On the Milky Way Nuclear Stellar Disk

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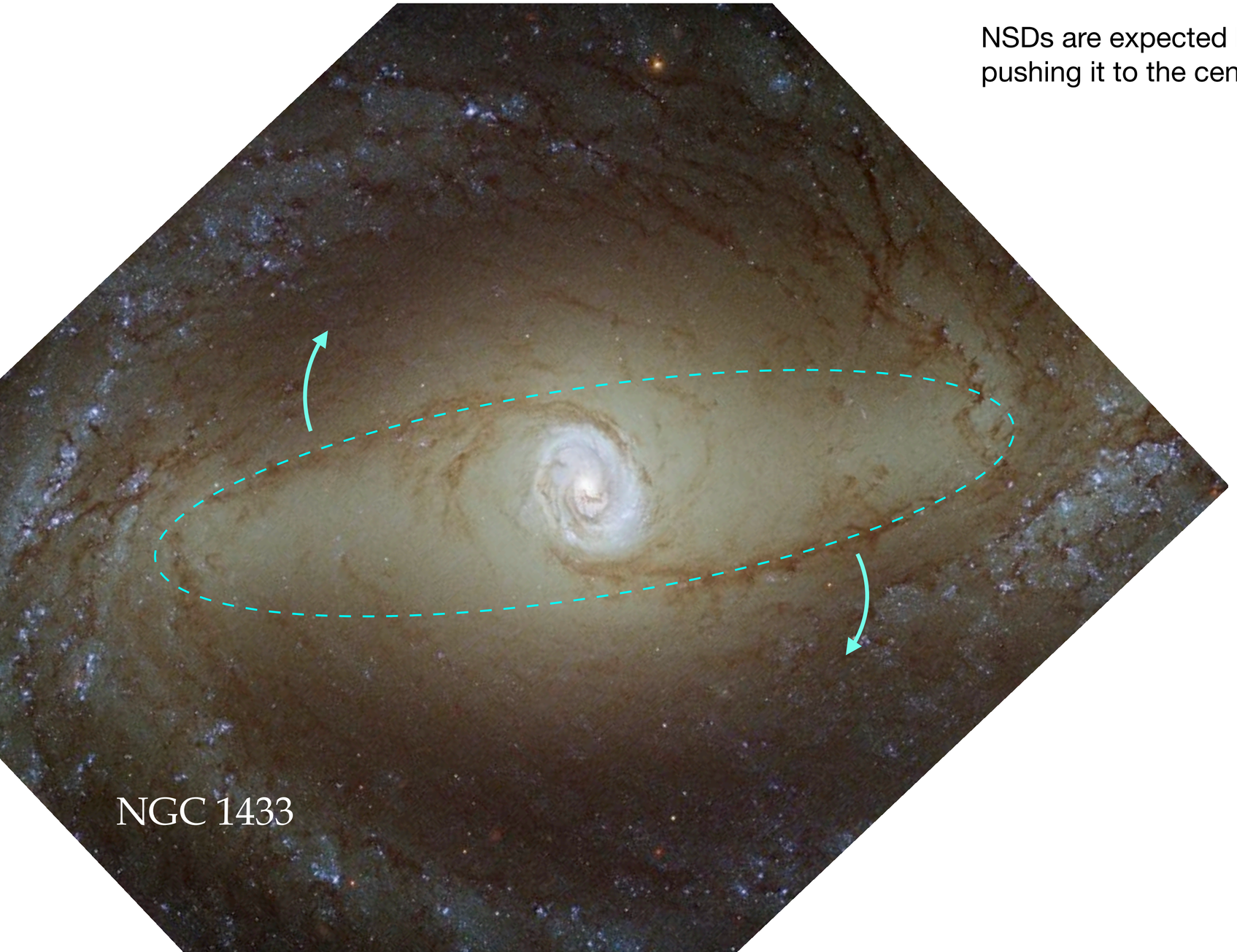
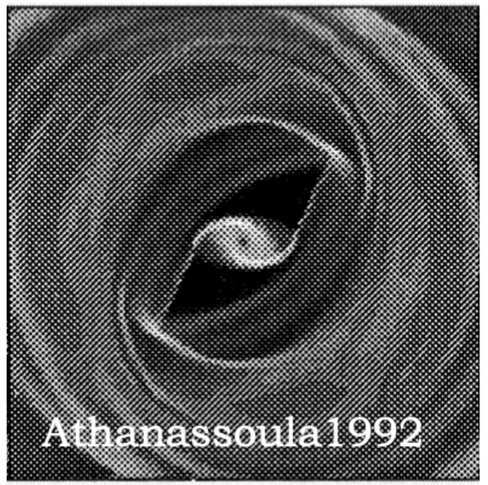
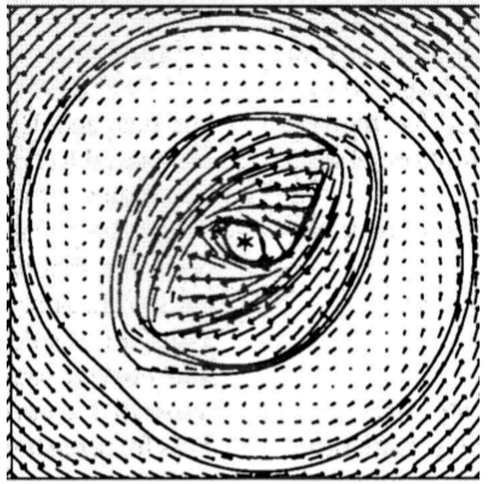
What is a Nuclear Stellar Disk ?

It is a small disk, often found at the center of Galactic bars

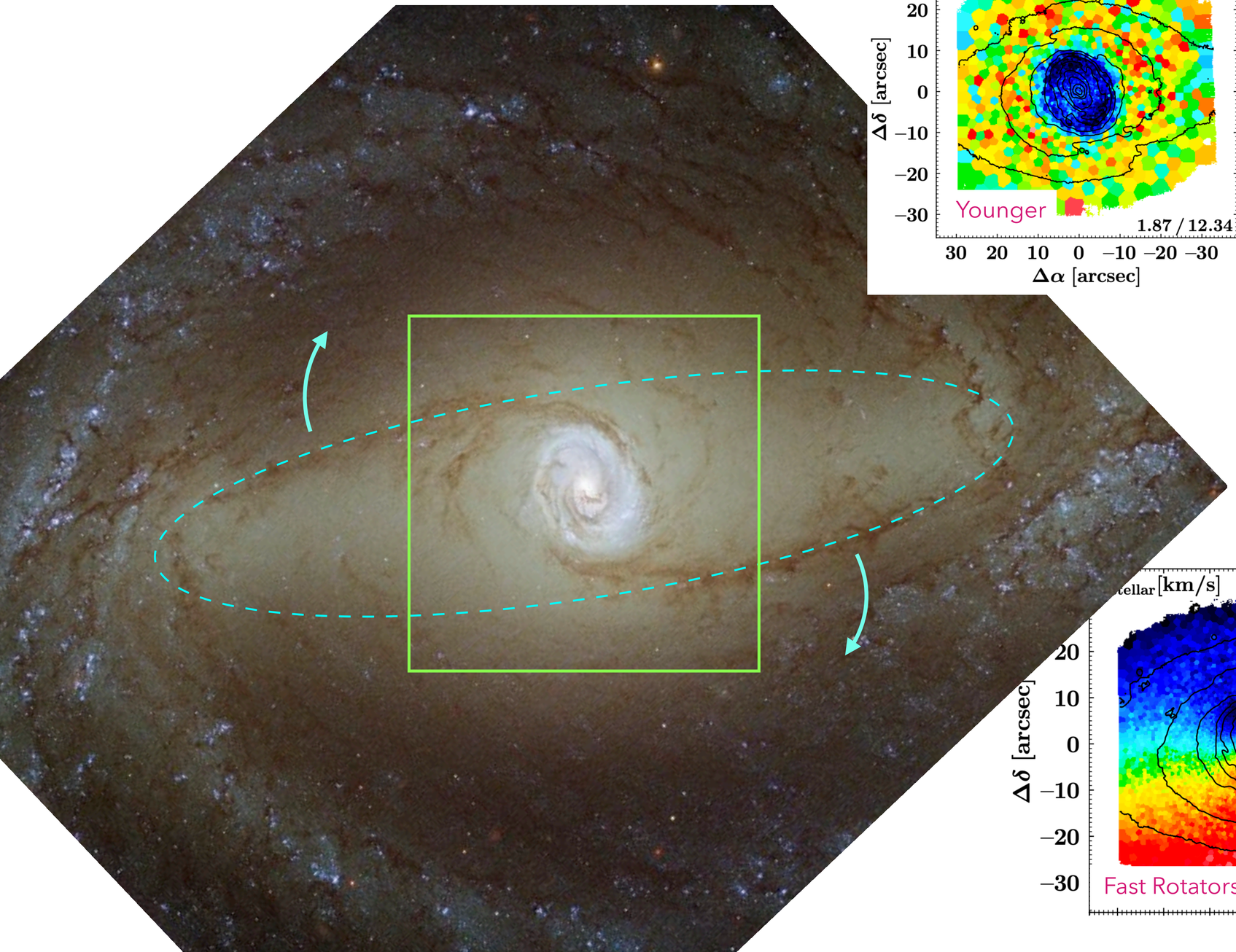
NSDs are expected because bars induce shocks in the gas, pushing it to the center, where it is expected to form stars

