M83 CASE

XUV DISK GALAXIES



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Summary

- * XUV Disk Galaxies
- Relevance
- CO emission in outer disks
- * M83 case
- Our results so far
- Conclusion

XUV DISK GALAXIES

- It is know from deep Halpha imaging that some galaxies possess very extended SF disks (Ferguson et al. 1998b)
- Thilker et al. (2005a) and Gil de Paz et al. (2005) discovered extended UV (XUV) emission in the extreme outer disk environment of M83 and NGC4625.







Relevance

- The presence of recently formed stellar complexes at large galactocentric radii also provides a simplified laboratory for investigating the SF threshold;
- It provides a proof of the presence of molecular gas in the outer disks of spirals;
- It allows investigating the SF in quiescent and lowmetallicity environments.
- * It offers the ideal place to study the unresolved issue of the atomic hydrogen gas origin.











First look

Spectrum

No highly significant CO was detected!!!!!

$$\begin{array}{c} \label{eq:starter} & \end{tabular} \\ \end{tabular} & \end{$$





Subaru data provided by Jim Koda

Halpha image

We take 13 points for our study.





Bolatto et al 2013

Hypothesis

We should expect to see the CO emission in M83.

One possibility is that the molecular clouds in our observations are CO-dark molecular hydrogen.

It isn't the metallicity: CO-to-H2 convertor XCO diverges from below to 12+log(O/H)=8.4



Conclusion

- Our progress in understanding these XUV disks has been halted by the difficulty of detecting molecular gas via CO emission.
- In particular, no highly significant (> 5 sigma) CO was detected in ALMA maps of the XUV disk of M83 when we expected to detect 20-30 molecular clouds with SNR> 17.
- * We hypothesize that the molecular clouds in the ALMA data are CO-dark, caused by the strong UV radiation field, which dissociates CO preferentially, due to small size of the star forming clumps in the outer regions of galaxies

