MUSE Observations of Counter-Rotating Stellar Disks in Galaxies: IC 719

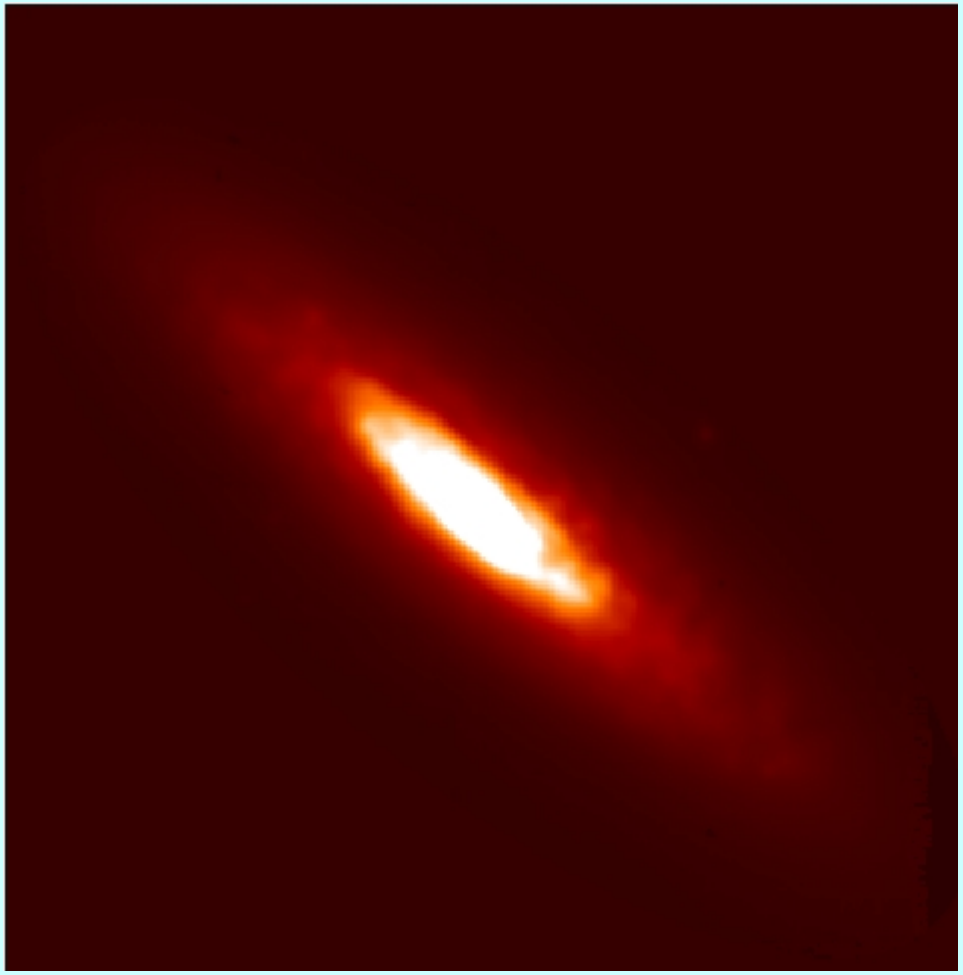
Alessandro Pizzella
Physics and Astronomy Dept, Padova University, Italy

L. Coccato, E.M. Corsini, E. Dalla Bonta`, L. Morelli, R. Bender, M. Fabricious, R. Saglia, M. Williams

Counter-rotation: when in one galaxy components with opposite spin co-exits.

