# PHYSICS AND ASTRONOMY

# SEMINAR


## Dr. Alejandro Benítez-Llambay

Institute for Computational Cosmology, Durham University, UK.


## “Probing LCDM with "dark" galaxies”


Abstract

"A fundamental prediction of the Lambda Cold Dark Matter (ΛCDM) model is the existence of numerous low-mass dark matter systems that are too small to host a luminous galaxy. The detection of these “dark” structures would offer an unprecedented probe to the current cosmological paradigm on scales that have not yet been explored. Some of these objects might hold sufficient gas left from the epoch of reionisation and could be detectable through emission in HI, or through fluorescence in Hα. The gas content of all low-mass systems is affected by the early Cosmic Reionisation (CR) of hydrogen, which heats the entire gas of the Universe to a temperature of a few 10^4 K and drives 90%-100% of the available baryons out from haloes less massive than ~10^9 M⊙- 10^8 M⊙. The remaining ~ 10% of the gas stays in thermal equilibrium with the UV background radiation field sourced by external sources, and reach hydrostatic equilibrium with the dark matter potential well, becoming dense enough to recombine and emit in 21cm, but without becoming self-shielding and forming stars. These objects are called “REionisation-LImited HI Clouds” (RELHICs). RELHICs are not, however, in isolation, but can be overtaken by the cosmic web, which may reduce their baryonic content further through ram pressure. The systems that undergo this interaction are called “COSmic WEB Stripped haloes” (COSWEBs). This dichotomy between RELHICs and COSWEBs makes it hard to predict the clustering of RELHICs from analytical considerations alone. Because of this and given their low baryonic content, we must rely on high-resolution cosmological hydrodynamical simulations to tackle this problem. In this talk I will discuss the origin and the properties of both RELHICs and COSWEBs, I will summarize recent progress on their characterisation, and I will discuss the prospects of their detection in the near future".


Friday, March 15, 2019

11:30 a.m.

ECS Building – Room 130