

Advancement in AGN

Jointly organised by IUCAA and CUHP



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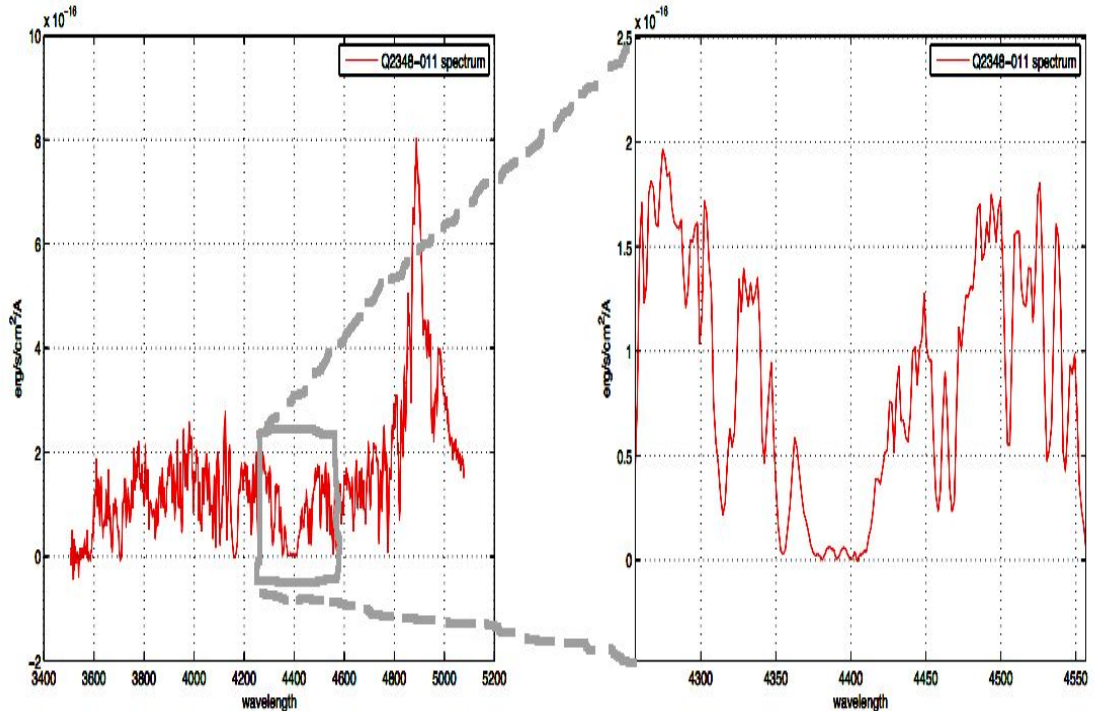
Central University of Himachal Pradesh

**Searching for Lyman-alpha Emission in Damped
Lyman-alpha Systems (DLAs)**

In Collaboration with Prof. Hum Chand (CUHP) and Dr. Ravi Joshi (IIA)

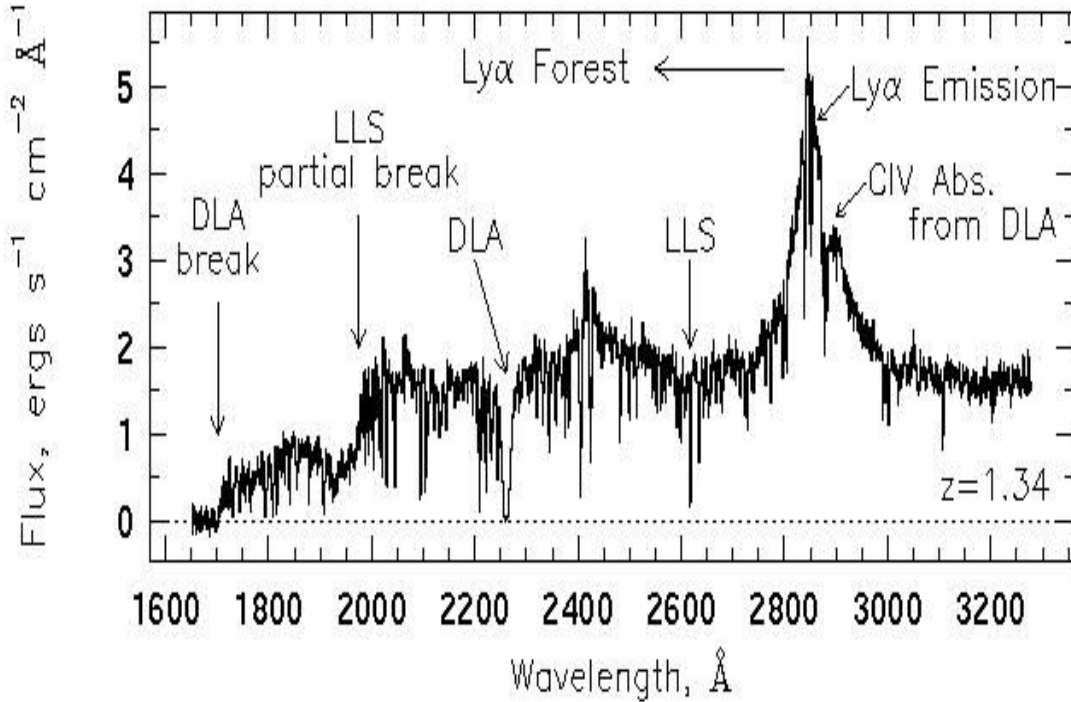
What are DLAs ?