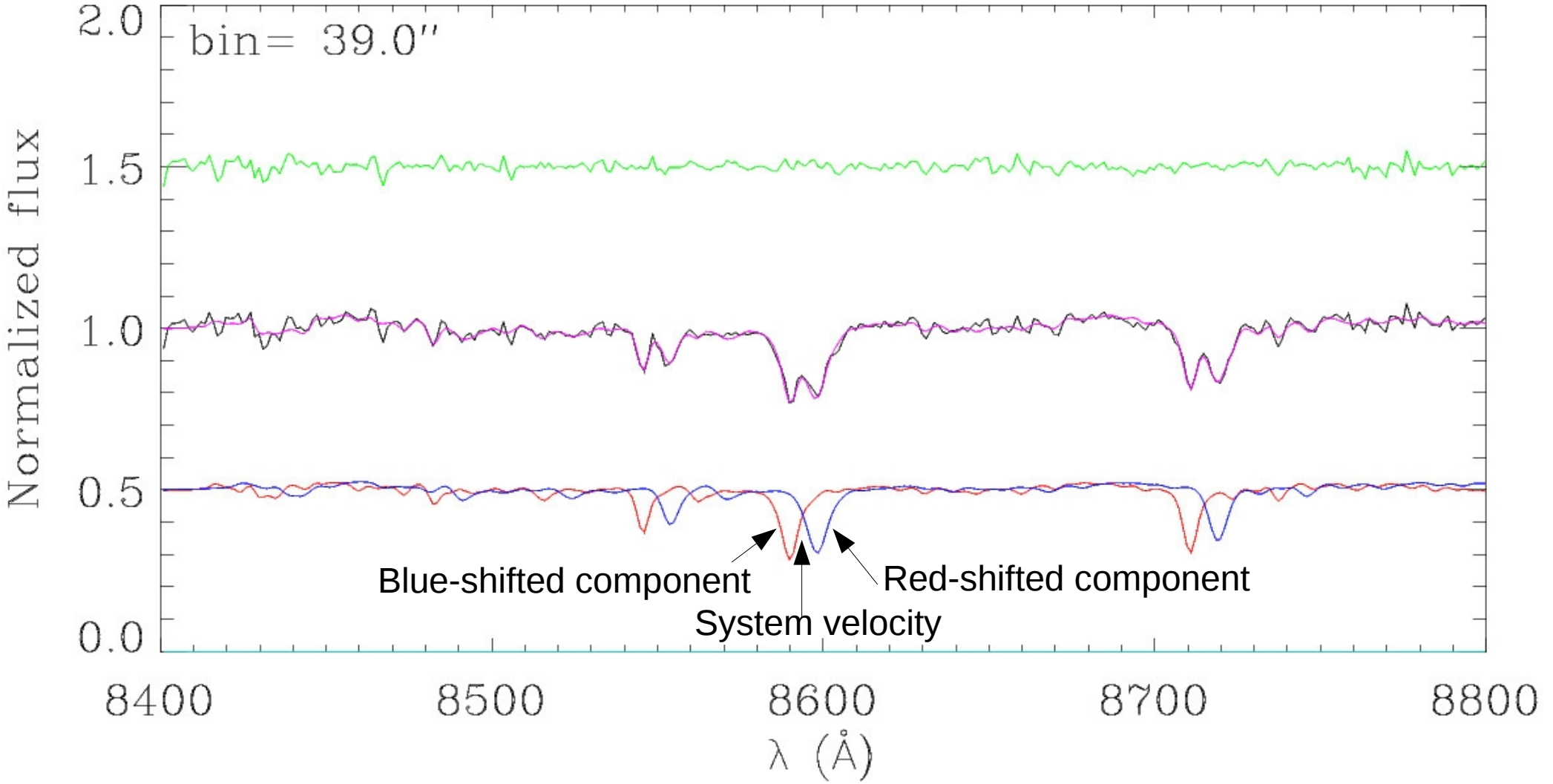
Counter-rotation is present in a number of disk galaxies, mostly S0s.
MUSE represents a huge step forward the study of this phenomenon.
In this “poster” we show how, with only 1 hour of observing time, we could achieve unforseen results.