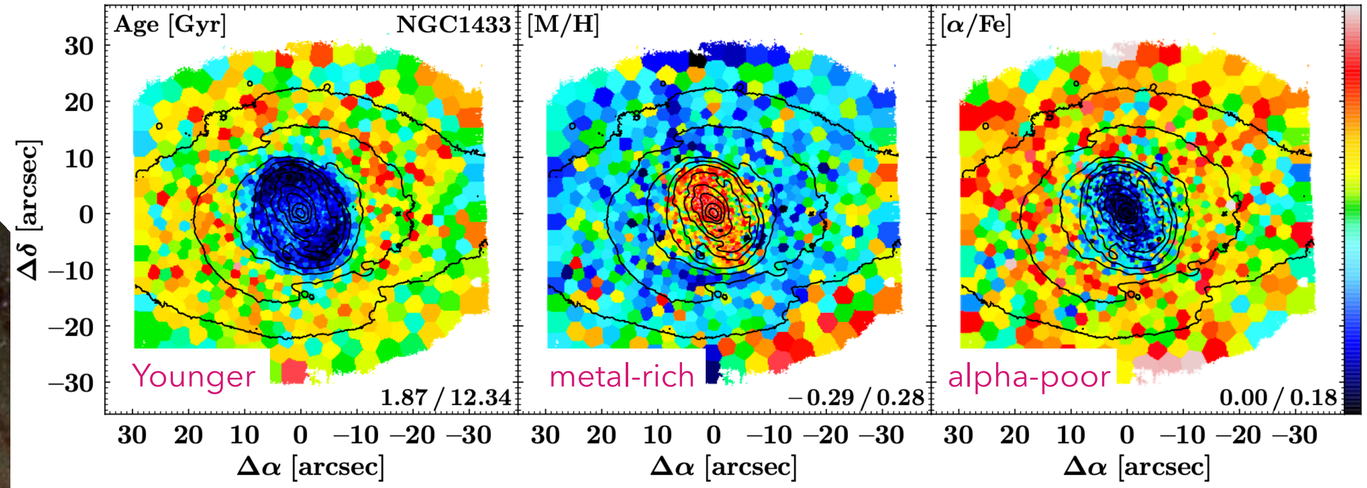






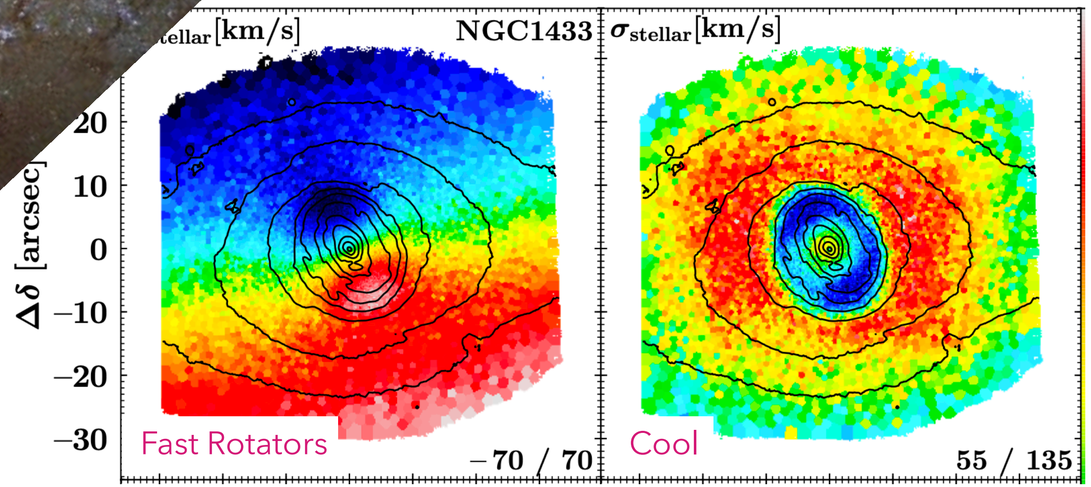
NSDs in other spirals





Gadotti et al. (2020)

The MUSE TIMER survey

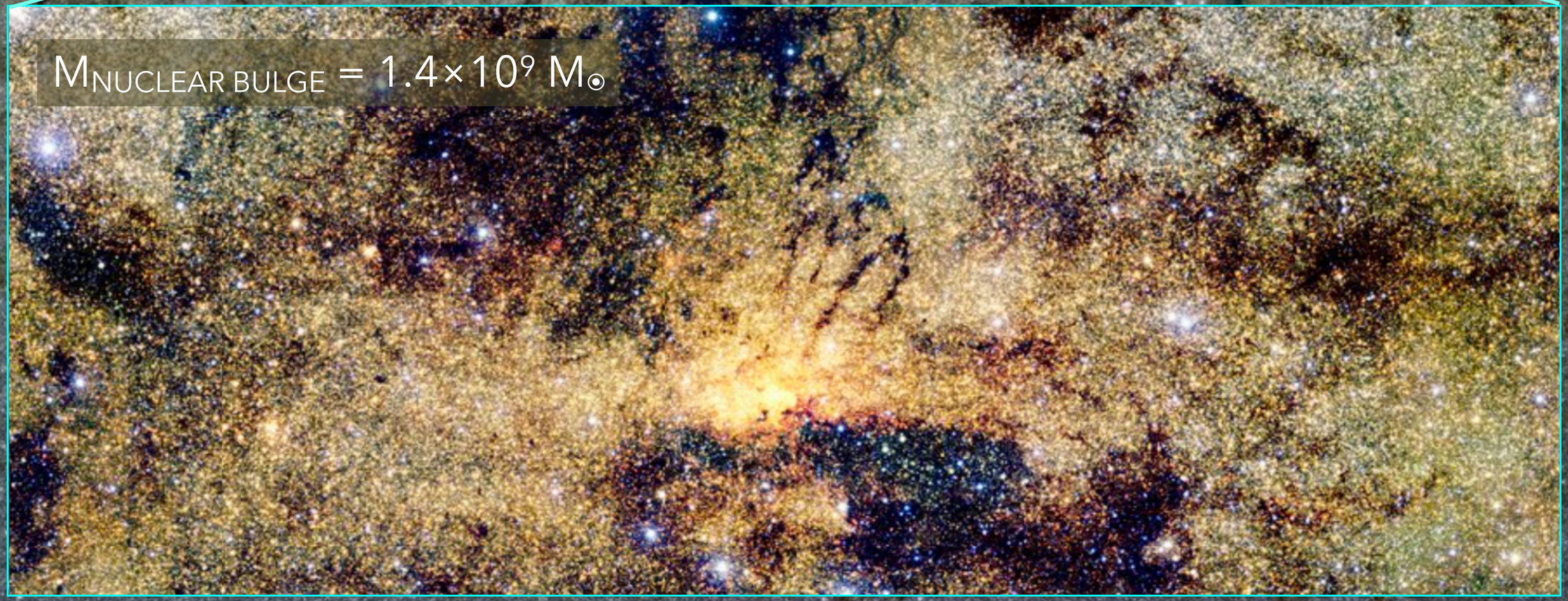



and in the Milky Way?

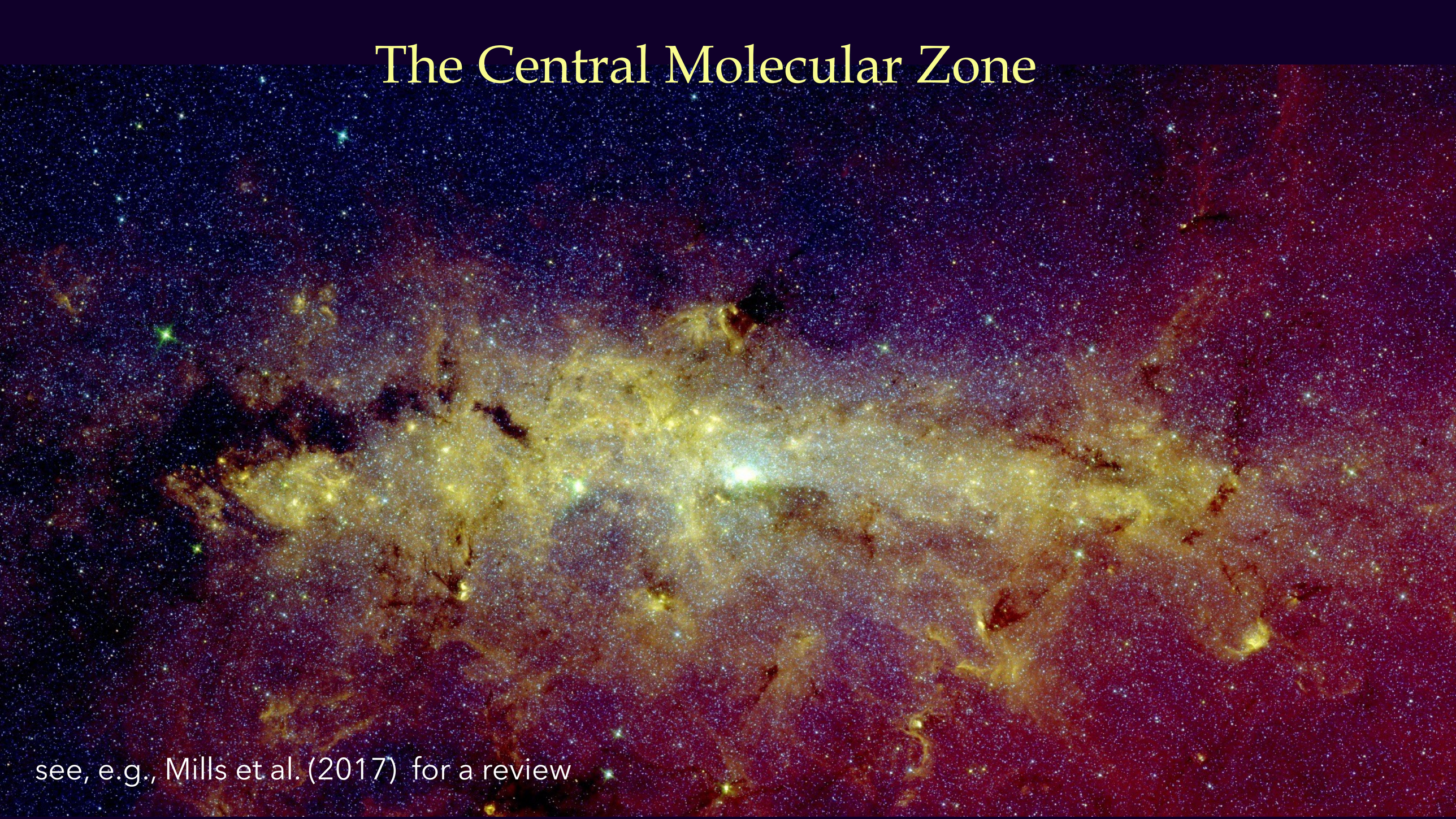
Launhardt+2002

IRAS + COBE/DIRBE

"a large Nuclear Stellar Disk with R_{NSD}= 230pc and h_z=45pc, and a Nuclear Molecular Disk of same size"



