

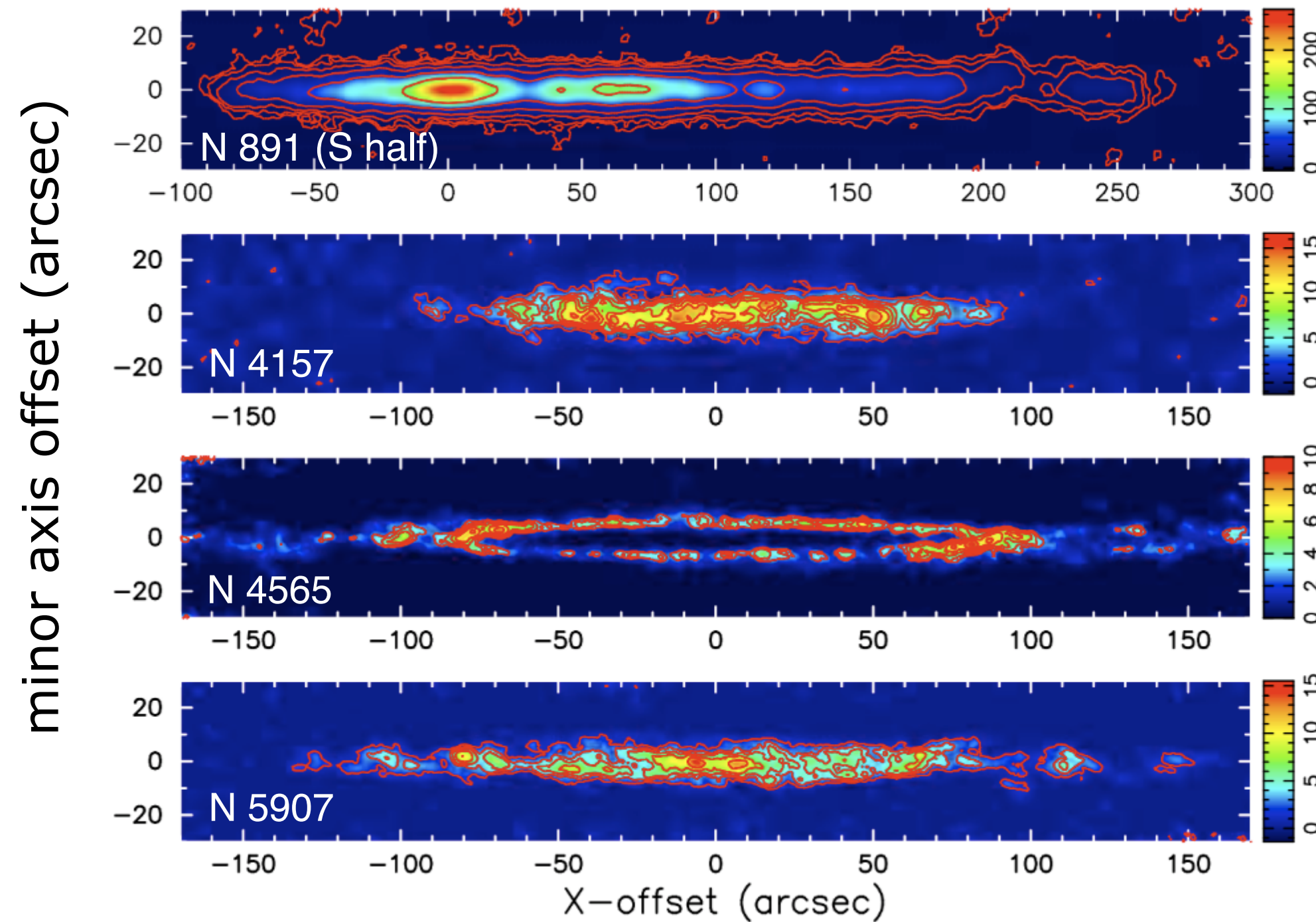
The Volumetric Star Formation Law in Nearby Edge-on Galaxies