MUSE - IC 719: is a normal-looking S0 galaxy



Reconstructed image
spaxel 0.2”x0.2”, seeing~1.4”

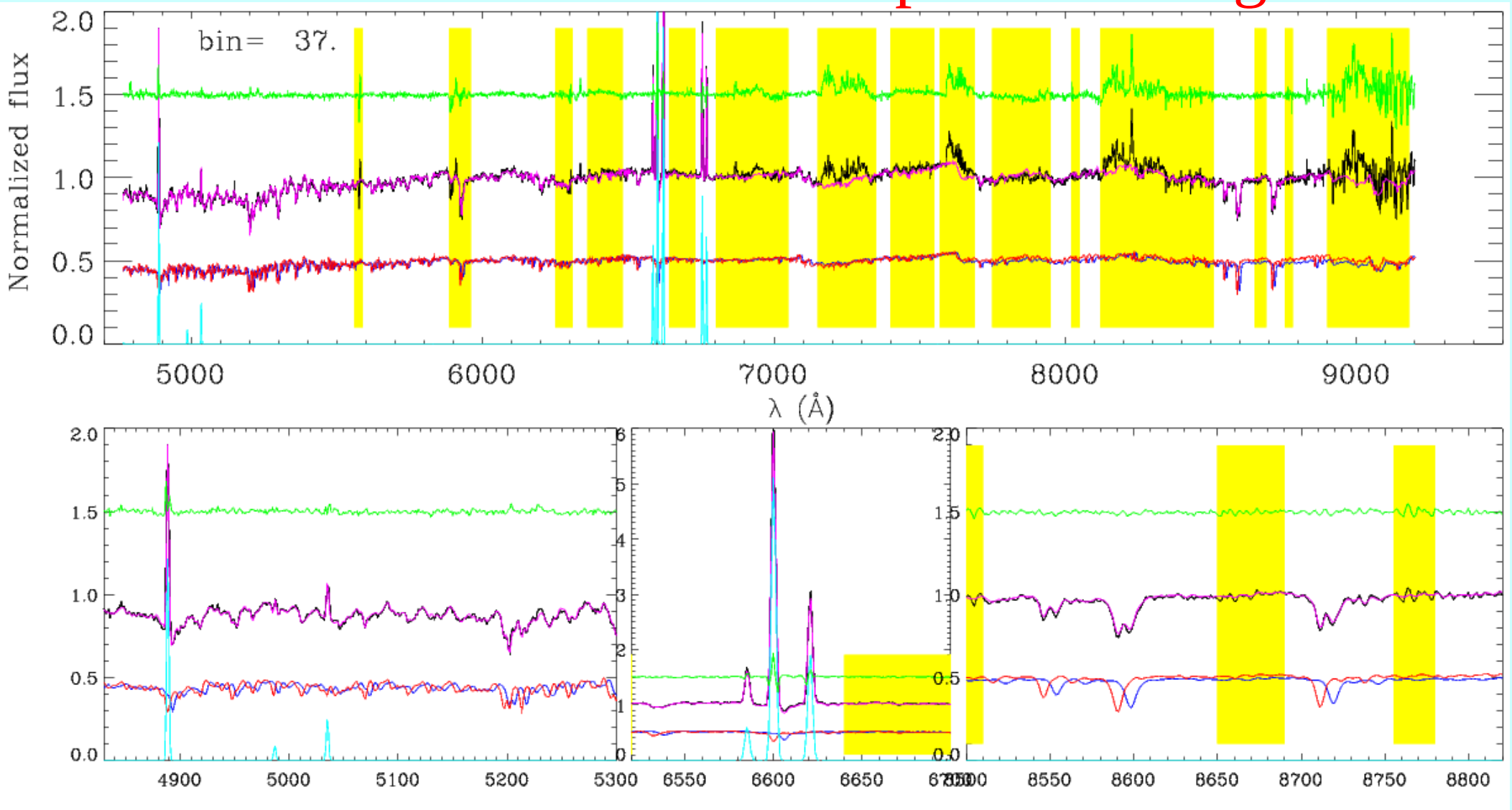
MUSE - IC 719 Ca Triplet region



Δλ=2.5Å R=2000-3500 ; σ = 65 - 35 km/s

The double-peaked line profile is due to the co-presence of two stellar component with a different velocity