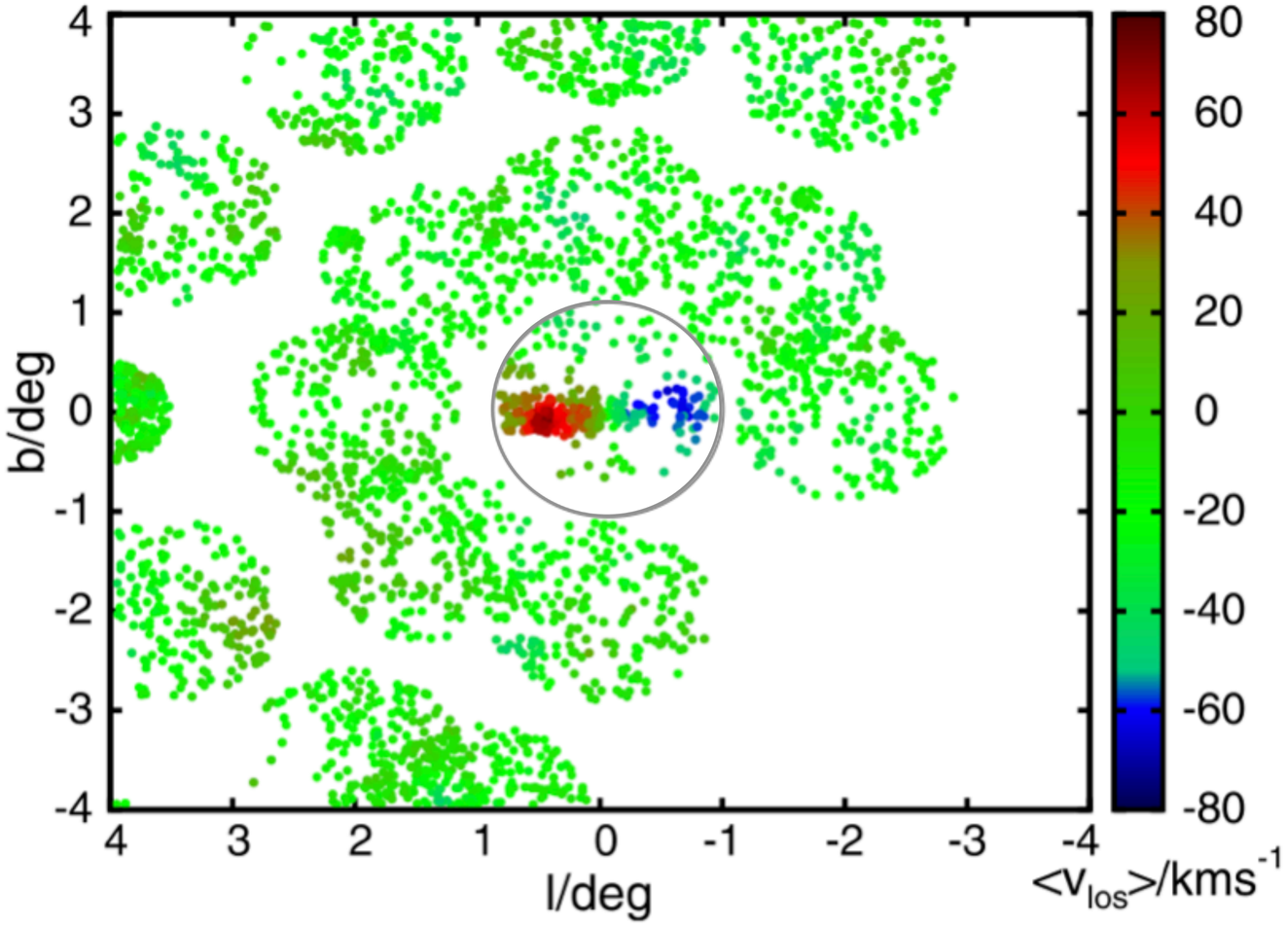
The Central Molecular Zone



see, e.g., Mills et al. (2017) for a review

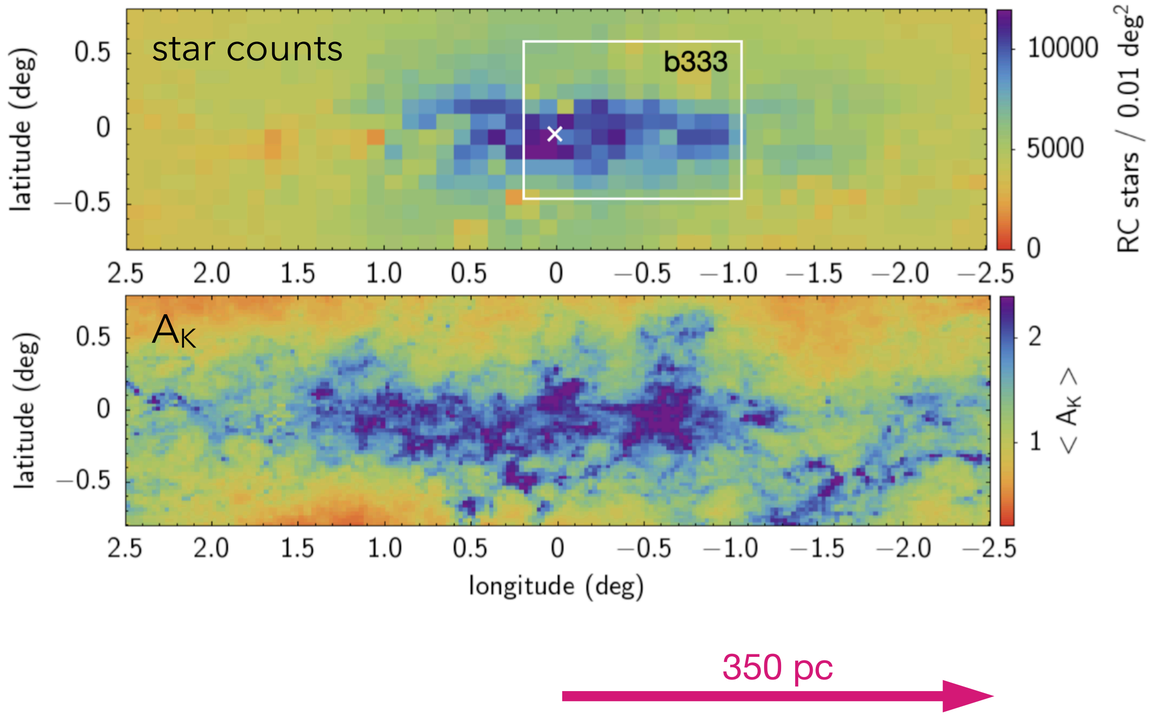
Detection of a NSD from RVs

Schönrich et al. (2015) APOGEE DR14



Observed kinematics of the MW Nuclear Stellar Disk region

MZ et al. (2024)