- **DLAs:** Galaxies with neutral hydrogen columns exceeding 10^{20} cm^{-2} , significantly attenuating Lyman alpha emission.



What are DLAs ?

- **Abundance:** Relatively rare, but crucial probes of high-redshift neutral gas in the Universe.
- **Importance:** Offer insights into the conditions for galaxy formation and the evolution of the ISM.



Why to study DLA ?

- DLAs are important for studying galaxy formation because they are thought to be the building blocks of galaxies.
- The large amount of neutral hydrogen gas in DLAs can be used to form new stars and galaxies.
- By studying DLAs at different redshifts, we can track how the abundance of neutral hydrogen gas has changed over time.



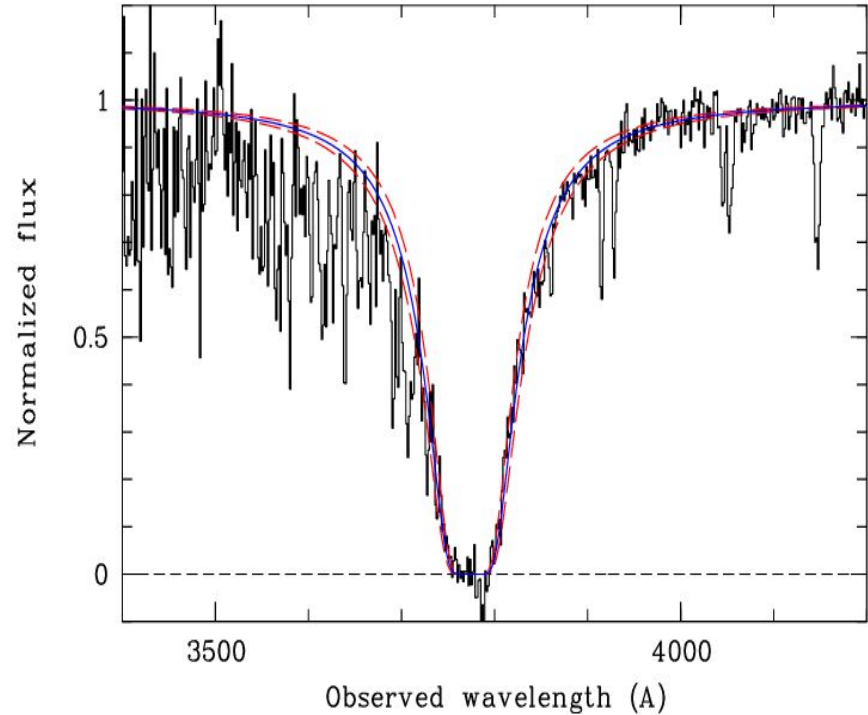
Motivation

- Studying Lyman-alpha emission in these distant objects can provide unique insights.
- Can we track the evolution of star formation activity within DLAs over cosmic time?