MUSE - IC 719: full spectral fitting

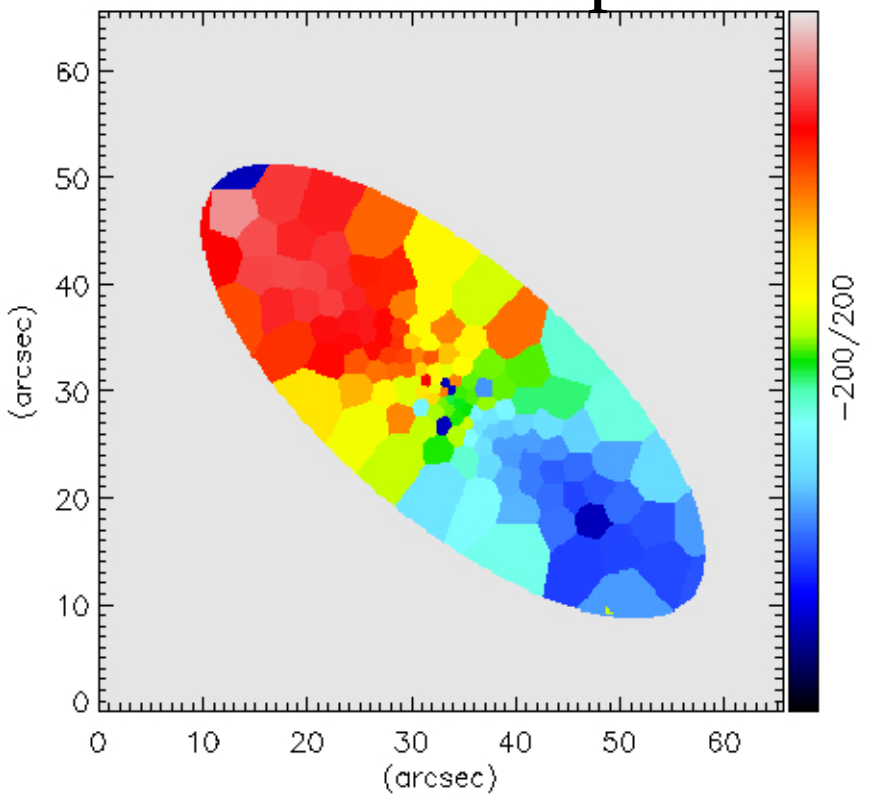


Stellar templates eMiles-MIUSCAT (Vazdekis et al. 2012) pPXF (Cappellari & Emsellem 2004) based code (Coccato et al. 2011)

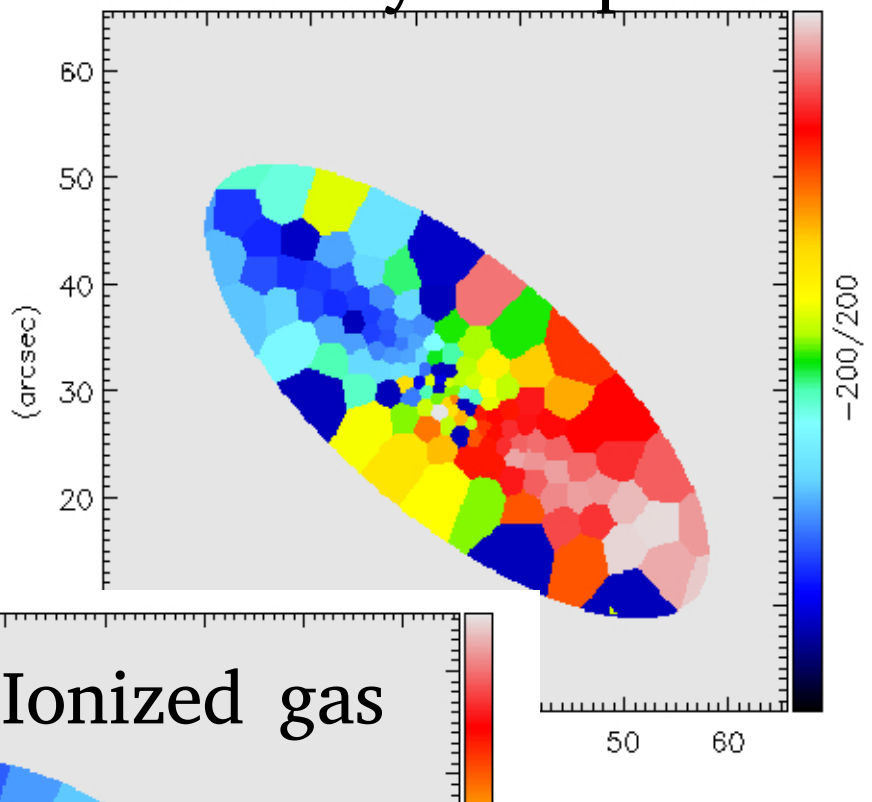
We can reproduce the spectrum as the sum of two independent stellar populations with different kinematics