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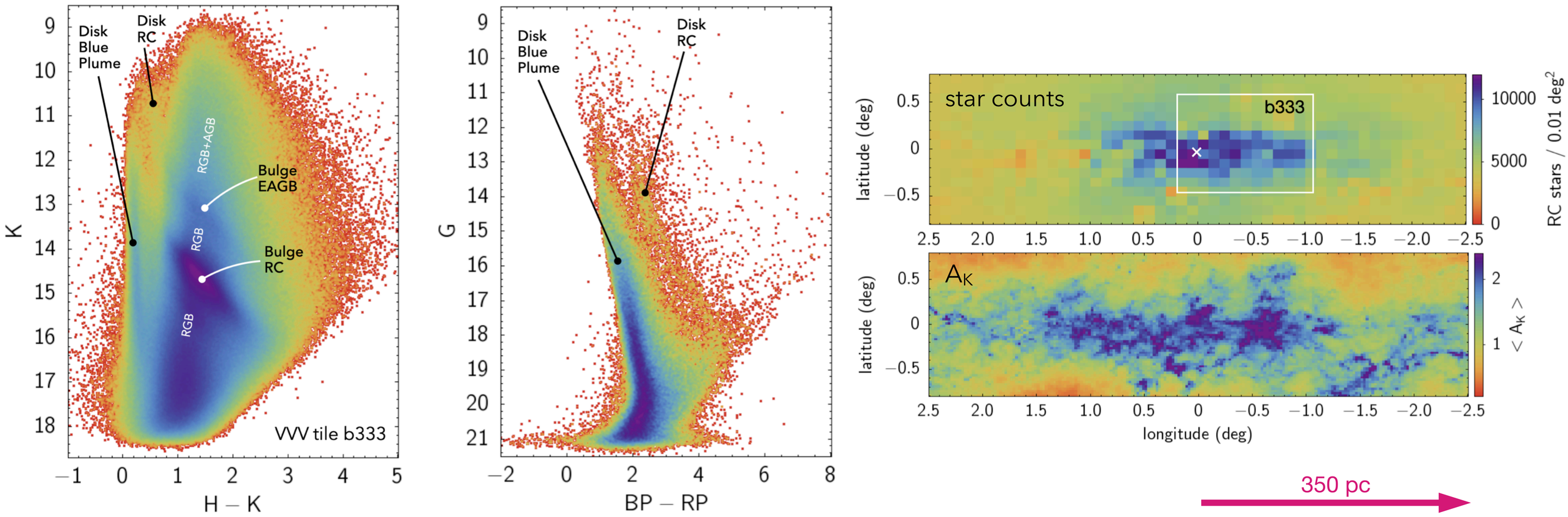
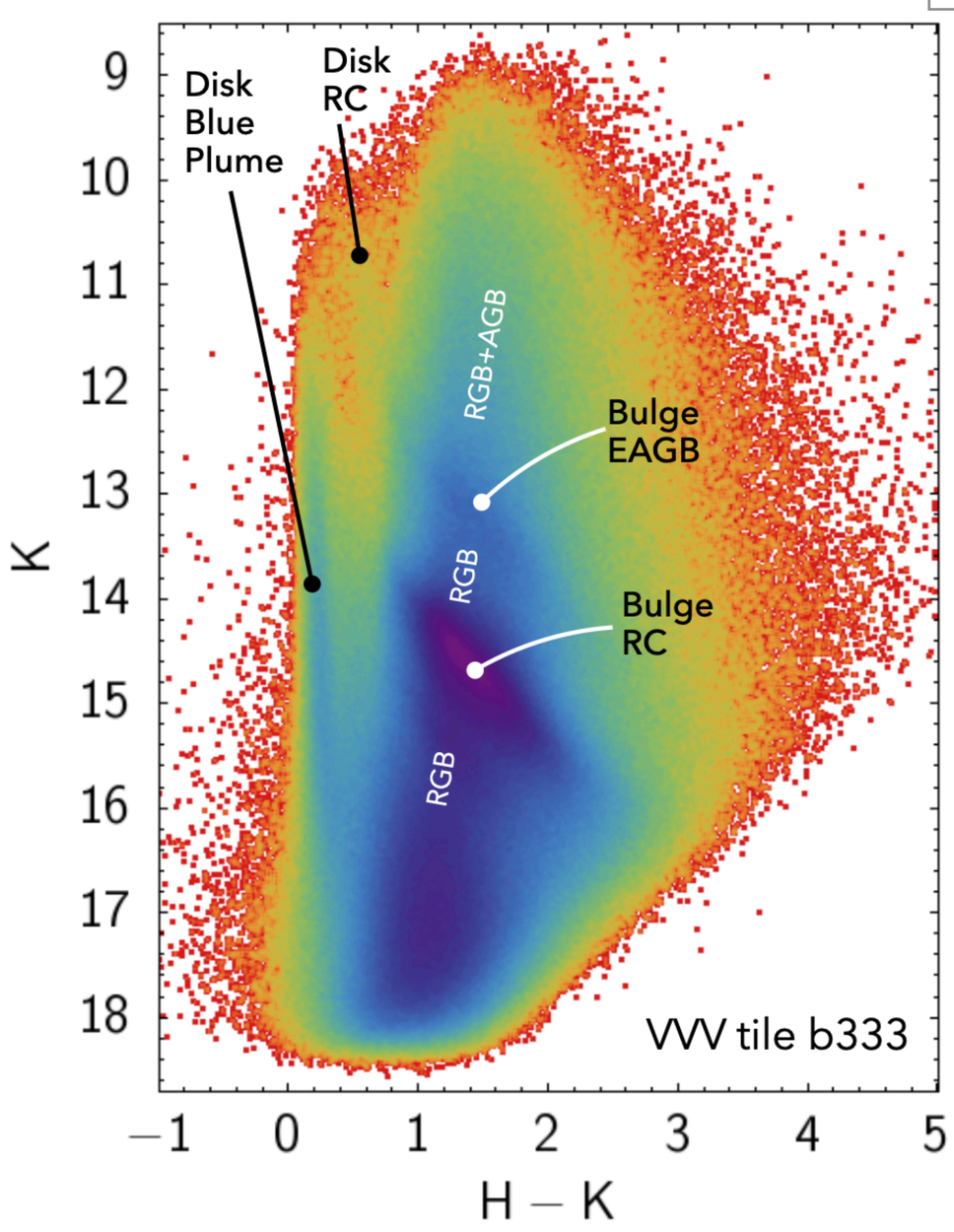
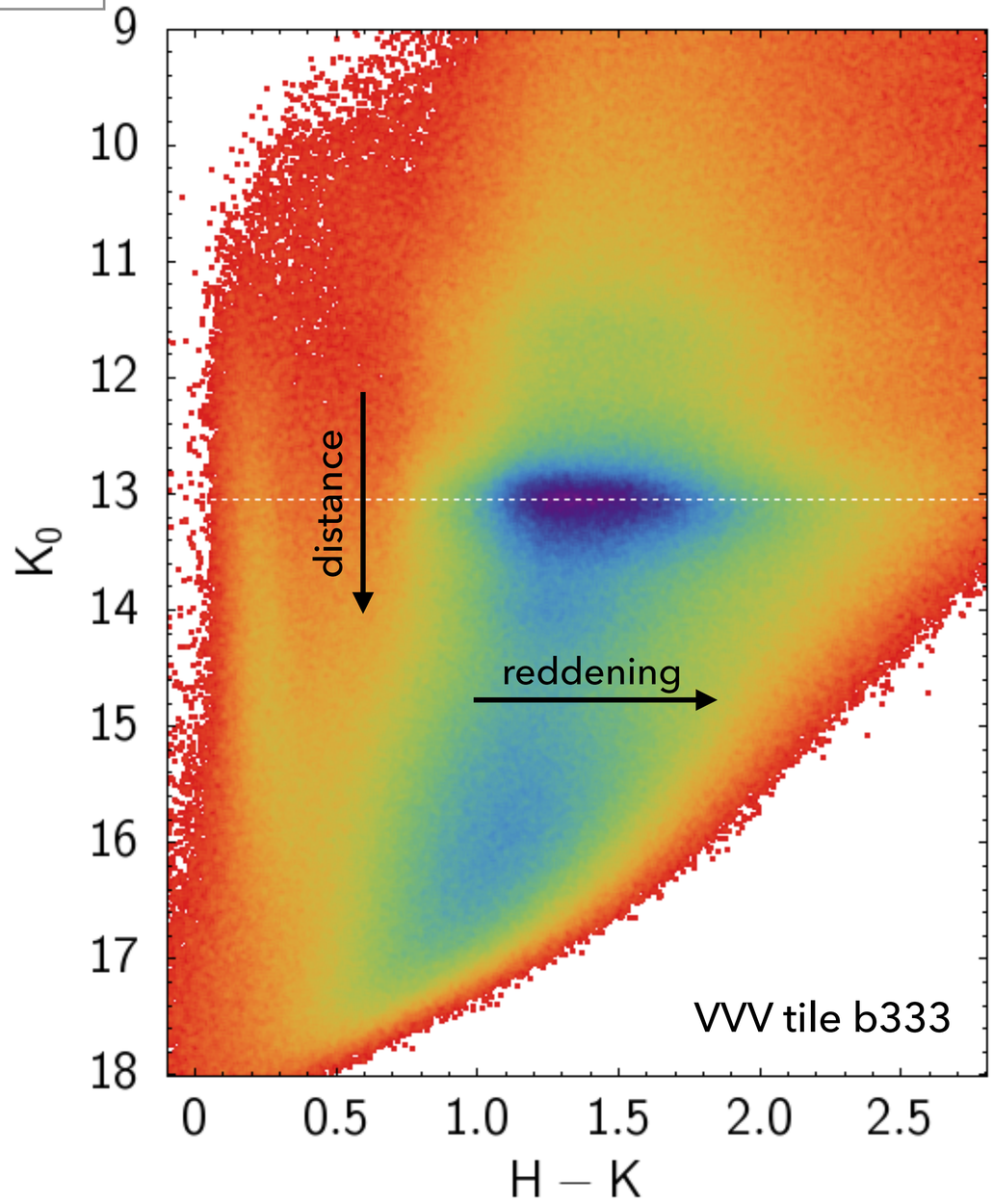


Fig. 1. CMD of the central region of the present catalog (tile b333)

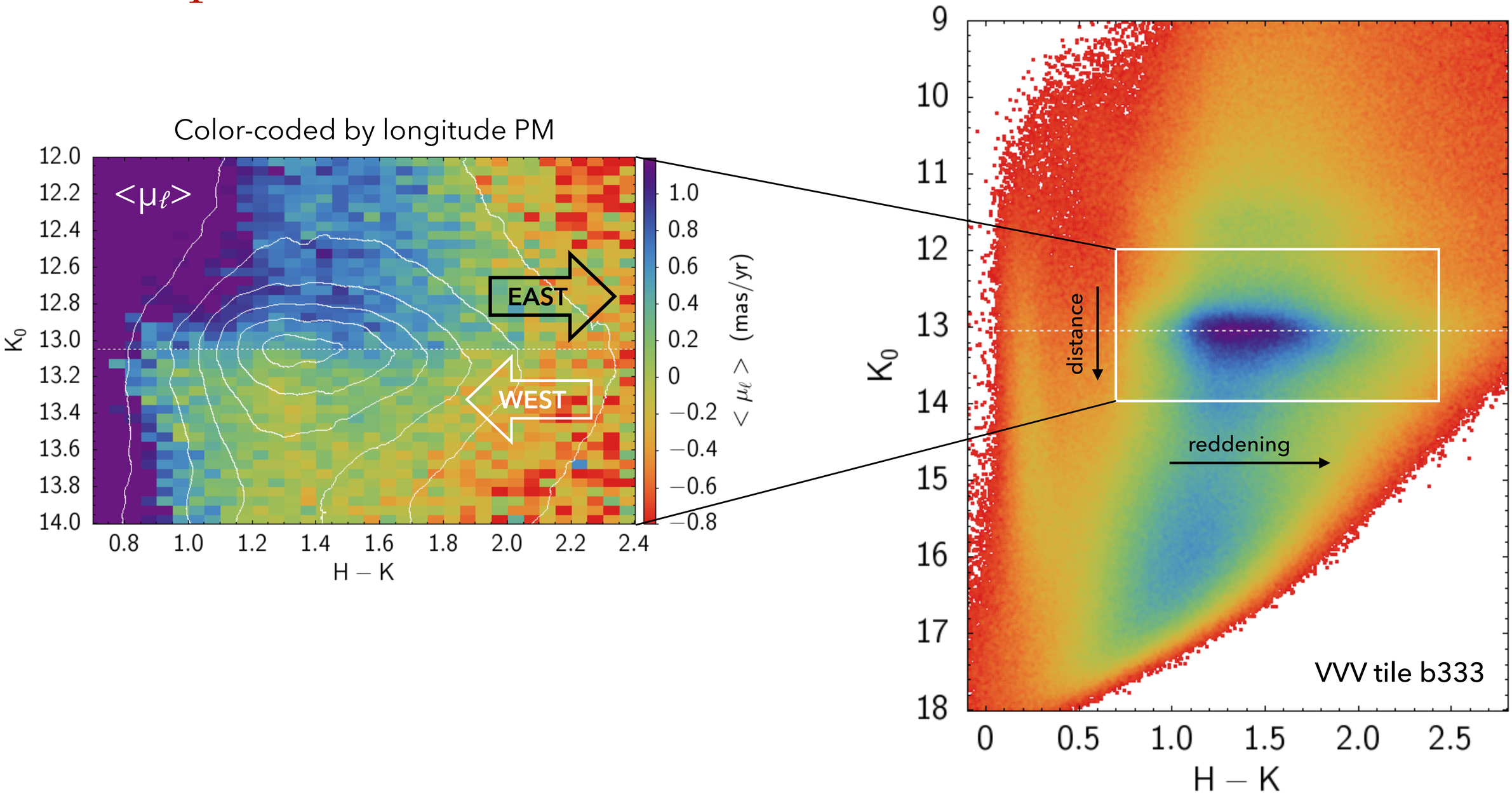
$K_0 = K - R_K \times E(H-K)$
$= K - 1.2 \times (H-K-0.1)$

