

Seminarium Astrofizyczne
(wykład pierwszy)

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ul. Pasteura 7, sala 404

Aleksandra Hamanowicz
(ESO)

3D view on Cosmic Baryon cycle

Galaxies are constantly fed by the diffuse material from the intergalactic medium through the **Circum-Galactic Medium (CGM)**. We can probe these vast gaseous halos around galaxies by studying absorbers detected in the spectra of **bright background quasars**. To understand the dynamics of the system we combine the physical properties from the absorption features with the broader view of the absorber's host and its environment by emission diagnostics, using IFU spectroscopy. Gas travelling through the CGM enters a galaxy and replenishes the gas reservoirs which further transforms into **molecular phase**- the direct fuel of the star formation. Recent studies have suggested a possible link between the cosmic density of H_2 - the most abundant molecule in the Universe - and the **Star Formation History of the Universe**. The second most abundant molecule, still linked to star formation, is CO and its rotational transitions are bright and relatively easy to observe with ALMA, allowing us to probe the molecular content of whole populations of galaxies.

In my talk, I will present the two surveys probing the gaseous content of galaxies in different phases: molecular within the galaxies and diffuse in the CGM. We combined MUSE and ALMA to understand the properties of host galaxies of quasar absorbers in the MUSE-ALMA Haloes Survey. Surprisingly, we found **large fraction of groups associated with absorbers**, which introduces a challenge in connecting CGM detected in absorption to a particular galaxy. Addressing the molecular gas content of galaxies, we turned towards the archival observations of ALMA calibrators, constructing ALMACAL-CO, blind CO emission-line survey. A survey is a part of the extensive science project ALMACAL, utilizing ALMA calibration data for scientific purposes. Thanks to a uniqueness of the ALMACAL dataset we are able to study galaxies over a wide area, and are not sensitive to the effects of cosmic variance. The results of the survey, confirm findings of other blind emission line searches: **the shape of the molecular gas mass function mirrors star formation history of the Universe**, suggesting that the molecular gas content of galaxies is closely linked to the evolution of SFH.

Serdecznie zapraszam,
Agnieszka Majczyna