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The GaXNet tools for Stage-IV Surveys and Cosmology with Galaxies and Galaxy Clusters

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The upcoming all-sky surveys from ground and space will collect detailed imaging and spectroscopical information for up to billions of galaxies. These huge datasets encode fundamental information related to cosmology and galaxy formation mechanisms. We have an unprecedented chance to fully exploit galaxies as laboratories for the cosmology and the physics of dark and baryonic matter (i.e. stars and gas) simultaneously. We present a series of deep learning tools to measure the most significant physical parameters for galaxies targeted by imaging and spectroscopical stage-IV surveys (e.g. LSST, Euclid, 4MOST) and novel techniques to fully exploit the multi-dimensional parameter space including all scaling relations among the measured parameters (both for galaxies and cluster of galaxies). We have started to test these techniques on the current stage-III survey (e.g. KiDS and SDSS) for the feature extraction, while we have forecasts for cosmological inferences using galaxy clusters.

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