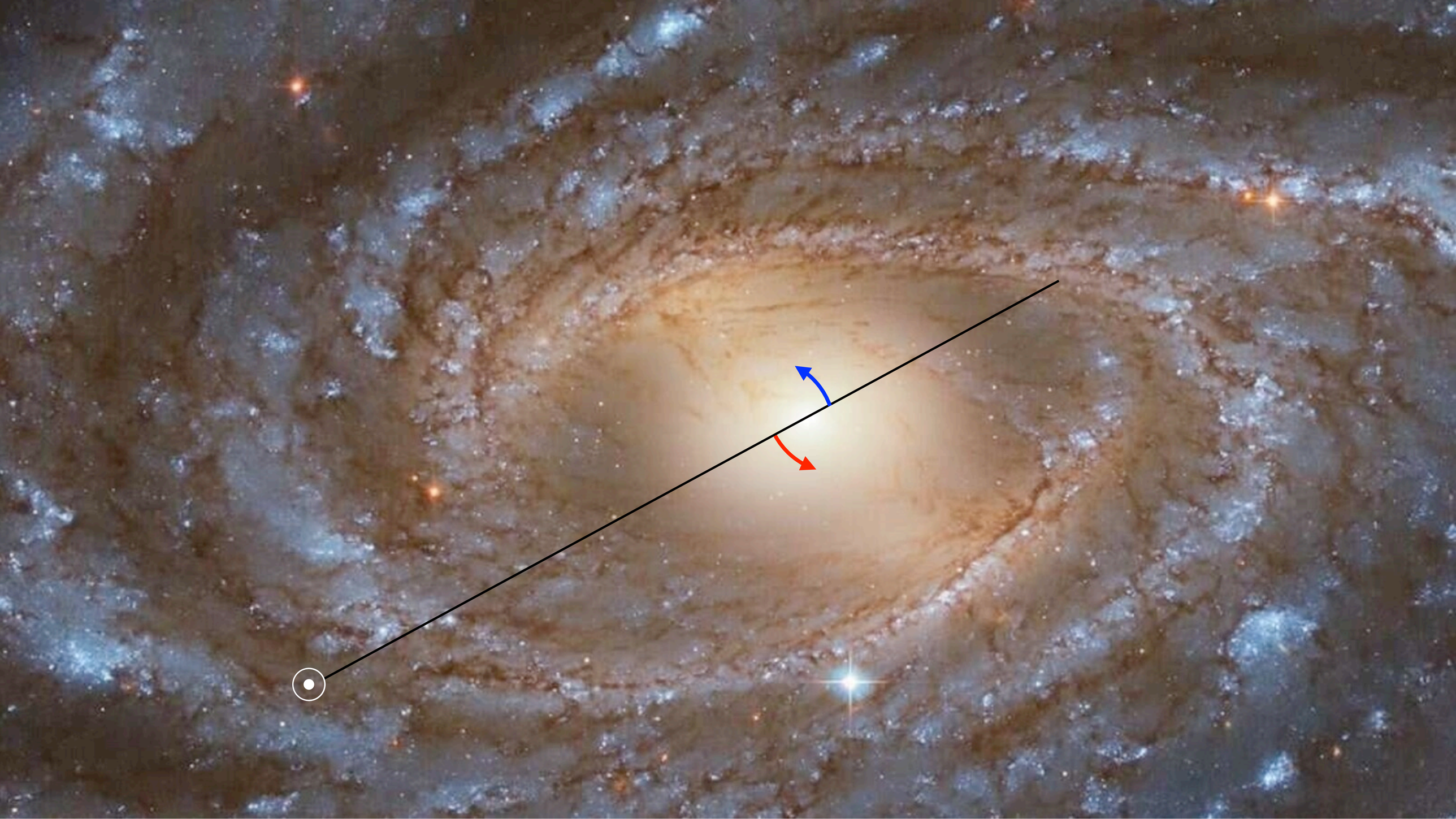
← from Nogueras-Lara et al. (2021)



