The J-PLUS survey: understanding the formation and evolution of M 33

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Abstract

It is widely accepted that large disk galaxies derive from the merger and accretion of many smaller subsystems. However, it is less clear how low-mass spiral galaxies fit into this picture. The best way to answer this question is to study the nearest example of a dwarf spiral galaxy, M 33. We propose to perform a detailed photometric analysis of the resolved and unresolved stellar population of M 33 using data from the Javalambre Photometric Local Universe Survey (J-PLUS). Using a set of 12 broad-, intermediate- and narrow-band filters, J-PLUS will cover a wavelength range between $330 - 1000\,\mathrm{nm}$, reaching magnitudes of $r \sim 22$. We will take advantage of the IFU-like capabilities of the survey to determine the properties of the spatially resolved and unresolved components of the galaxy. In particular, we will perform a 2-D analysis of the underlying population as well as a detailed study of M 33 star cluster system. Spectral fitting diagnostics of the resolved and unresolved populations will allow us to determine ages, metallicities and masses of the galactic disk, spheroidal components and cluster system. We will analyze two regions covering a total area of $3.2\,\mathrm{deg}^2$. One field will be centered on M 33 covering the disk and the outskirts. A second field will cover the line connecting M 33 with M 31 to map the stellar substructure surrounding M 33. This study will provide key insights into the star formation history of low-mass galaxies as well as place M 33 within the context of galaxy formation process.

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