Seminarium Astrofizyczne
wtorek 25.06.2024 godz. 12:30
ul. Pasteura 7, **sala 207**

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Structural and Spectroscopic Evolution of Quiescent Galaxies in the Middle-Aged Universe

As very recent James Webb Space Telescope (JWST) NIRCam images confirm, quiescent galaxies have been undergoing morphological transformations for more than 12 billion years of cosmic time. The synergy between high-resolution ground-based imaging and dense spectroscopic surveys enables us to follow the evolution in structural, stellar population, and dynamical properties of quiescent galaxies over the $0.2<z<1$ redshift interval. These statistically large samples provide the key link between the population we observe in the local universe and the small number of distant quiescent systems unveiled by the JWST. We use Subaru/Hyper Suprime-Cam images and large-area MMT/HectoSpec redshift surveys to trace the evolution in average size of quiescent systems segregated by their stellar population age to separate the effects due to the influx of newly quenched galaxies from the size growth in the quiescent phase via mergers. We combine size, concentration, and velocity dispersion measurements to follow the increase in the central dark matter fraction and test its relationship with the size evolution of galaxies after they quench. Our results demonstrate the power of the state-of-the-art spectro-photometric surveys to fully characterize quiescent galaxy evolution in the last 6 billion years of cosmic time. The next generation facilities (PSF, MOONS, 4MOST) will enable equivalent investigations of quiescent systems at distances when the universe was less than 30% of its current age, reaching out further towards the era probed by the JWST.

Serdecznie zapraszam,
Michael Romano, on behalf of the SOC