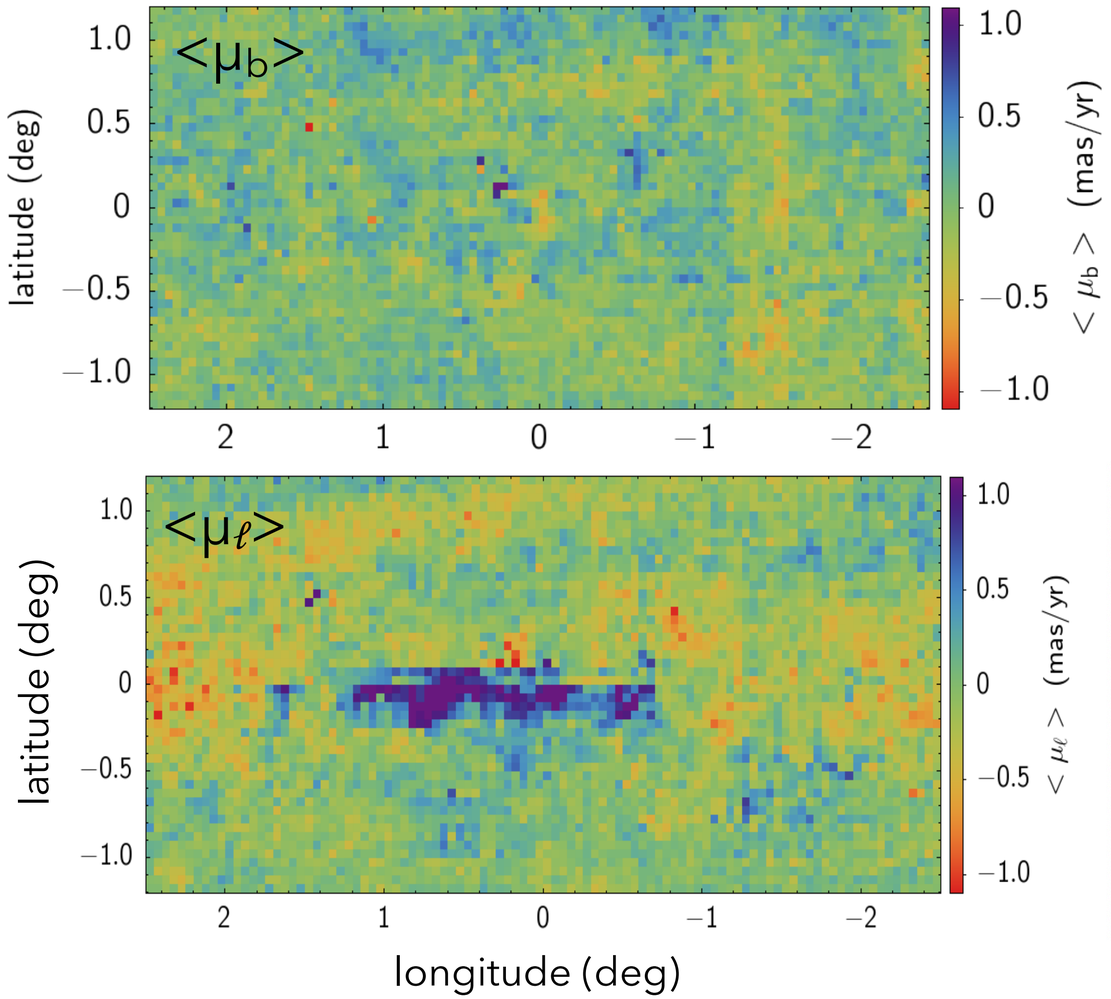


Proper motions of RC stars

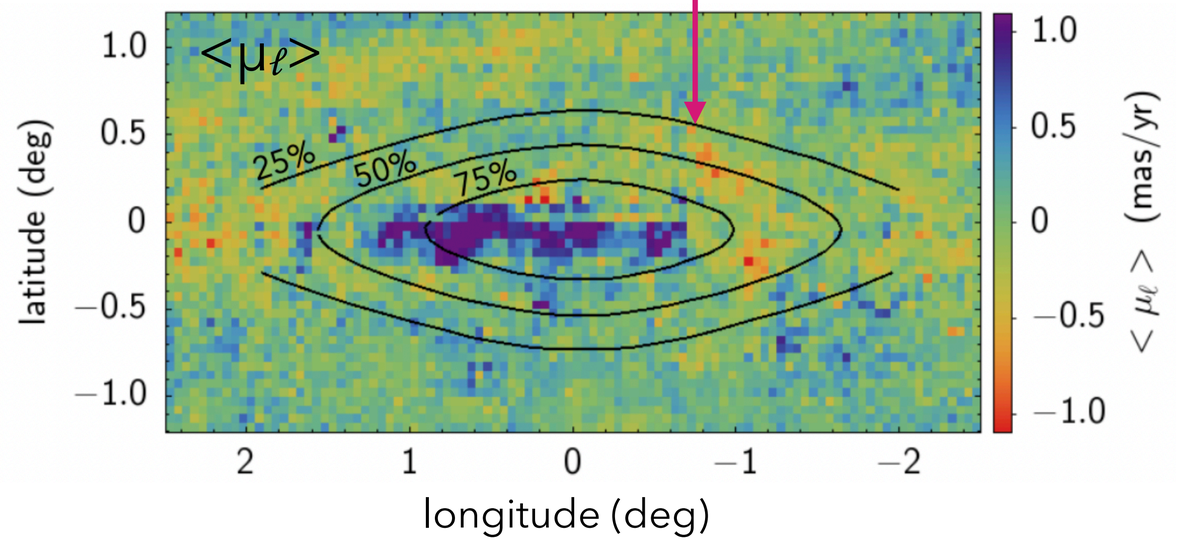


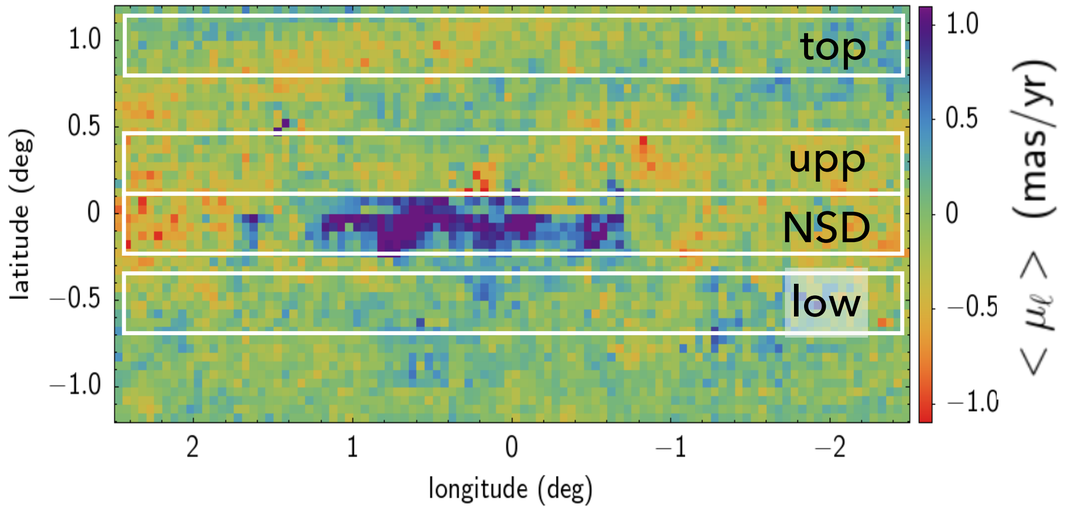


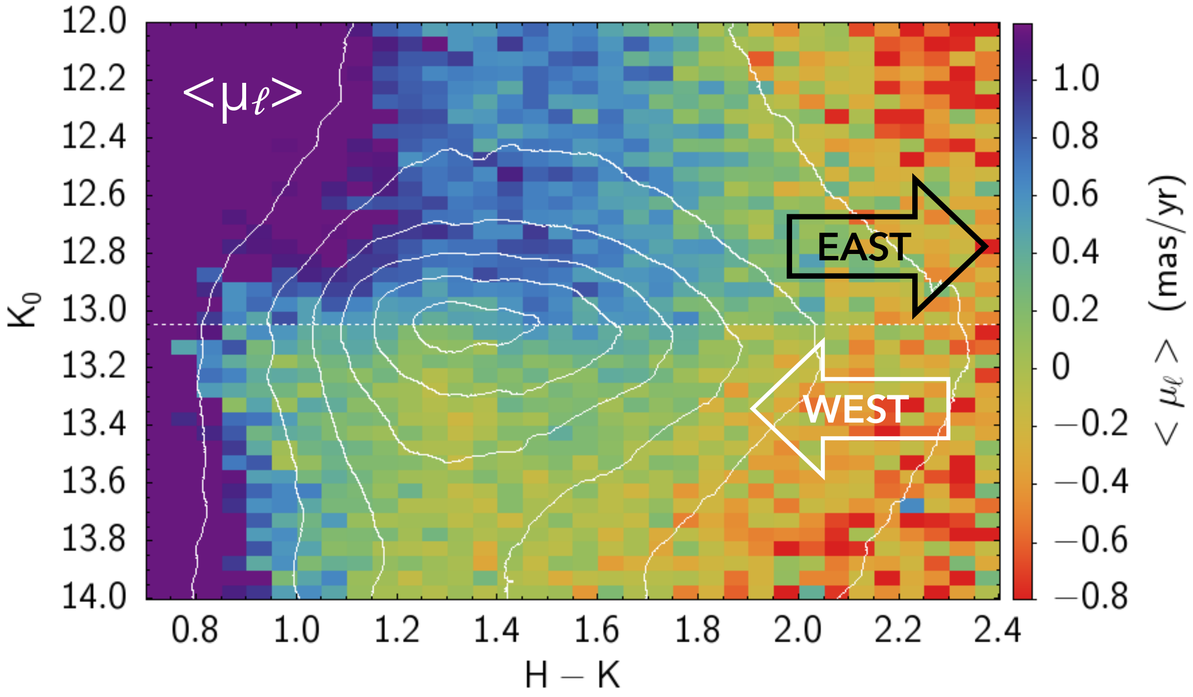
PM maps of the MW central region



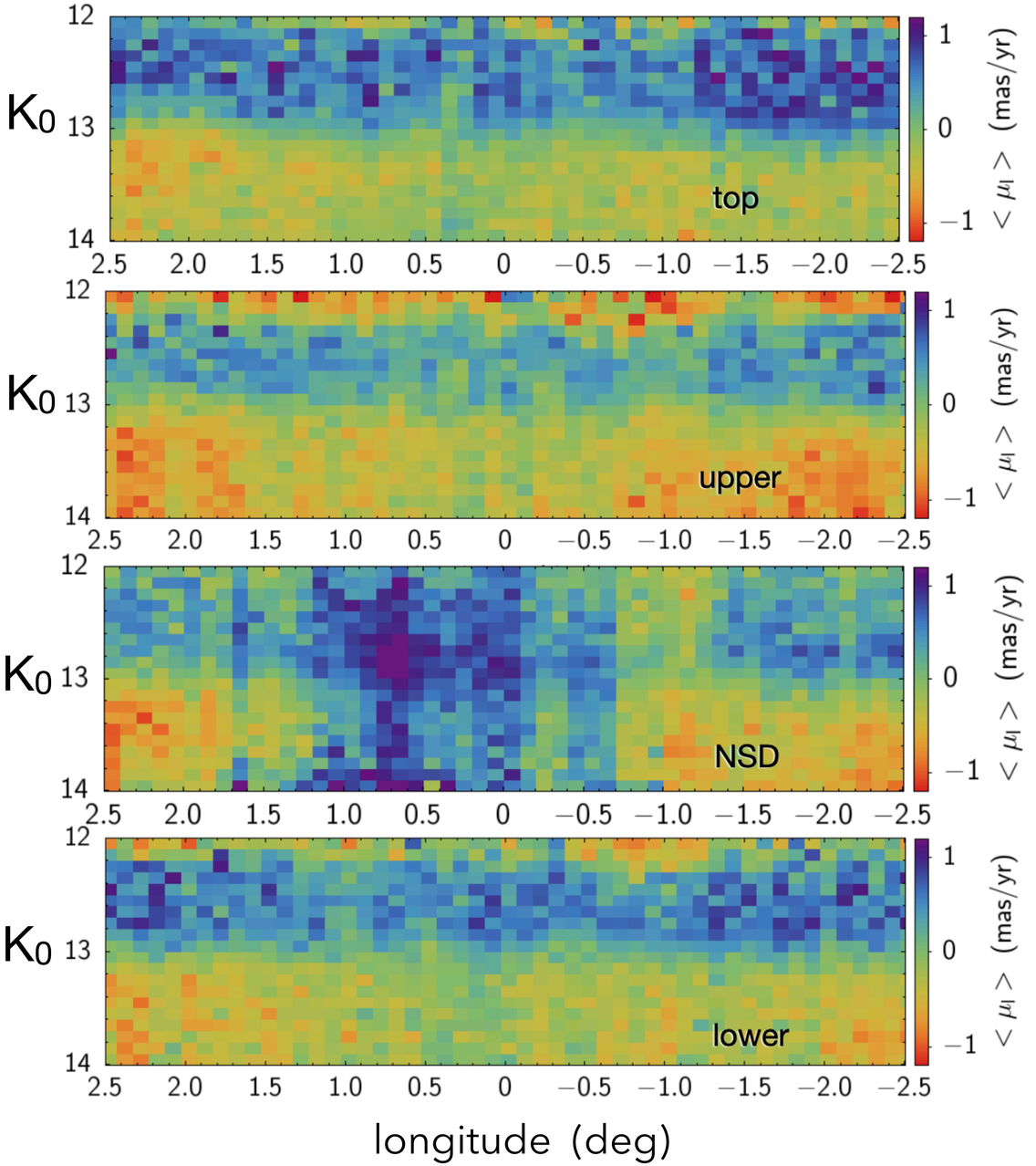
NSD model by Sormani et al. (2022)