IC 719 kinematics -Velocity field

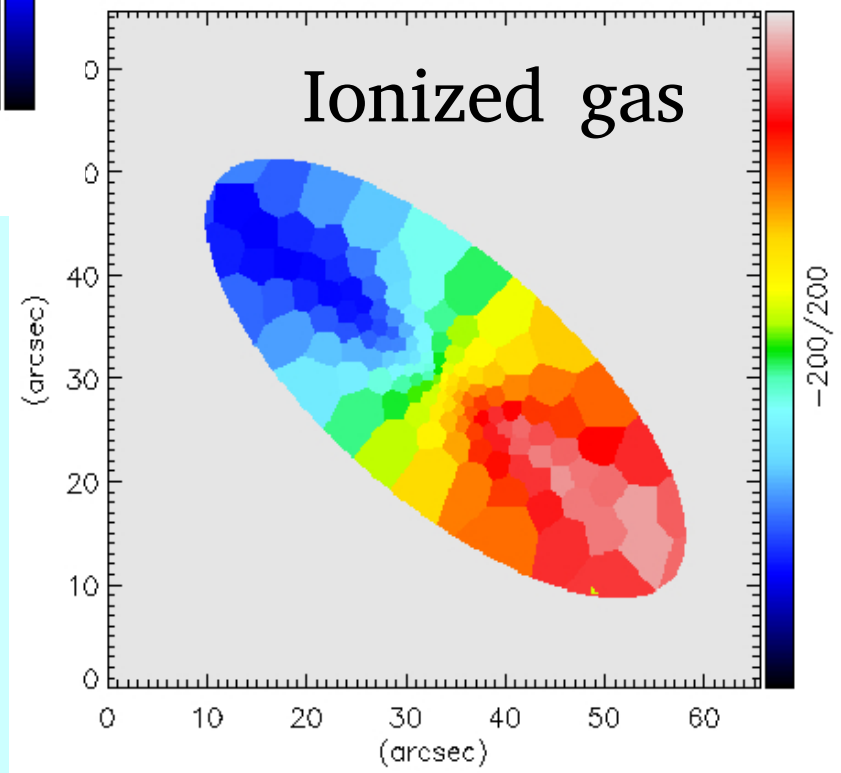
Main stellar component



Secondary component

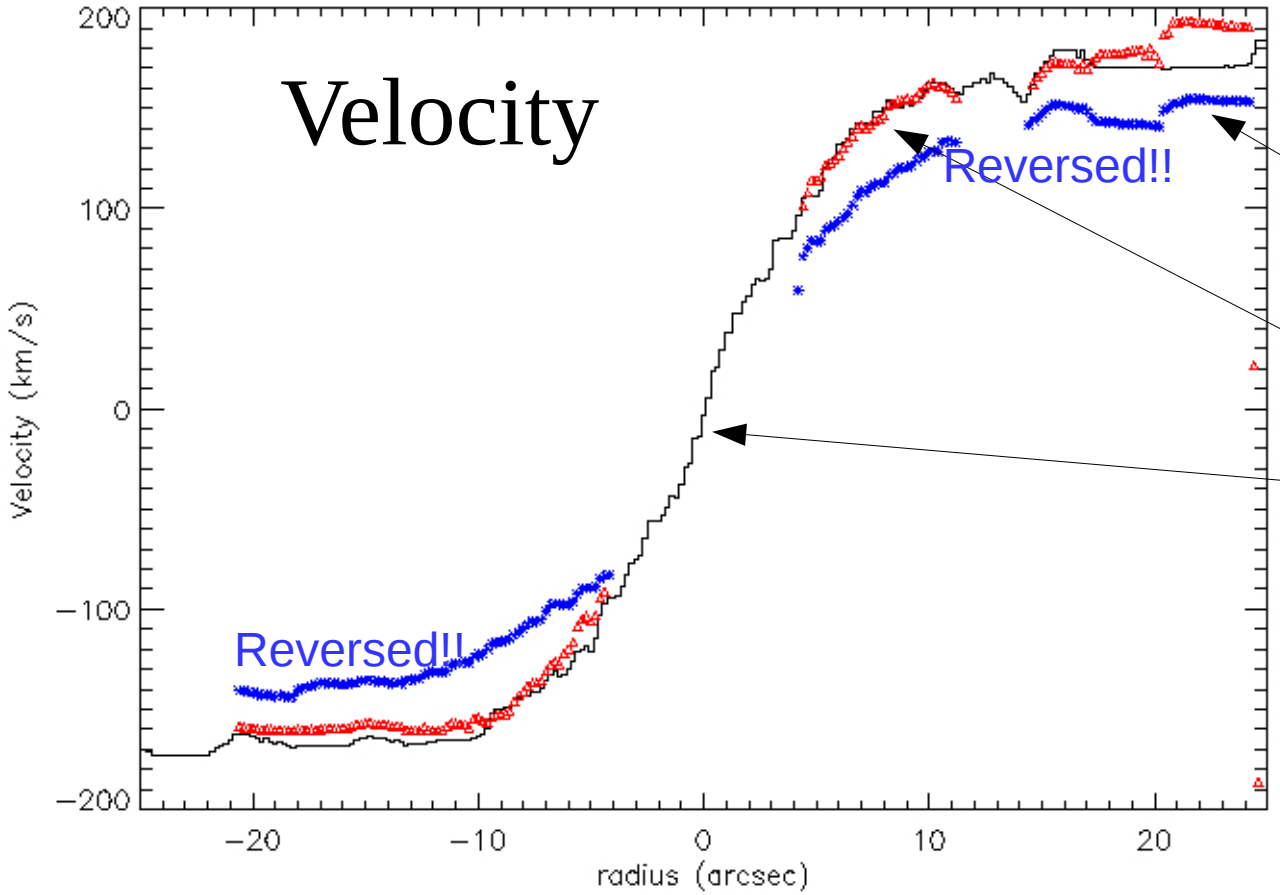


Ionized gas



We call Main Component the one that dominates the light. The ionized gas corotates with the secondary stellar component and counter-rotate with the main stellar component. (see also Katkov+ 2013 who studied extensively this galaxy)

