SDSS)

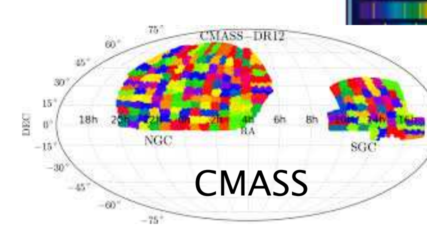


Extension to other spectroscopic surveys

SDSS

VIPERS
VIMOS PUBLIC EXTRAGALACTIC REDSHIFT SURVEY

VVDS



DARK ENERGY SPECTROSCOPIC INSTRUMENT

eBOSS

Optimal constraints on the growth rate using the observed galaxy power spectrum

Jan-Albert Viljoen, PhD Candidate: Javiljoen74@gmail.com
Supervisors: Prof. Roy Maartens, Dr Jose' Fonseca

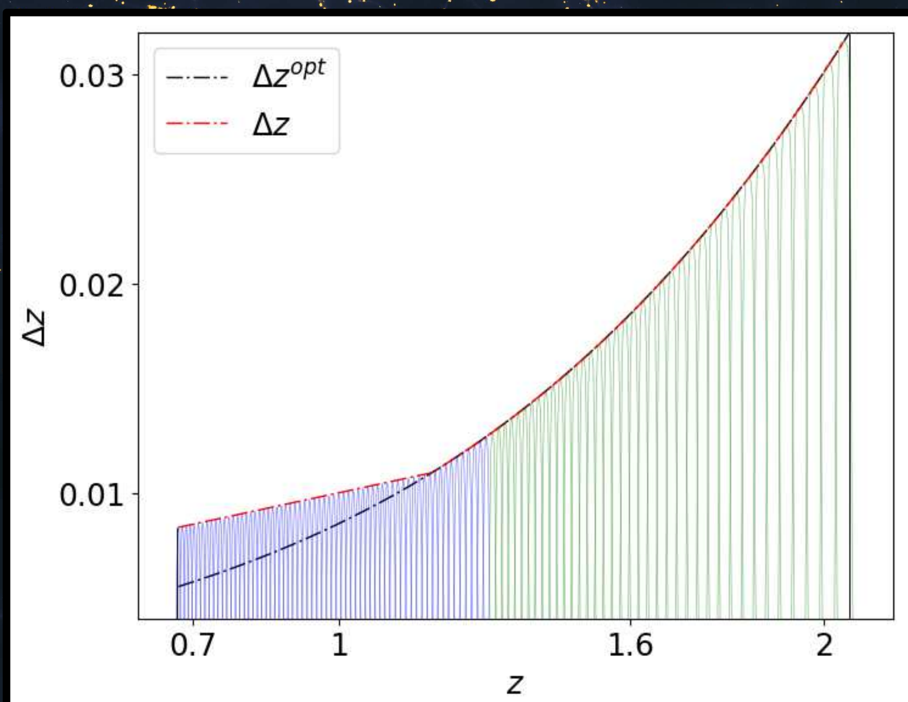
SKA AFRICA SQUARE KILOMETRE ARRAY

UNIVERSITY of the WESTERN CAPE

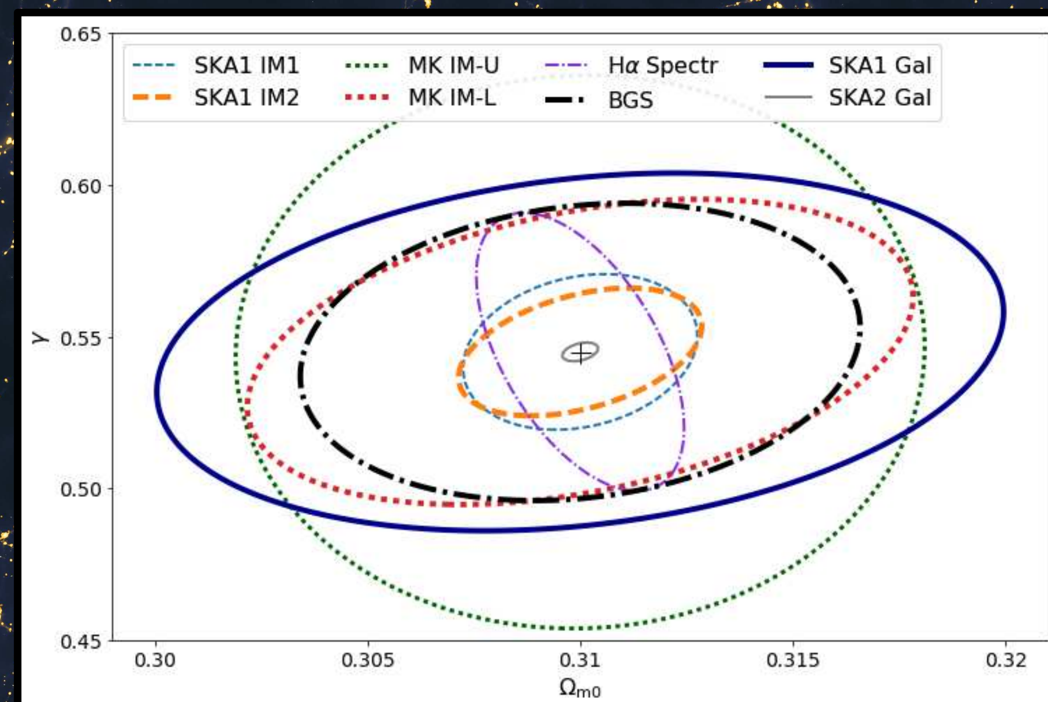
CRC Centre for Radio Cosmology

$$\langle \delta_{\rm g\,obs}(z,\boldsymbol{n})\delta_{\rm g\,obs}(z',\boldsymbol{n}')\rangle = \sum_{\ell} \frac{2\ell+1}{2} C_\ell(z,z')\mathcal{L}_\ell(\boldsymbol{n}\cdot\boldsymbol{n}')$$

arxiv:1907.02975



Euclid-like binning strategy



optimal constraints