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Identification of an $[\alpha/\text{Fe}]$ -enhanced thick disk component in an edge-on Milky Way Analogue

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ABSTRACT

The Milky Way disk consists of two prominent components — a thick, alpha-rich, low-metallicity component and a thin, metal-rich, low-alpha component. External galaxies have been shown to contain thin and thick disk components, but whether distinct components in the $[\alpha/\text{Fe}]$ - $[\text{Z}/\text{H}]$ plane exist in other Milky Way-like galaxies is not yet known. We present VLT-MUSE observations of UGC 10738, a nearby, edge-on Milky Way-like galaxy. We demonstrate through stellar population synthesis model fitting that UGC 10738 contains alpha-rich and alpha-poor stellar populations with similar spatial distributions to the same components in the Milky Way. We discuss how the finding that external

UGC 10738: самая красная, самая массивная, аналог MW

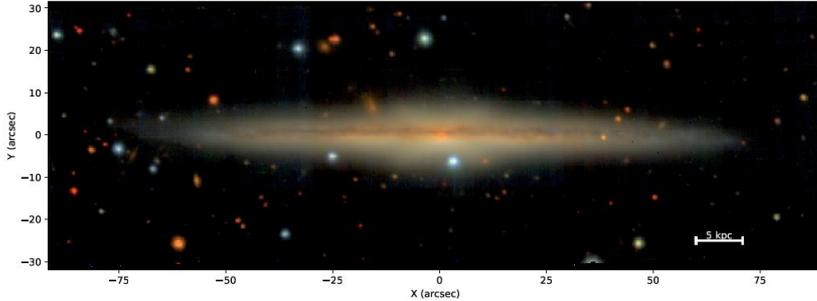
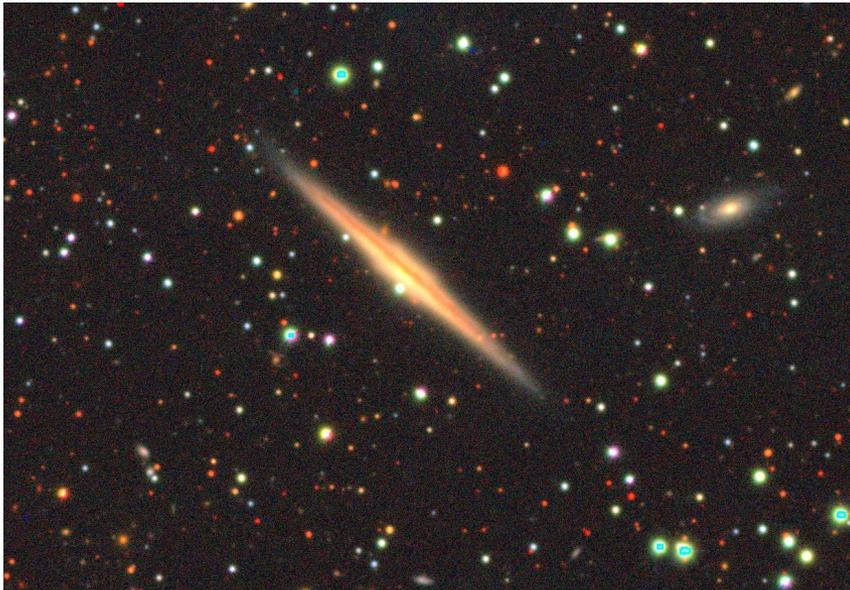


Figure 1. Pseudo-*gri* colour image of UGC 10738 created from the MUSE datacube. The X/peanut-shaped bulge and prominent dust lane are clearly visible. The white bar indicates a scale of 5 kpc at the distance of UGC 10738, $D = 99$ Mpc.

MUSE/VLT



Legacy Survey

Пространственные бины: 9 по радиусу, 4 по высоте над плоскостью

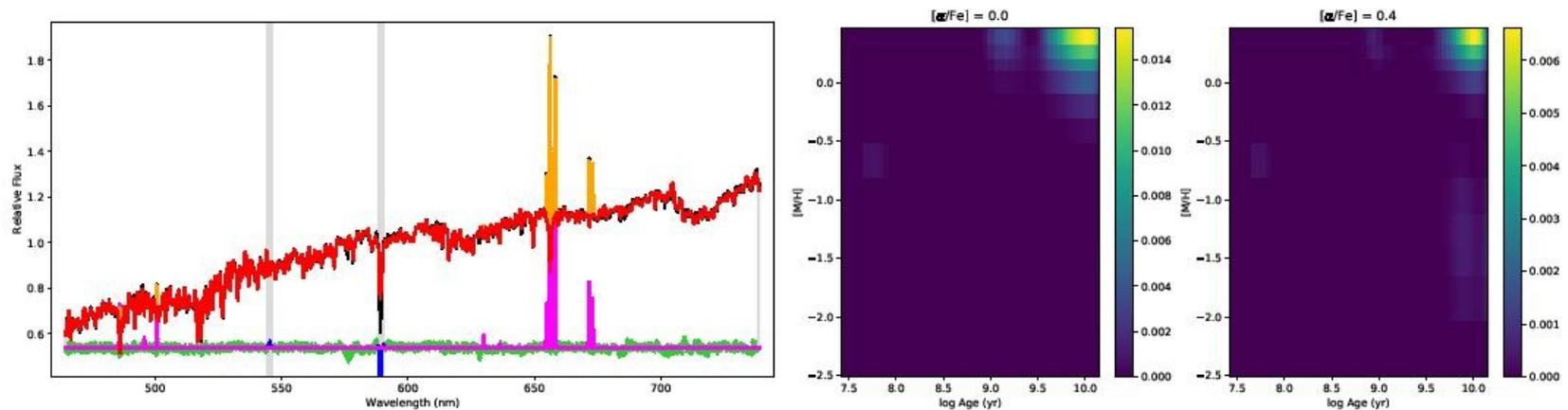


Figure 2. Left panel: example spectral fit with the observed spectrum in black, the stellar component of the fit in red and the gas component in pink and orange. The residuals are in green, with masked regions in blue. Right panels: mass fraction of stars with a given age, $[Z/H]$ and $[\alpha/Fe]$ that best reproduce the observed spectrum.