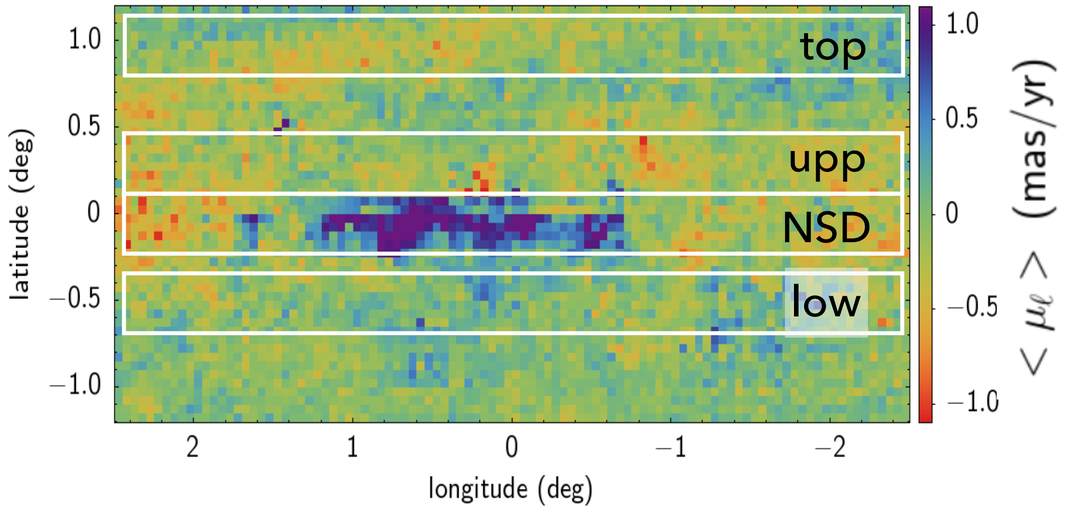


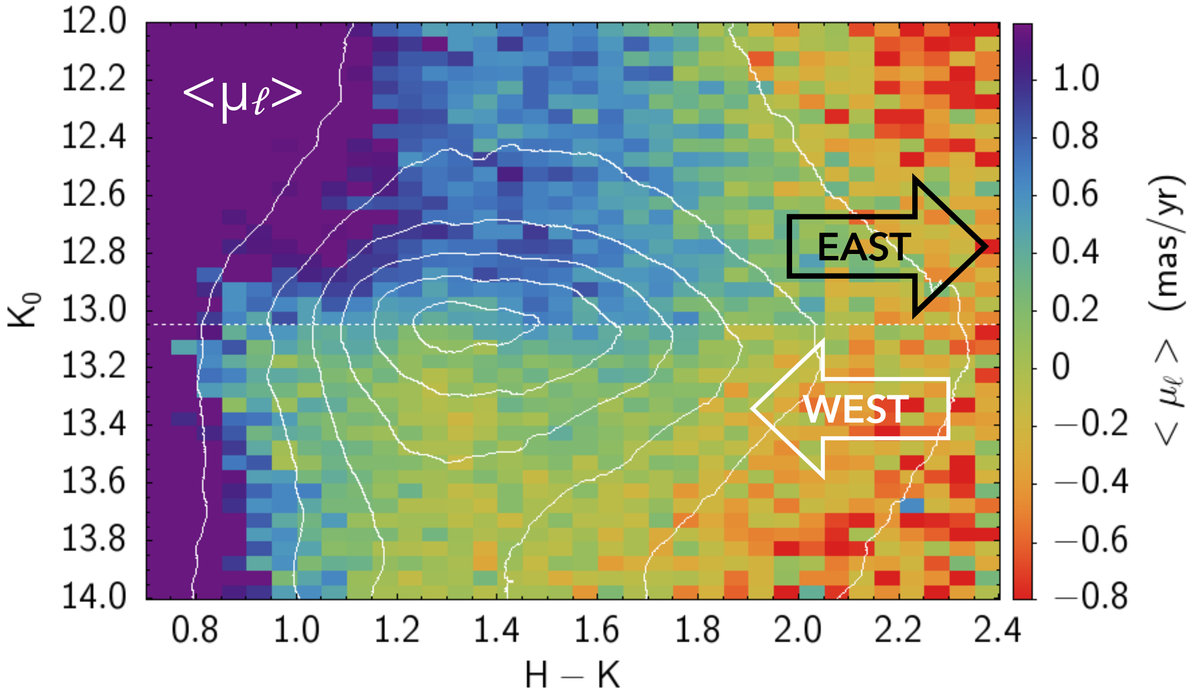




Color-coded by longitude PM







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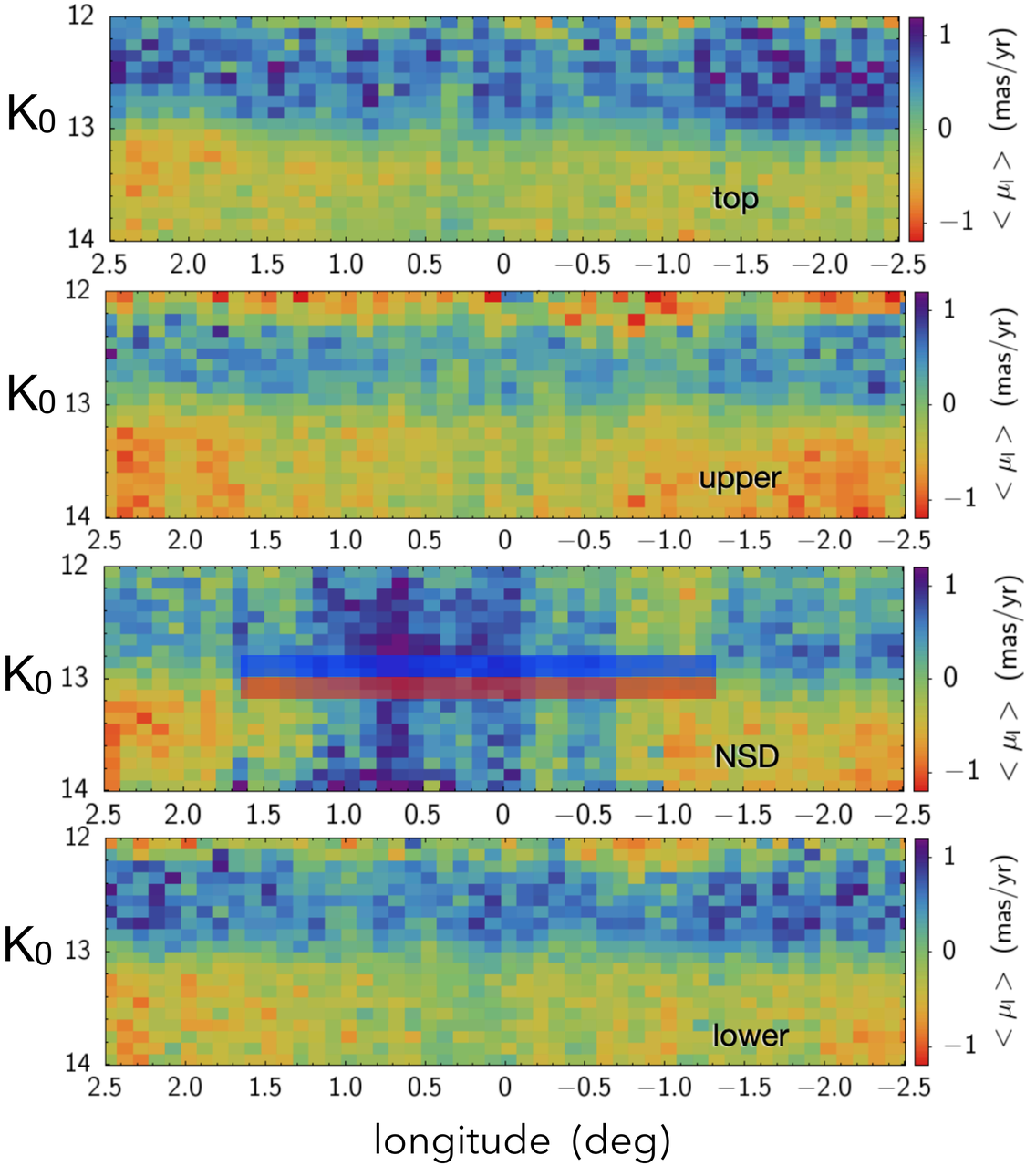
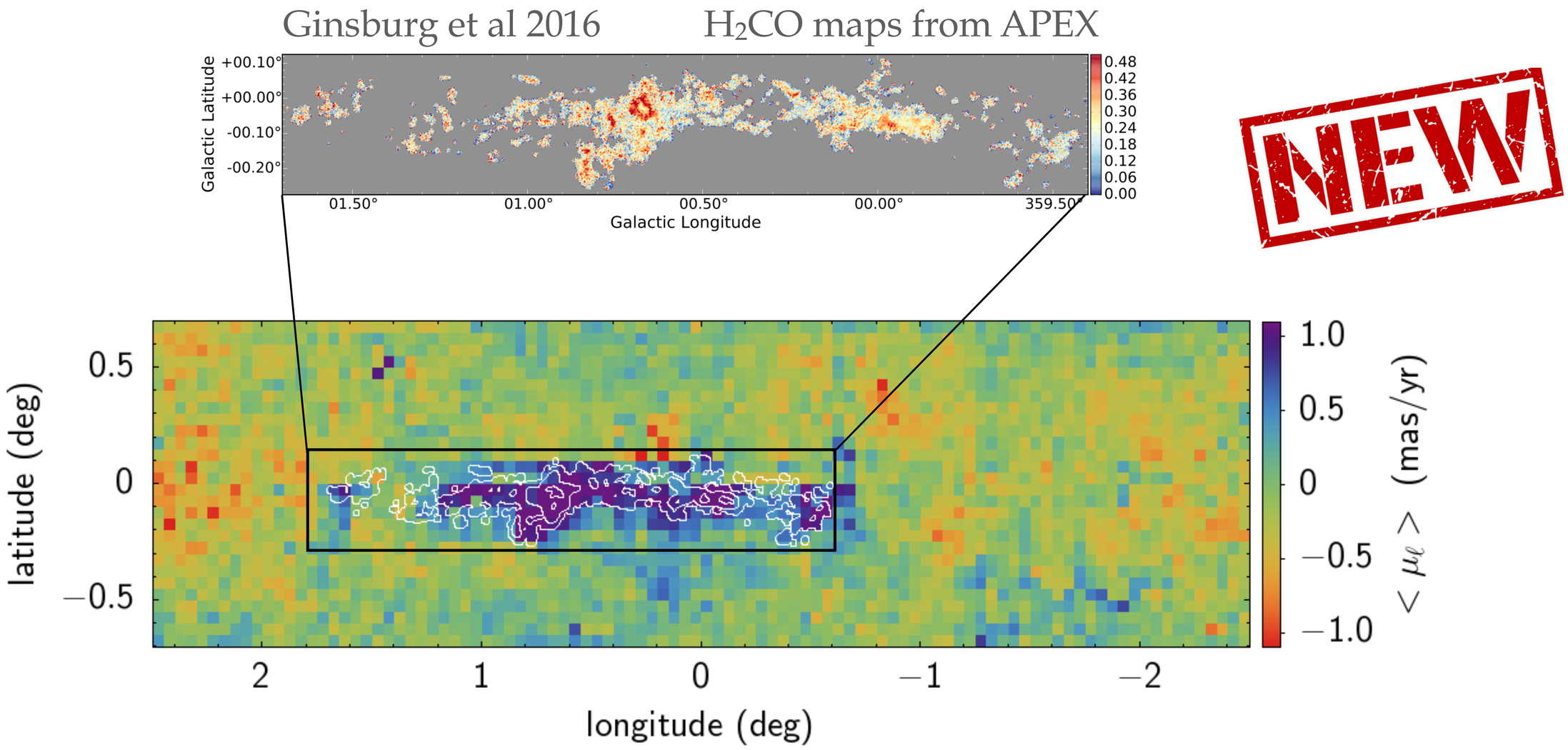
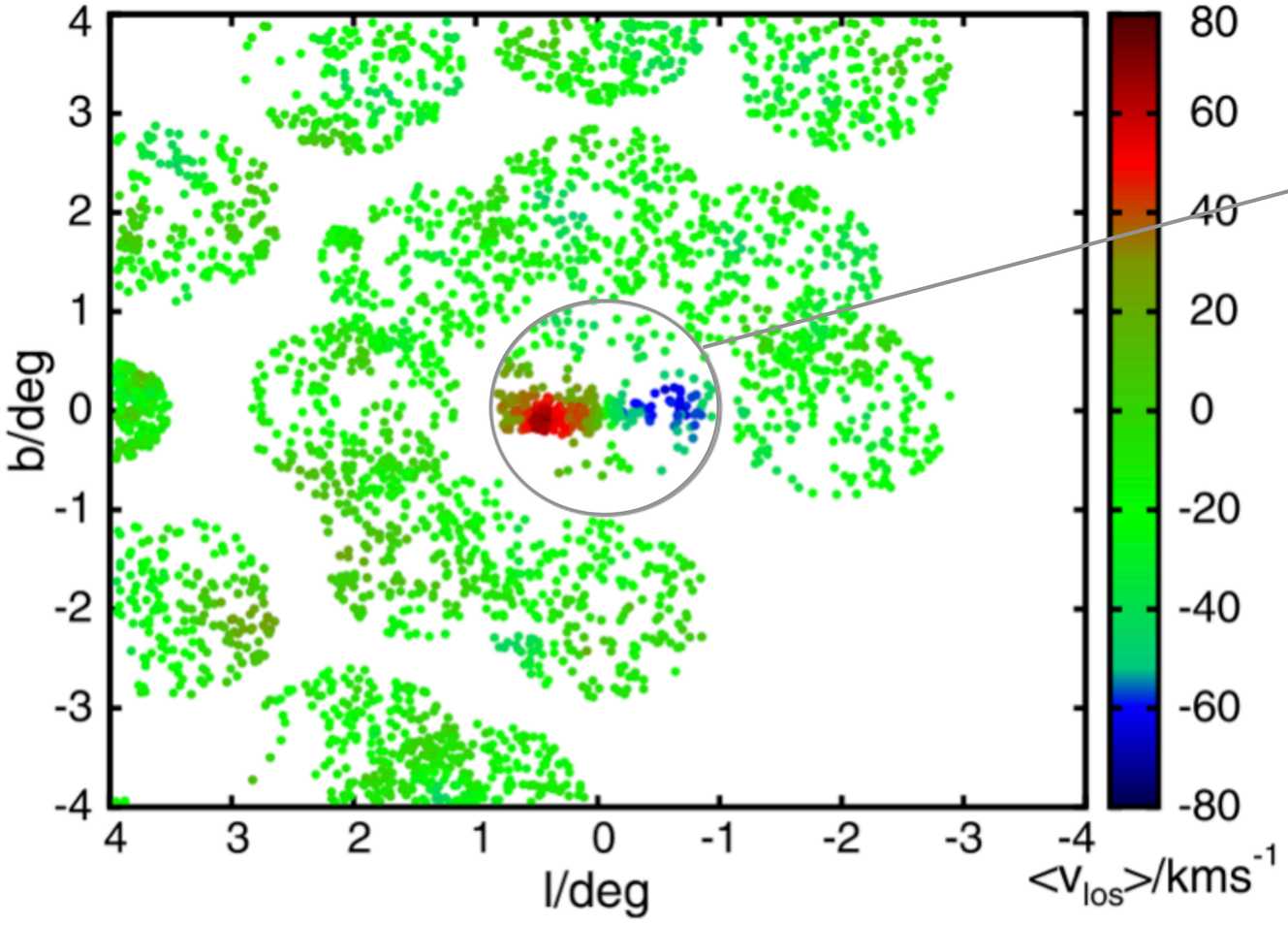