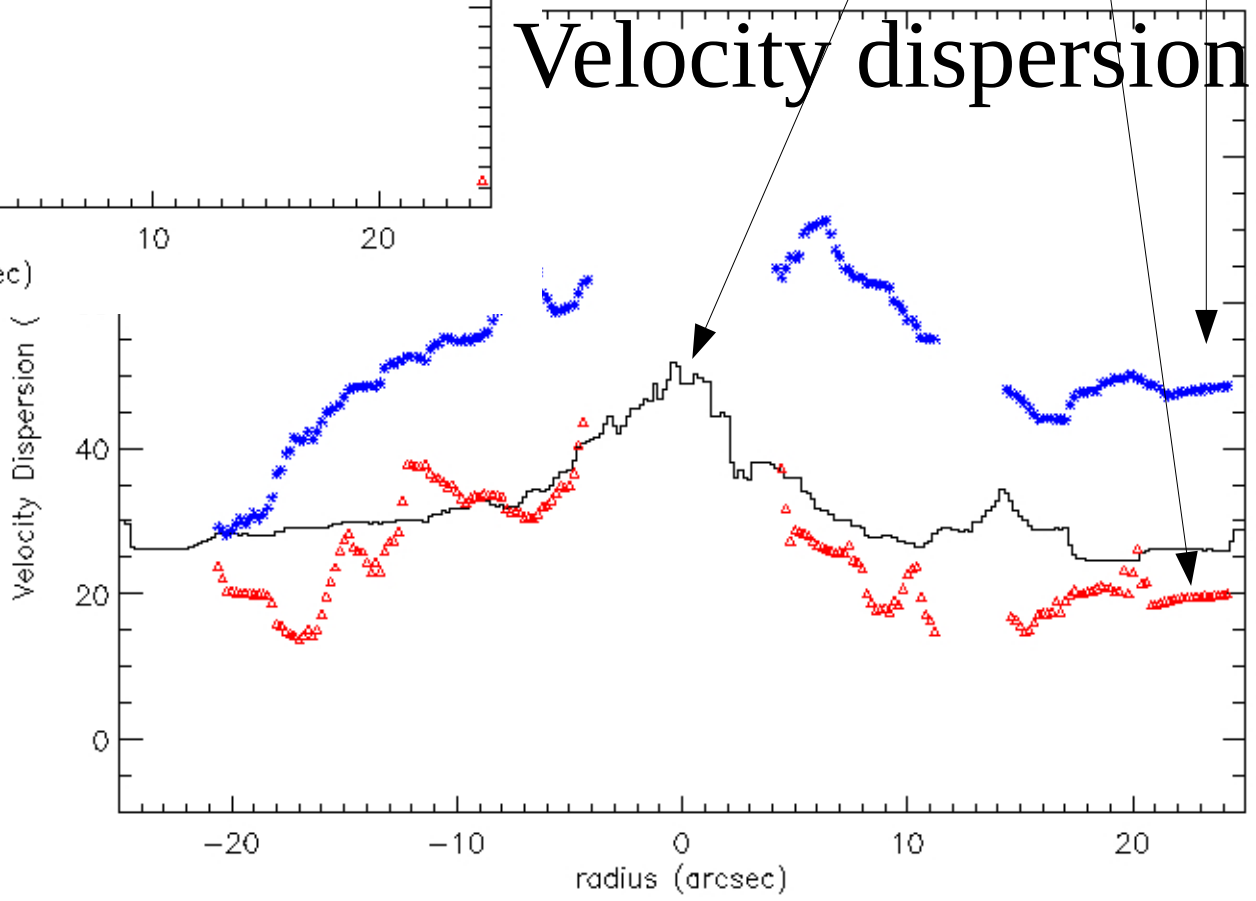
Major Axis



Main component (velocity has been changed in sign)

Secondary component

Ionized gas



Once we reverse the velocity of the main component we can notice that it does not share the same kinematics as the ionized gas and secondary component.

