Contribution ID: **33** Type: **Poster**

Estimation of Galaxy properties in 3D MUSE archival data with convolutional neural networks

Next generation instruments are focused on producing massive amounts of spectroscopic data that require new approaches that are computationally efficient and more accurate. While traditional processes such as the convolution-based template matching have been proven successful, they are computationally demanding. Machine learning methods have proven to be orders of magnitude faster and showing promising results. Here we built on the previous efforts and explore these techniques further. Using simulated 3D MUSE cubes, we train a Convolutional Neural Network (CNN) to detect and measure the Lyman-alpha, C IV, and He II emission lines, in order to trace the over-densities and characterise the large scale structure environment. We then test the accuracy of the CNN against real data using ˜300 deep field MUSE cubes of archival data. With this work we will have a new tool for processing and characterising large amounts of data, which will be faster and less computationally demanding. We will also be able to set tighter constraints on this new method of quasar spectra analysis, aiming to extrapolate the results to the new upcoming massive spectroscopic surveys.

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Session Classification: Posters

Track Classification: Paris