Title: Candidate dark galaxies in the Perseus cluster
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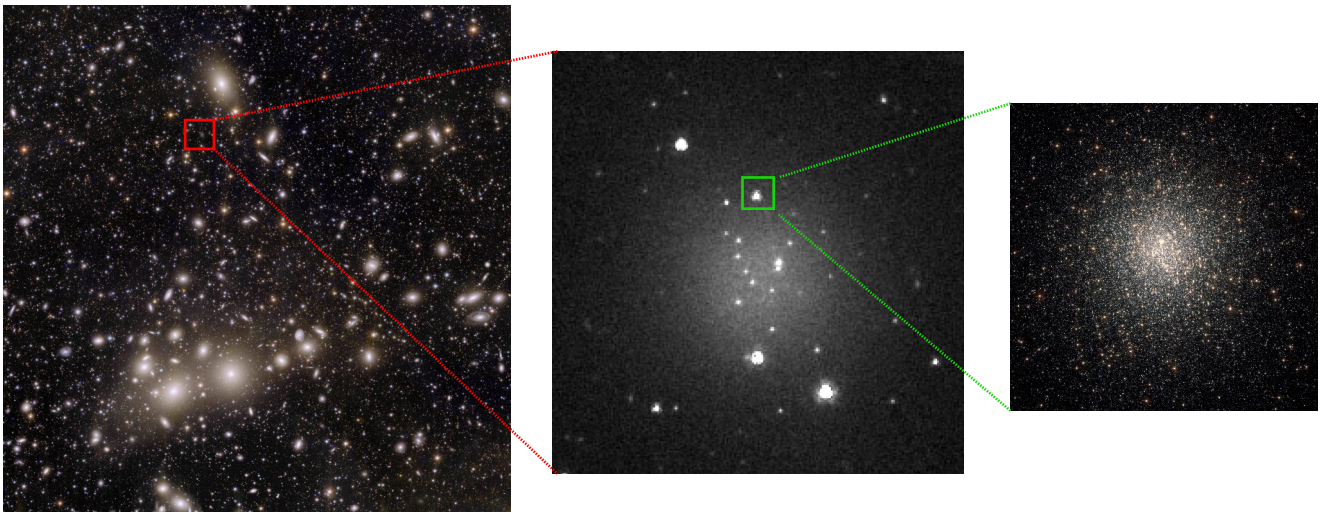

Left: Perseus galaxy cluster; Middle: low surface brightness dwarf galaxy; Right: globular cluster

Description:

The **Perseus galaxy cluster** is one of the most studied nearby clusters of galaxies at a distance of roughly 72 Mpc. This massive and rich cluster is extremely well-studied and therefore benefits from a large amount of ancillary data covering a wide range of wavelengths. Recently, the Euclid Space Telescope obtained wide-field multi-band observations of this cluster at an unprecedented depth and spatial resolution, as part of the Euclid Early Release observations (EROs). The Euclid observations of Perseus are unique as they allow the *simultaneous* detection and characterization of a large number of cluster galaxies to extremely low surface brightness levels as well as their globular cluster systems.

Dark galaxies are galaxies that contain little to no visible stars but are dominated by dark matter and gas. These galaxies are essentially "invisible" in the traditional sense, as they emit very little light (if any) and are primarily detected through their gravitational effects or indirect methods. Since dark galaxies are dominated by dark matter, studying them can reveal more about the properties of dark matter, including its distribution and interaction with baryonic matter.

One effective method for identifying dark galaxies makes use of their association with **globular clusters** (GCs). This approach involves searching for spatial overdensities of GCs that appear to lack an associated visible dwarf galaxy. Globular clusters would not naturally cluster together in space unless bound by sufficient gravitational mass, such as that provided by a dark matter halo. Consequently, detecting such GC overdensities can serve as indirect evidence for the presence of dark galaxies.

This project aims to analyse the spatial distribution of globular clusters identified within the Perseus cluster and detect any significant overdensities. These overdensities will be cross-referenced with known dwarf galaxies in the field, identifying those that lack a visible counterpart. A detailed photometric analysis will then be conducted on these overdensities to further investigate and confirm their potential dark galaxy nature.