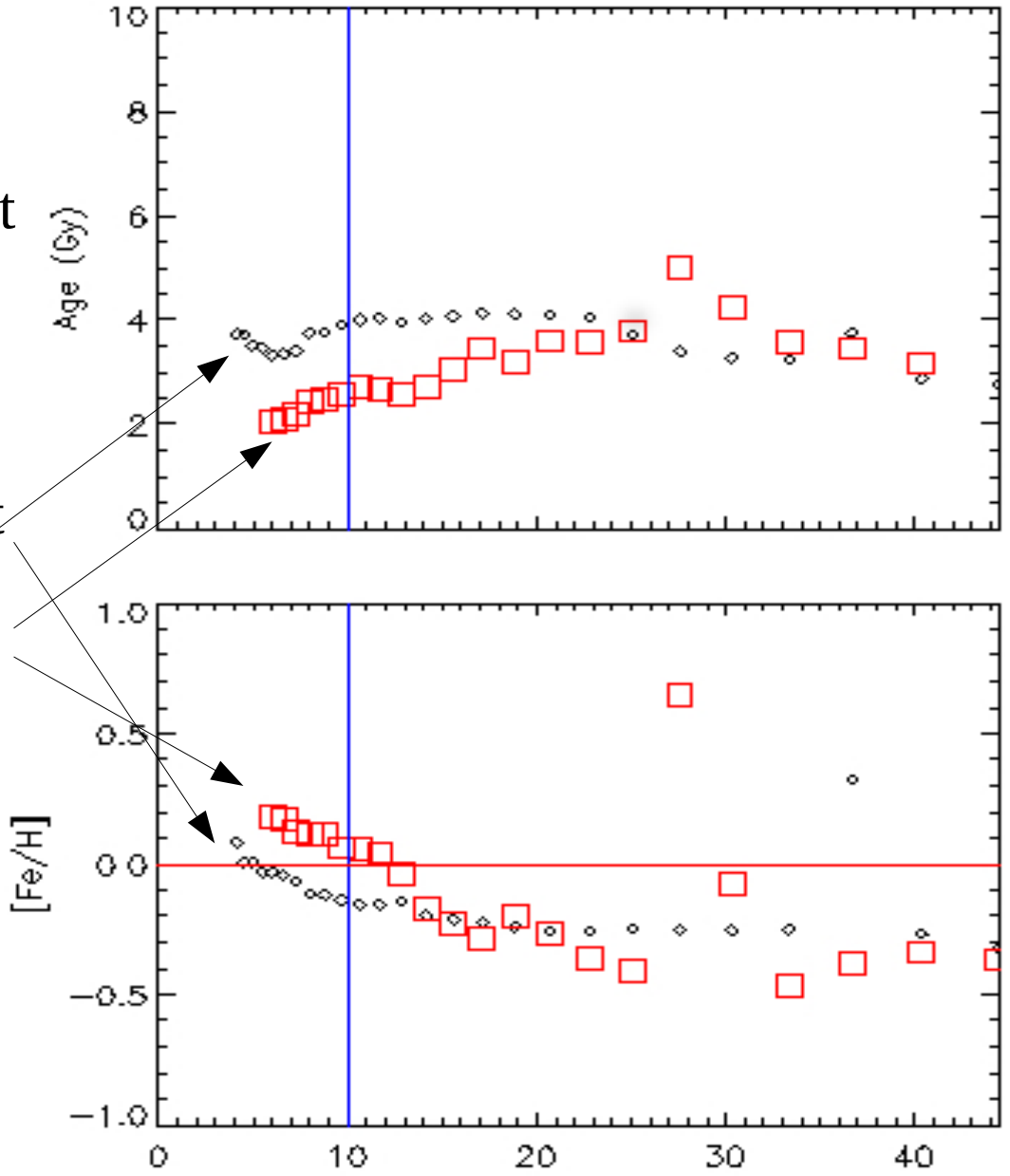
IC 719 - Stellar populations

The secondary component is younger than the main component

Main component

Secondary component

The two components have a similar (but different) trend in metallicity.



IC 719: Conclusions

MUSE is a perfect instrument for the study of counterrotating disks.

1) the CaT give a precise kinematical measurement
2) the large spectral range allows to recover the stellar populations properties of the two components
3) the IFU capabilities allows to have a complete 2-D map

Huge progress from the past

Concerning IC 719 we conclude that the counter-rotating disks originated 2Gy ago by acquired gas.

It like looking into a numerical simulation where you can distinguish between acquired and preexisting material. But we can see it!
A systematic study will allow to investigate

- radial migrations
- Time scale of ionized gas acquisition and subsequent star formation
- dynamical heating
- etc.