X47a Revealing the Cosmic Baryon Distribution with FRBs and Subaru PFS

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The dispersion measure (DM) from Fast Radio Bursts (FRBs) are a promising probe of "missing" cosmic baryons since they encode all ionized gas along the line-of-sight. However, it has proved challenging to precisely model the separate DM contributions from the Milky Way, FRB host, intervening cosmic web, and CGM halos. Detailed spectroscopic observations of the foreground galaxy distribution help precisely characterize the cosmic web and foreground CGM DM contributions, dramatically improving our sensitivity toward the IGM and CGM baryon distributions. The FLIMFLAM survey has implemented this idea with 4m-class spectroscopic surveys targeting localized FRBs, and the first data release (DR1) analysis of 8 FRB fields has made the first-ever measurement of the fraction of cosmic baryons residing in the diffuse IGM, $f_{\rm igm} = 0.60^{+0.11}_{-0.10}$, as well as measuring the CGM halo gas fraction $f_{\rm gas} = 0.55^{+0.26}_{-0.29}$. With Subaru PFS, we would be able to target higher-redshift FRBs at $\langle z_{\rm frb} \rangle \approx 0.6$ compared to $\langle z_{\rm frb} \rangle \approx 0.15$ of FLIMFLAM. This is represents $\sim 4\times$ increased cosmic path length probed per FRB field, allowing significant improvements in the $f_{\rm igm}$ constraints to the $\sim 2\%$-level with samples of ~ 30 FRBs. These measurements will allow strong and unique constraints on the nature of stellar and AGN feedback that redistribute the cosmic baryon, which has been shown in cosmological simulations to modify the IGM baryon fraction by up to $\Delta f_{\rm igm} \approx 0.25$. In this talk, I will both summarize the recent FLIMFLAM results, as well as present forecasts for constraints possible with PFS.