WHAT HAPPENS WHEN AN AGN IRRADIATES MOLECULAR GAS?

The Remarkable Case of NGC 2110

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AGN feedback affects the width of the SFR-mass relationship in galaxies.

The EAGLE hydrodynamic simulation at z=0

WHY SHOULD WE CARE ABOUT MOLECULAR GAS IN DISTANT AGN?

Galaxies in EAGLE with:
- Standard AGN feedback
- No black holes

Scholtz+ (2018)
Jackson+ (2020)

AGN feedback affects the width of the SFR-mass relationship in galaxies.
Relative to star-formation, the efficiency of low-excitation CO emission is depressed in distant AGN.
Low gas fractions and high apparent star-formation efficiencies in distant AGN.

Is this the tell-tale sign of rapid AGN quenching of star-formation at cosmic noon?
AN AGN CAUGHT IN THE ACT:
THE REMARKABLE CASE OF NGC 2110

PanSTARRS-1

100'' = 16 kpc

HST narrow-band
VLA (contours)

Ferruit+ (2004)
AN AGN CAUGHT IN THE ACT:
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Rosario+ (2019)
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Rosario+ (2019)
THE AGN SUPPRESSES CO EMISSION BUT DOES NOT DESTROY H$_2$

Spitzer/IRS spectrum

H$_2$ excitation diagram

Rosario+ (2019)

The similarity of CO (2-1) and hot H2 line emission also supports this notion.
Take home messages:

AGN feedback can be localised because the nuclear radiation field is anisotropic.

Depressed CO emission does not directly imply a lack of molecular gas.

The gas content and distribution of distant AGN host galaxies are different from $z=0$. Could this produce a more pronounced suppression of CO emission?