Galaxy Kinematics and Tully-Fisher analysis in the $z=1.4$ XMMUJ2235-2557 cluster field

Jose M. Pérez$^1$, Bodo Ziegler$^1$, Miguel Verdugo$^1$, Asmus Böhm$^2$

$^1$ University of Vienna, Department of Astrophysics, Türkenschanzstr. 17, 1180 Vienna, Austria
$^2$ Institute for Astro- and Particle Physics, Technikerstrasse 25/8, 6020 Innsbruck, Austria.
Introduction

XMMUJ2235-2557 Cluster

Properties:

\[ M_{Tot}(<1\text{Mpc}) = (5.9 \pm 1.3) \cdot 10^{14} M_\odot \]

\[ R_{500} \approx 0.75 h_{70}^{-1} \text{Mpc} \] (from X-ray data, Rosati et al. 2009)

Spectroscopic redshift and photometric HST and HAWKI exposures available.

First Tully-Fisher analysis on a cluster at redshift 1.4

New MXU spectroscopy with FORS@VLT

<table>
<thead>
<tr>
<th>Int. Time</th>
<th>Seeing</th>
<th>Dispersion</th>
<th>( \lambda/\Delta\lambda ) (9035 Å)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 hours</td>
<td>0.8”</td>
<td>0.81 Å/pixel</td>
<td>1390</td>
</tr>
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</table>
Methods

1. Structural parameters (inclination, effective radius…) of each galaxy are determined by using Galfit on HST and HAWKI images.

2. The observational rotation curve (RC) is extracted from the galaxy emission lines.

3. A simulation of the 2D intensity and velocity field of each galaxy is performed.

4. Simulated RCs are computed and fitted to the observational one assuming a regular shape. By minimization, we obtain the maximum velocity in the flat part.
The direction of dispersión is along the y-axis in the velocity field and in the slits of the HST/HAWKI images.
Cluster galaxies in XMM2235-2557 are brighter on average by 1.5 magnitudes and smaller by a factor 2.5 compared to the Tully-Fischer local relation for a fixed $V_{\text{max}}$. In both diagrams, black stars are observed field galaxies at $z=1.0$ and $z=1.17$. 
Summary and Outlook

1. Cluster galaxies in XMM2235-2557 show brighter $M_B$ and smaller sizes than the local TFR. This suggests that during early assembly infalling galaxies are more compact and experience enhanced star formation.

2. In the next step we analyze distorted Velocity fields and examine cluster specific interactions.