The CMZ is hiding the RC stars behind it

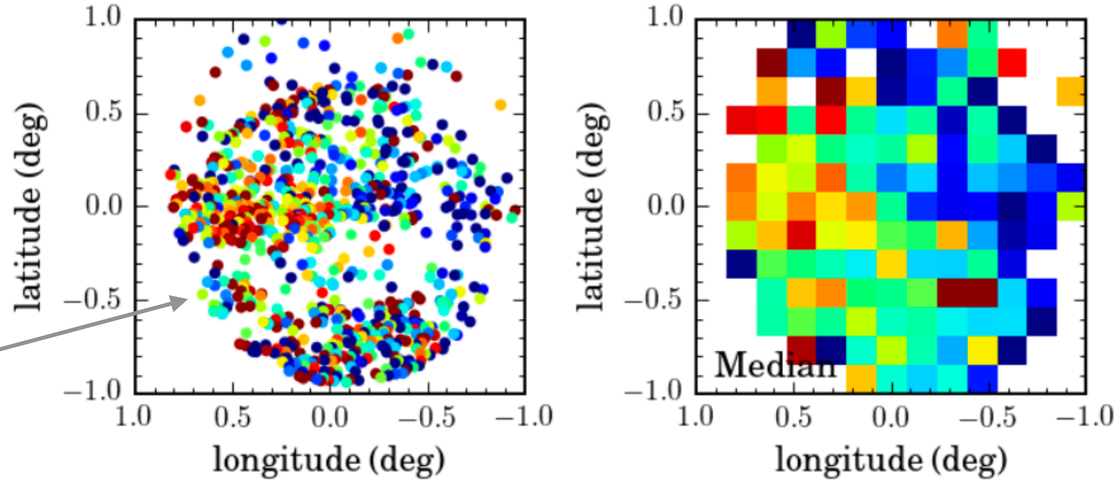


The NSD rotation from RVs

Schönrich et al. (2015) APOGEE DR14



MZ et al. (2024) APOGEE DR17



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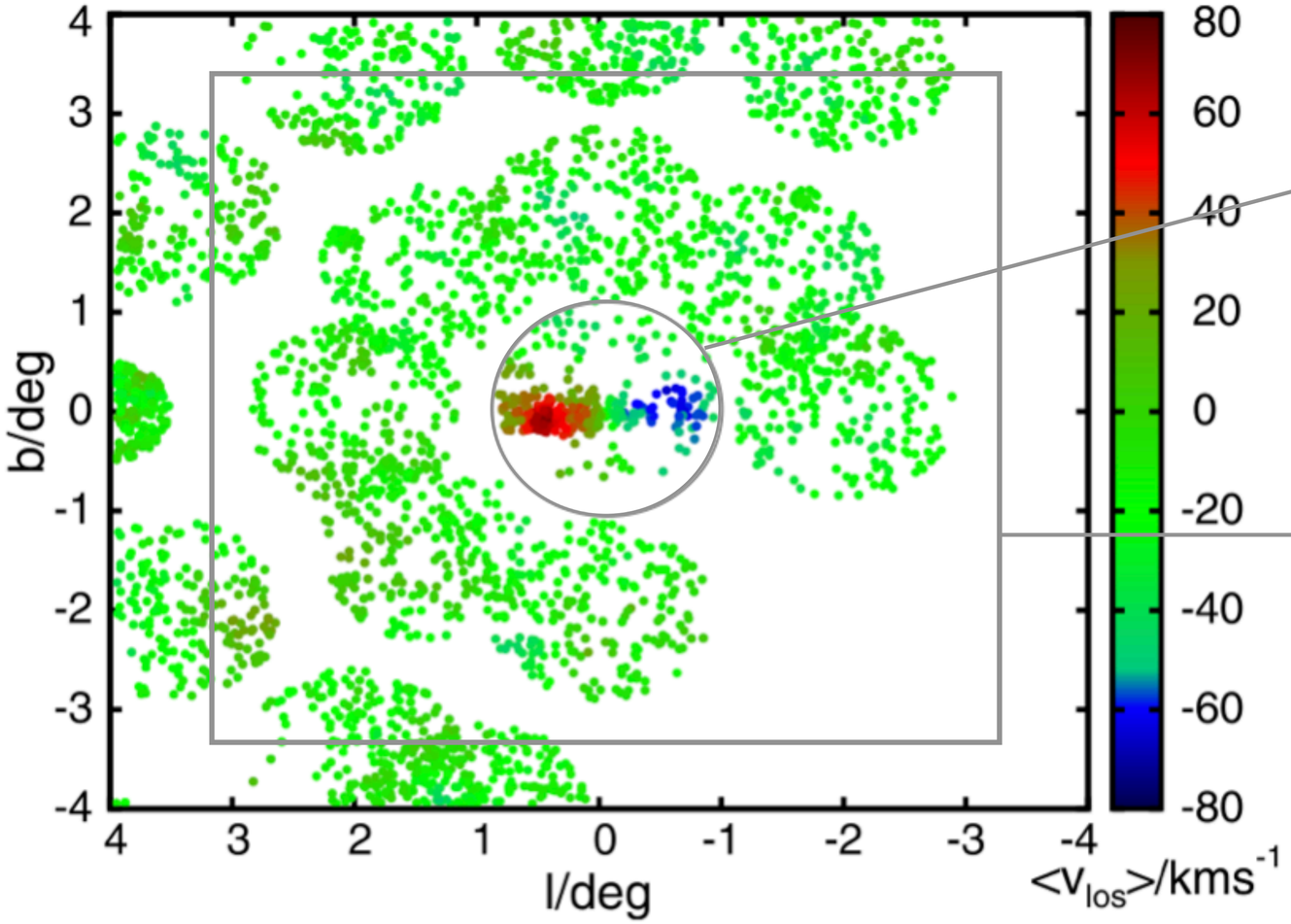

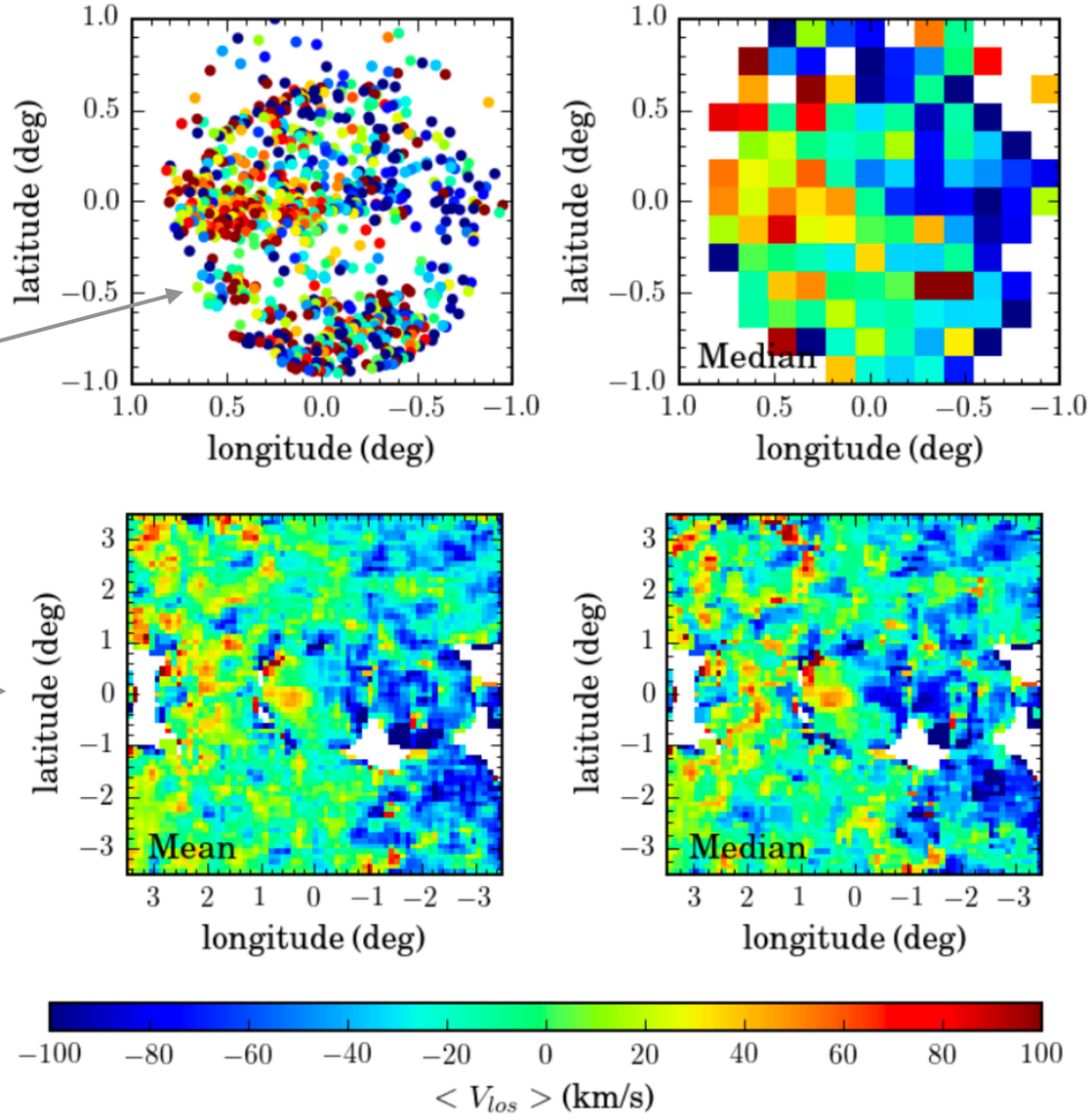

Conclusions

We detect the rotation of the nuclear region of the MW. Near side →E Far side →W
However the NSD rotation is not faster nor colder than that of the surrounding region

We detect a region where all the RC stars move →E.
We interpret this as an evidence that the CMZ hides the far side of this population.

We do not find clear evidence, in the present PM data, for the existence of a cold, fast rotating NSD.

RV data from APOGEE DR17 do not confirm a **clear** kinematical detection of the NSD, as previously reported.

take-home message

The present work highlights our poor understanding of the Milky Way nuclear region.

Strong observational biases affecting this region much more than its surroundings may produce "features" that are not real