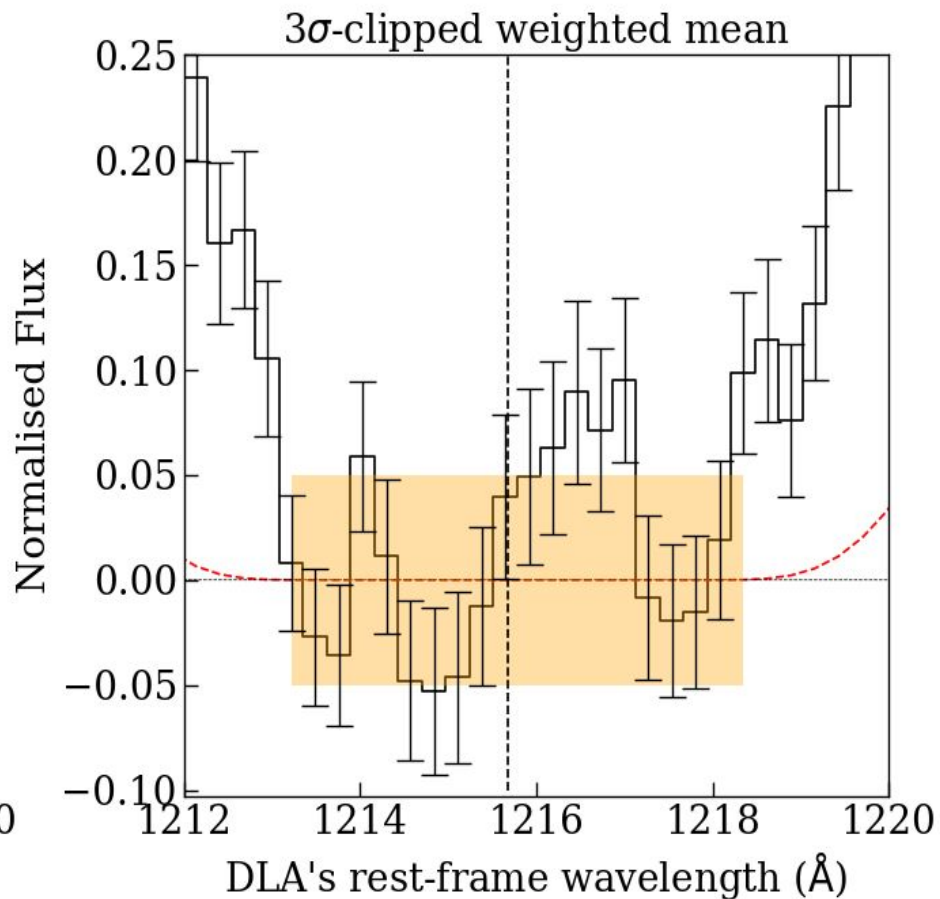
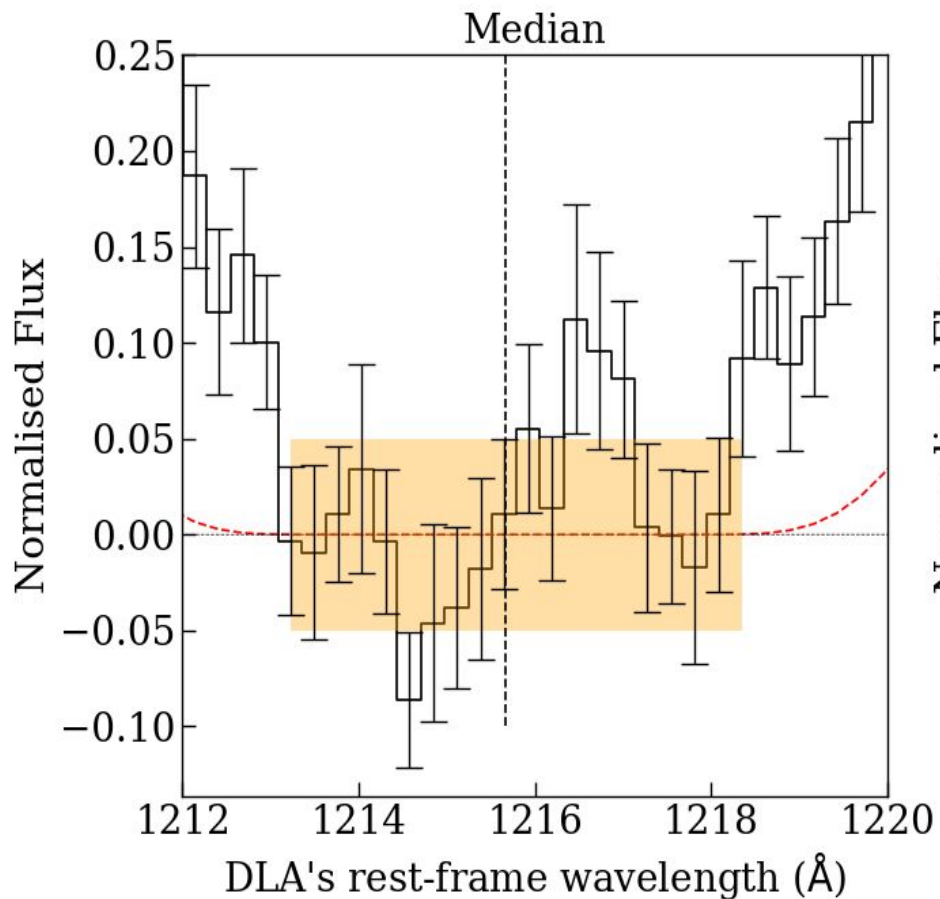
Sample

- We took the SDSS DR16 DLA catalog
- Which have 117,420 DLA Candidates.
- BAL probability < 0.50 .
- $\log(\text{NHI}) > 21.0$.
- Continuum to noise ratio (CNR) > 5 . We got 947 sources only.



Methodology

- We used the spectrum of 947 sources.
- Used two ways to stack the spectrum
 - Median stacking
 - Weighted mean stacking



Result

- The presence of Lyman-alpha emission suggests galactic outflow in the DLAs.
- It suggests there is dust which has dust optical depth around 0.001 angstroms.
- And Expansion velocity around 70 km/s.

