

# The Simulated Circumgalactic Medium

Jacob Vander Vliet  
NMSU

Christopher W. Churchill<sup>1</sup>

Sebastian Trujillo-Gomez<sup>2</sup>

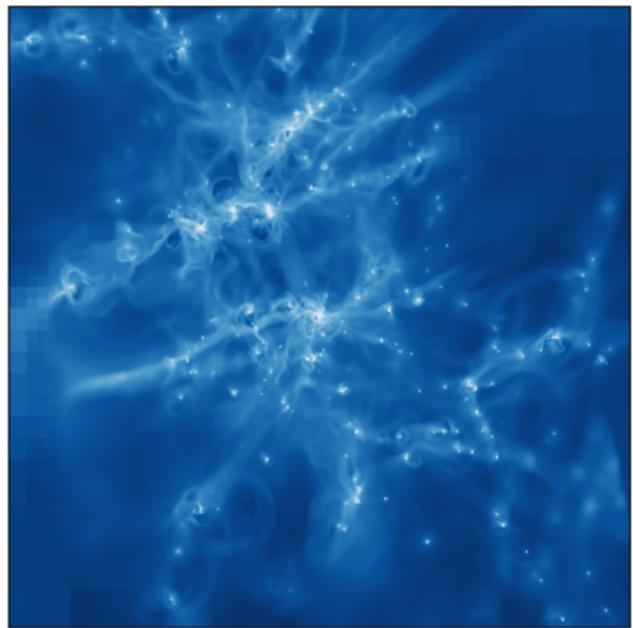
Anatoly Klypin<sup>1</sup>

Elizabeth Klimek<sup>1</sup>

Glenn Kacprzak<sup>3</sup>

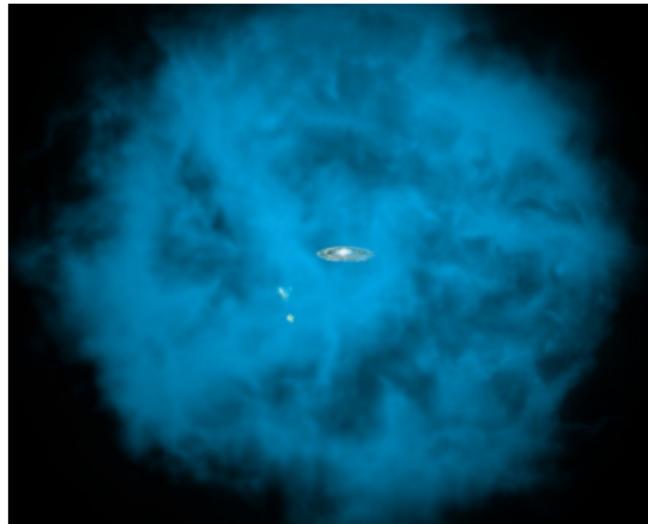
<sup>1</sup> NMSU, <sup>2</sup> Zurich University,

<sup>3</sup> Swinburne University of Technology



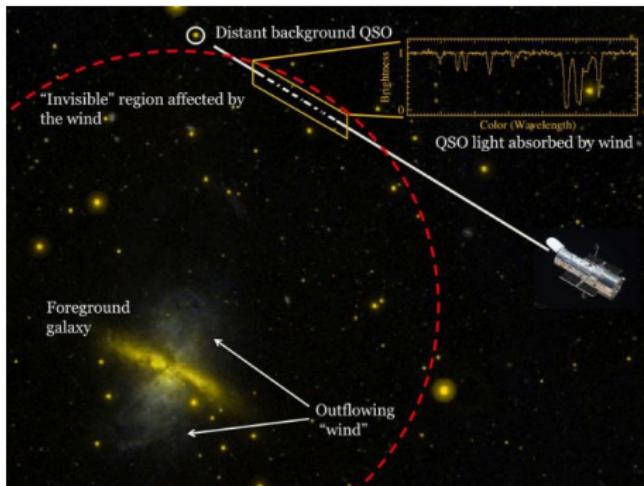
# Circumgalactic Medium

- Gas halo around galaxies
- Extends to 1–2  $R_{vir}$
- Interface between ISM and IGM
- Infalling material
  - Accretion from IGM
  - Satellites
- Outflowing material
  - AGN
  - Supernova
- Major driver of galaxy evolution



