



Contribution ID : 12

Type : **Contributed talk**

Evidence for the invisible gas around galaxy halos using fast radio bursts from CHIME/FRB

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Most of the baryonic mass in galaxy halos consists of diffuse, magnetized plasma, which is referred to as the circumgalactic medium (CGM). The properties of the CGM remain relatively unconstrained, as the low density of the gas makes it hard to image in most wavelengths of the electromagnetic spectrum. Fast radio bursts (FRBs) are thus incredibly good probes of this plasma, because they undergo dispersion as they propagate through the CGM.

I used over 1600 FRB DMs from CHIME/FRB's upcoming Baseband Catalog 2, which is the largest catalog of FRBs that have a localization error of $< 1'$, to conduct an unprecedented statistical study of nearby galaxy halos. In doing so, I obtained the strongest evidence ($p = 0.0053$; $\sim 2.6\sigma$) for a DM excess due to the CGM to date, with an amplitude of $119 \pm 43 \text{ pc cm}^{-3}$. I also obtained some of the first FRB-based constraints of the baryon distribution of the CGM of Milky Way like galaxies, with tentative evidence ($\sim 2.4\sigma$) that galaxy halos in this mass range may be more relaxed than previously thought, almost tracing the underlying dark matter distribution directly. However, more FRBs are needed to further test this. My work demonstrates the power of FRBs to map the invisible diffuse plasma in the Universe and forecasts a 5σ detection of the CGM with 10000 FRBs, which can then be used to place the best constraints (amongst all probes of hot plasma) on the distribution of baryons in the CGM.

Did you give a contributed talk at CASCA 2026?

No

If you are selected for a poster, would you be interested in giving a short flash talk on your work?

Yes

What is your career level?

PhD

Which keyword describes the area of focus of this talk?

Transients

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Session Classification : Transients & Cosmology