Стандартный фиттинг набором SSP:

2 репера по альфа-элементам, 5 - по возрастам (eMILES)

Очень похоже на Млечный Путь!

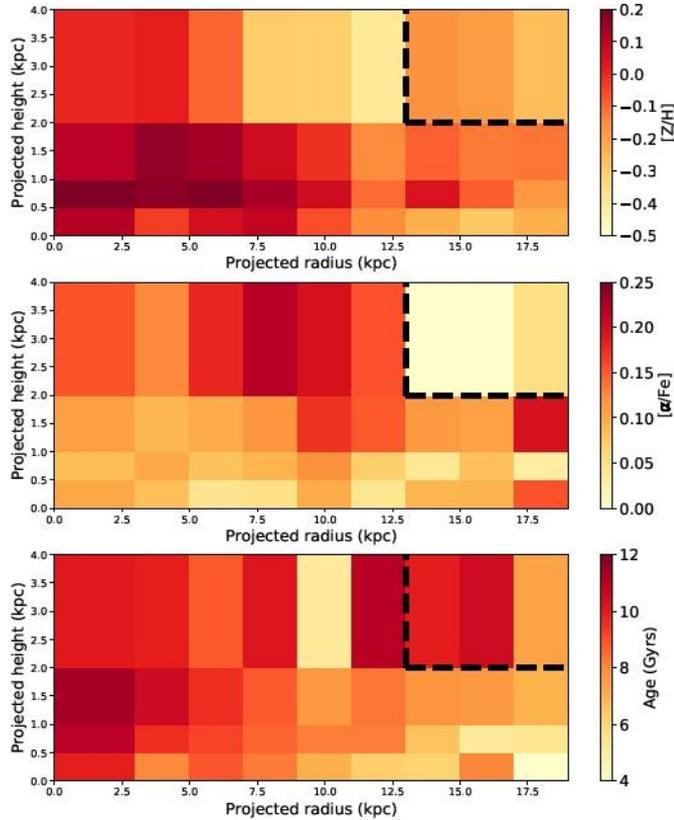


Figure 3. Maps of the mass-weighted average $[Z/H]$, $[\alpha/Fe]$ and age (in Gyrs) in UGC 10738. Values have been averaged over all four quadrants of the galaxy. The dashed black line in the upper left of each panel indicates the low S/N region.

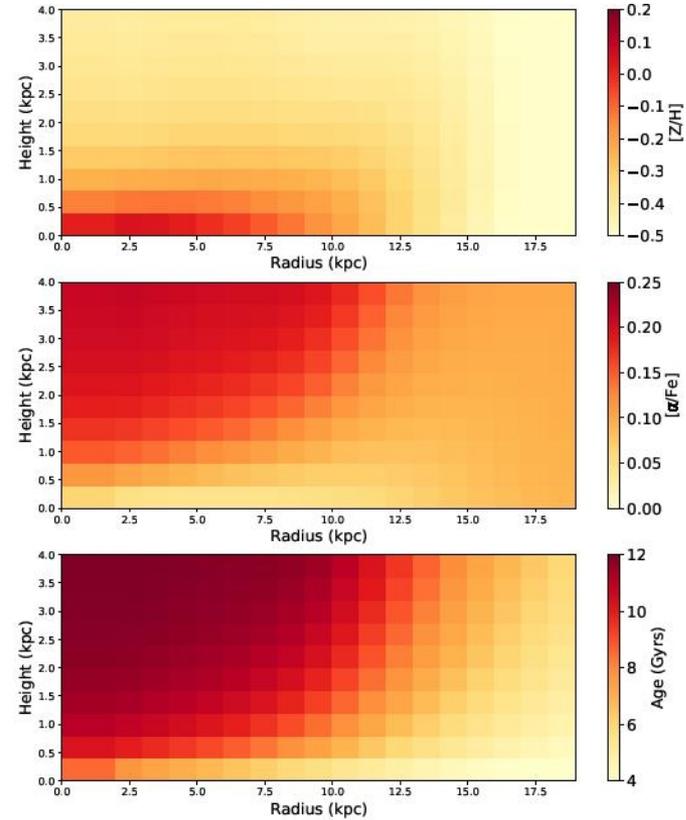


Figure 4. Maps of the mass-weighted average $[Z/H]$, $[\alpha/Fe]$ and age (in Gyrs) for the Milky Way, derived from the model presented in Sharma et al. (2020), showing the same spatial extent as in Fig 3.

Совершенно бредовая дискуссия:

- Два одинаково хороших (и популярных) объяснения происхождения толстого диска MW с высоким отношением α -элементов к железу:
 - Короткая вспышка SF 10 млрд лет назад с перерывом 2-3 млрд лет после нее

ИЛИ

- Плавная история SF без перерыва с могучей радиальной миграцией и распушением диска с возрастом (Binney & Schonrich 2009).

НАДЕЖДА: если таких галактик много, то это доказательство в пользу второй гипотезы (???)