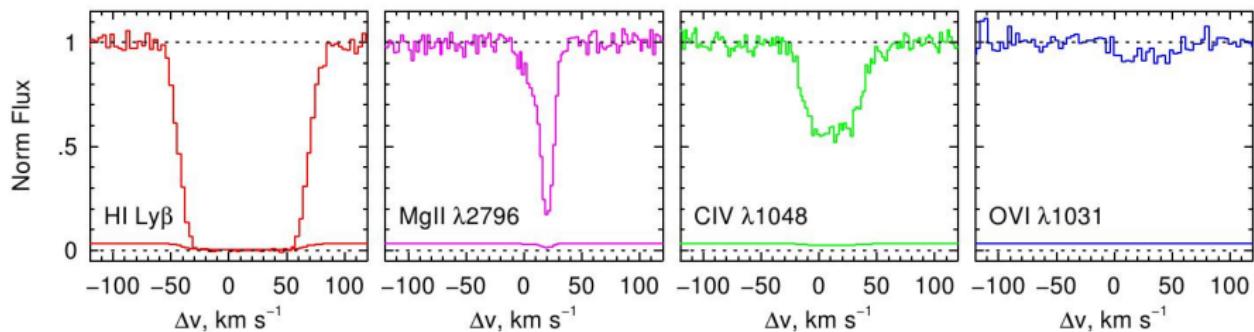
# Observing the CGM

- Too diffuse to observe in emission
- Use absorption lines in quasar's spectrum
- Limitations:
  - Requires a bright QSO in line with the galaxy's halo
  - Get one data point per galaxy
  - Identifying host galaxy can be complicated
  - Relating spectral line to physical conditions is difficult
- Alternative:
  - Look in simulations



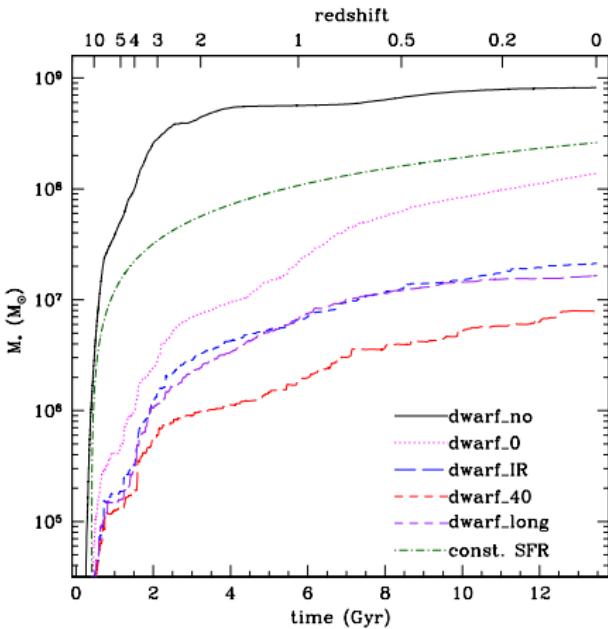
# Mockspect

- Code to perform mock observations of a simulated CGM
- Works with ART simulations
- Generates lines of sight based on:
  - Orientation
  - Impact parameter
- Generate synthetic spectrum for each LOS for each ion
- Identifies which cells are the significant source of the absorption

