

Zapraszam na krótki, 20-minutowy wykład specjalny w ramach Seminarium Astrofizycznego, który odbędzie się w sali 118 (Pawilon na Hożej 69) 14 sierpnia (wtorek). Wykład zacznie się wyjątkowo o godzinie 12:00.

Prelegent: Sebastian Turner (Astrophysics Research Institute, Liverpool John Moores University)

Tytuł: "k-means clustering in galaxy feature data from the GAMA survey"

Abstrakt

A fundamental bimodality of galaxies in the local Universe is apparent in many of the features used to describe them. Multiple sub-populations exist within this framework, each representing galaxies following distinct evolutionary pathways. Accurately identifying and characterising these sub-populations requires that a large number of galaxy features be analysed simultaneously. Meanwhile, future galaxy surveys such as LSST and Euclid will yield data volumes for which traditional approaches to galaxy classification will become unfeasible. To address this, we apply the k-means unsupervised clustering method via a robust cluster validation approach to feature data derived from a sample of 7338 local-Universe galaxies selected from the Galaxy And Mass Assembly (GAMA) survey. This method allows us to partition our sample into k clusters without the need for training on pre-labelled data, facilitating a full census of our high dimensionality feature space and guarding against stochastic effects. We find that the local galaxy population natively splits into 2, 3, 5, and a maximum of 6 sub-populations, with each corresponding to a distinct ongoing evolutionary mechanism. Notably, the impact of the local environment appears strongly linked with the evolution of low-mass ($< 10^{10}$ solar masses) galaxies, with more massive systems appearing to evolve more passively from the blue cloud onto the red sequence. With a typical run time of ~ 3 minutes per value of k for our galaxy sample, we show how k-means unsupervised clustering is an ideal tool for future analysis of large extragalactic datasets, being scalable, adaptable, and providing crucial insight into the fundamental properties of the local galaxy population.

Agnieszka Majczyna