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Gas accretion from the cosmic web in the local Universe

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Abstract

Numerical simulations predict that gas accretion from the cosmic web drives star formation in disks galaxies. The process is more important in low mass haloes, therefore, when galaxies were low mass in the early universe, but also in dwarf galaxies of the local universe. The central role played by cosmic gas infall is as clear from numerical simulations as it is obscure to observations. The gas that falls in is predicted to be tenuous, patchy, partly ionized, multi-temperature, low-metallicity, and large-scale; thus, hard to show in a single observation. One of the most compelling cases for gas accretion at work in the local universe comes from the extremely metal poor (XMP) galaxies. They show metallicity inhomogeneities associated with star-forming regions, so that large starbursts have lower metallicity that then underlying galaxy. This and other evidence suggest that local XMP are primitive disks sustained by cosmic web gas accretion. In the contribution we described the case posed by XMP galaxies to support the existence of cosmological gas accretion.

1 Extremely metal poor galaxies and gas accretion

According to numerical simulations, gas accretion from the cosmic web drives star formation in disks galaxies [2, 12]. The process is important in low mass haloes ($< 10^{12}\mathrm{M}_{\odot}$), therefore, when galaxies were low mass in the early universe, but also in dwarf galaxies of the local universe. The gas that falls in is predicted to be tenuous, patchy, partly ionized, multi-temperature, low-metallicity, and large-scale; therefore, hard to disclose with a single observation. We describe the existing theoretical predictions and observational constraints in paper[8]. The theoretical prediction of gas from the web feeding star-formation is more

clear than its observational confirmation, which still remains indirect. One of the most compelling cases for gas accretion at work in the local universe comes from the extremely metal poor (XMP) galaxies. They show metallicity inhomogeneities associated with star-forming regions, so that large starbursts have lower metallicity that then underlying galaxy [5, 10, 9]. Due to the short mixing time-scale in the galaxy, the metal poor-gas producing stars should have been received recently from outside, hinting at cosmic gas accretion. This and other evidence suggest that local XMP are primitive disks sustained by cosmic web gas accretion. In the contribution to the SEA XI Scientific Meeting, we detailed the case posed by XMP galaxies supporting the mechanism of cosmological gas accretion.

We refer the interested reader to the papers cited above, as well as to a number of excellent reviews covering the topic of cosmic gas accretion from different perspectives [11, 12, 3, 6, 4, 1, 7].

Acknowledgments

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