

## **Seminarium Astrofizyczne**

wtorek 23.06.2020 godz. **12:00**

<https://zoom.us/j/439968736>

Meeting ID: 439 968 736

Password: 072094

### **Francesco Valentino**

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### **The early death of cosmic giants**

The majority of the stars in the local Universe belong to massive, red, spheroidal, old galaxies that died several billion years ago, ceasing their active formation of new stars. In our current view, these galaxies experienced an intense burst of growth immediately followed by a sudden death early in the Universe, so that we routinely observe a numerous population of such dead cosmic giants already in place 10 Gyr ago at  $z \sim 2$ , comfortably reproduced by the most recent galaxy formation models and simulations. However, the coherent scenario that we have been building in the last 15 years has been recently shaken by the discovery of the existence of massive dead galaxies already at  $z \sim 4$ , only 1.5 Gyr after the Big Bang. How is it possible to assemble 100 billion Suns in such a short time, given the expected theoretical limits on the sustainable star formation rate? What can we learn about such a dramatic production of stars? What are the progenitors of these quiescent galaxies at  $z > 4$ ? And why do these cosmic giants die so early in the history of the Universe?

In this seminar, I will present a new Keck/VLT spectroscopic investigation of some of the most distant massive quiescent galaxies ever found so far. I will show how to identify them in the first place and how we can determine their physical properties, including their short formation timescales ( $\sim 50$  Myr) and quenching phases. I will compare their number and properties with the ones of their candidate progenitors, the starbursting sub-mm galaxies at  $z > 4$ . I finally will show that state-of-the-art cosmological simulations, while roughly capturing the main evolutionary trends, struggle to reproduce the timescales and numbers of

massive quiescent galaxies at  $z \sim 4$ , suggesting the necessity to revise our recipes for early galaxy evolution.

Serdecznie zapraszam,  
Agnieszka Majczyna