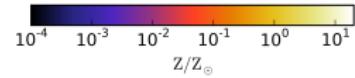
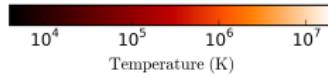
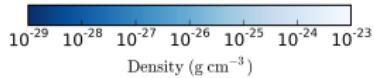
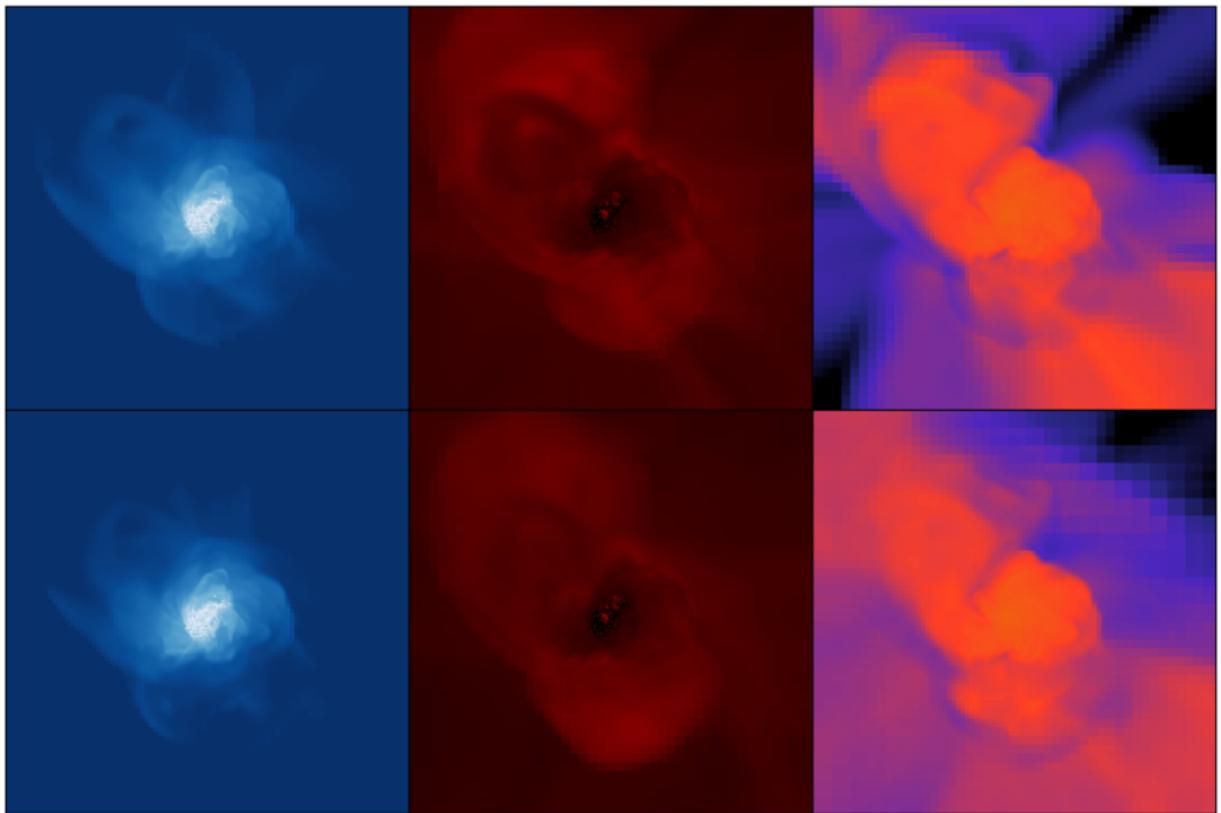


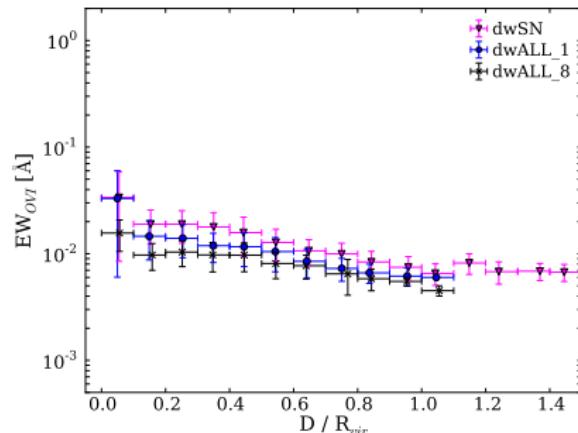
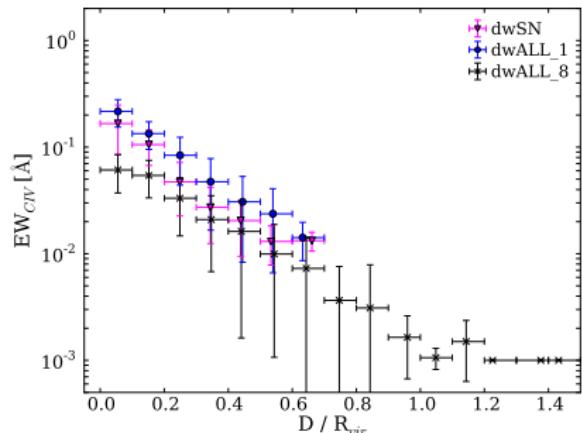
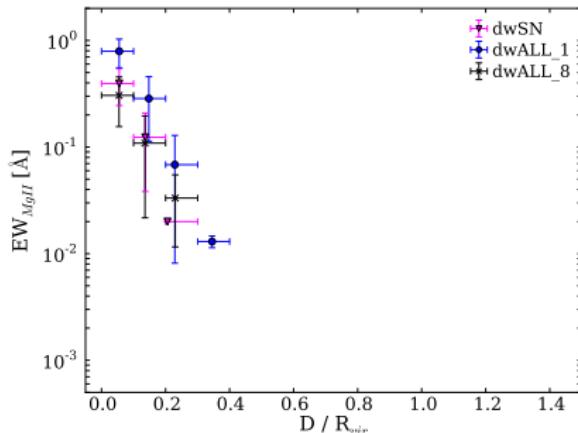
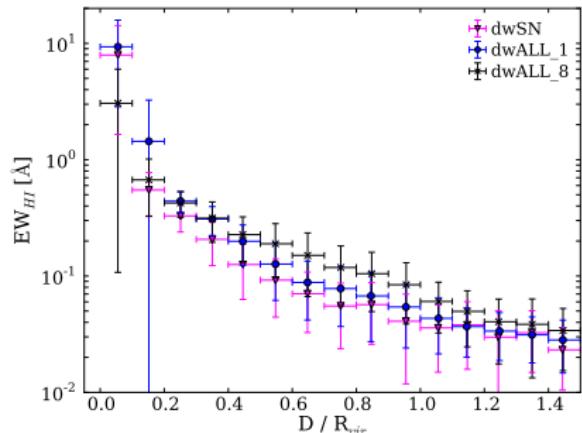
# Dwarfs

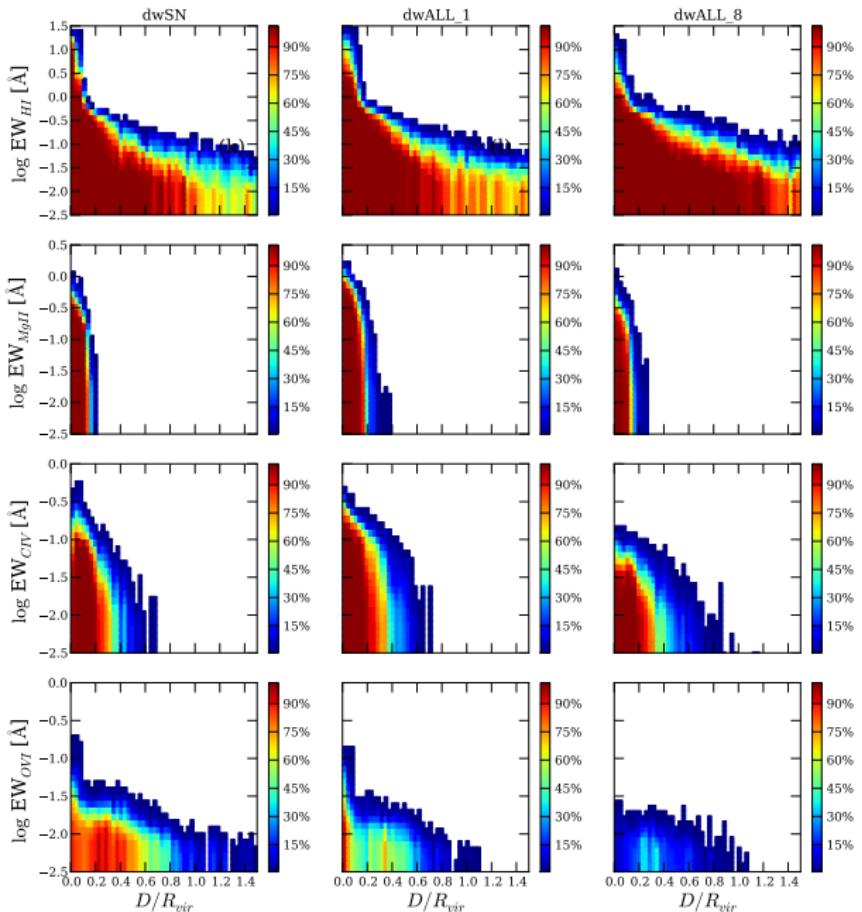
- One halo run three times with changing feedback recipes
  - $M_h = 3 \times 10^{10} M_\odot$
  - Runs:
    - dwSN: SN only
    - dwALL\_1: SN with radiation pressure and weak photoheating
    - dwALL\_8: SN with radiation pressure and strong photoheating
- Very different stellar masses, star formation histories
- How does CGM change with different feedback?



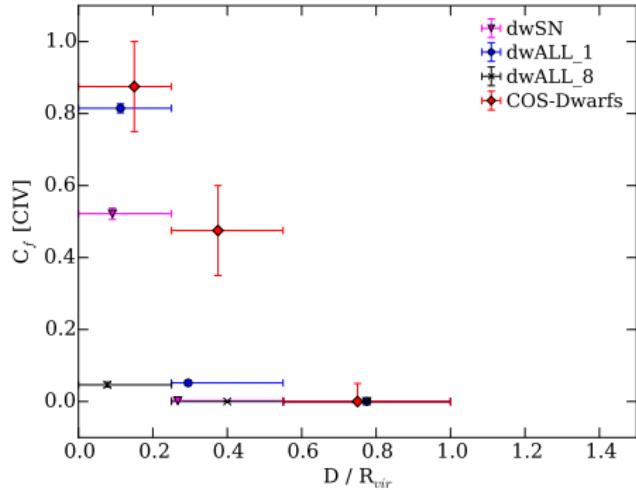
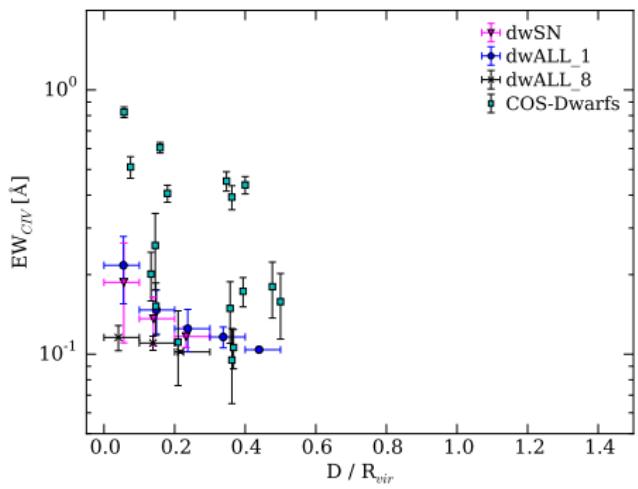
Stellar mass history

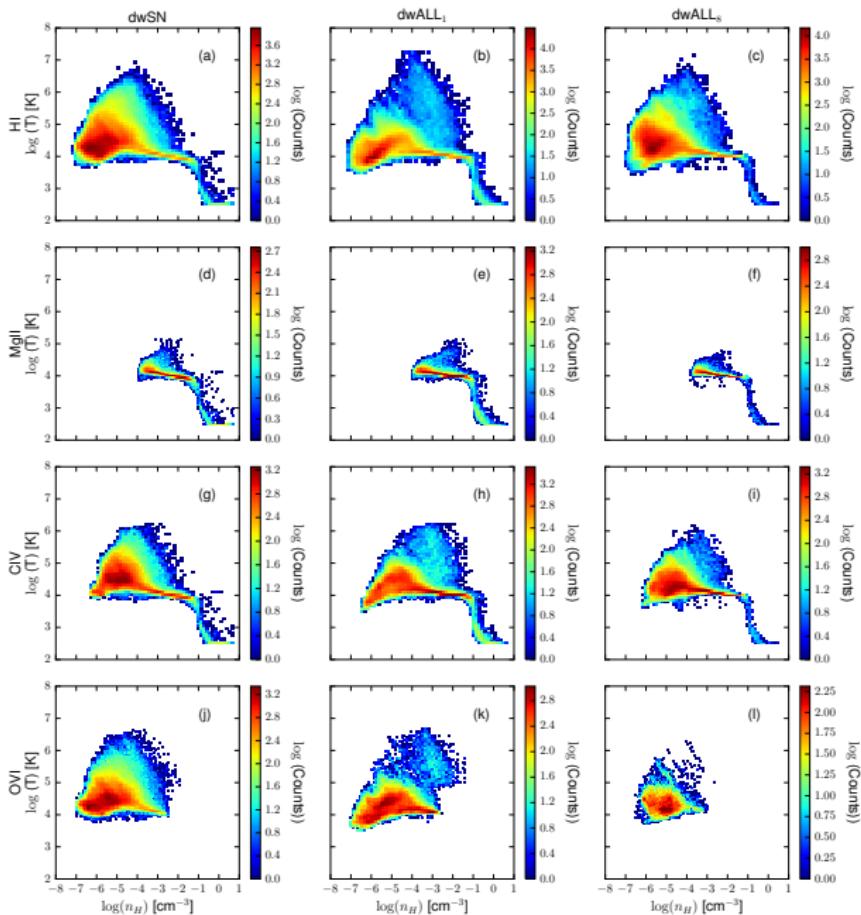






# COS-Dwarfs





# Summary

- Changing the stellar feedback strength has a significant affect on the galaxy, but the CGM is greatly altered by the galaxy, but not the CGM
- Simulations agree with observations of CIV absorption
- Only OVI is sensitive to feedback details, but is too weak to observe.
- Increased radiation feedback removes the collisionally ionized OVI