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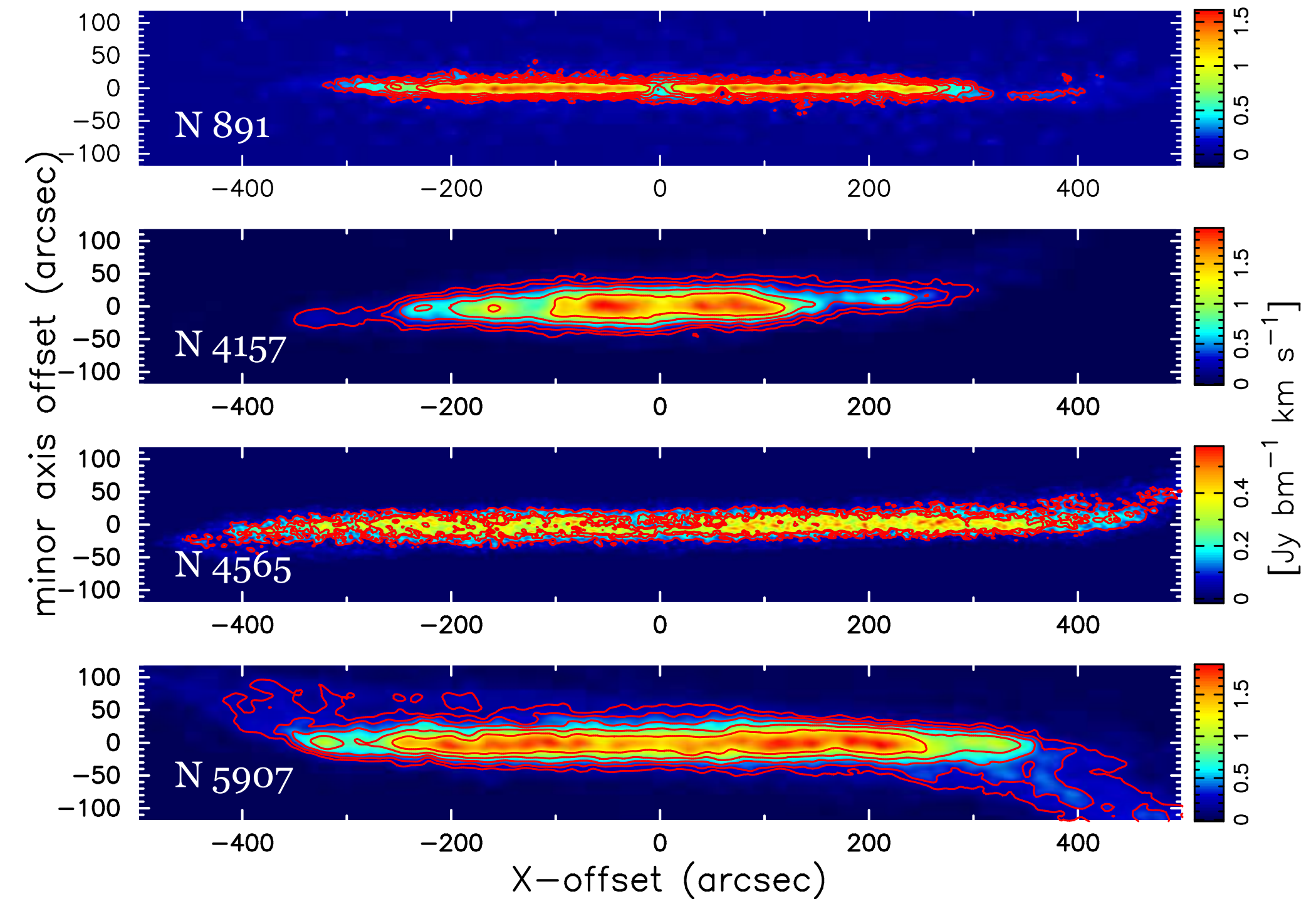
September 11, 2018
The HI/Story of the Nearby Universe

Observations

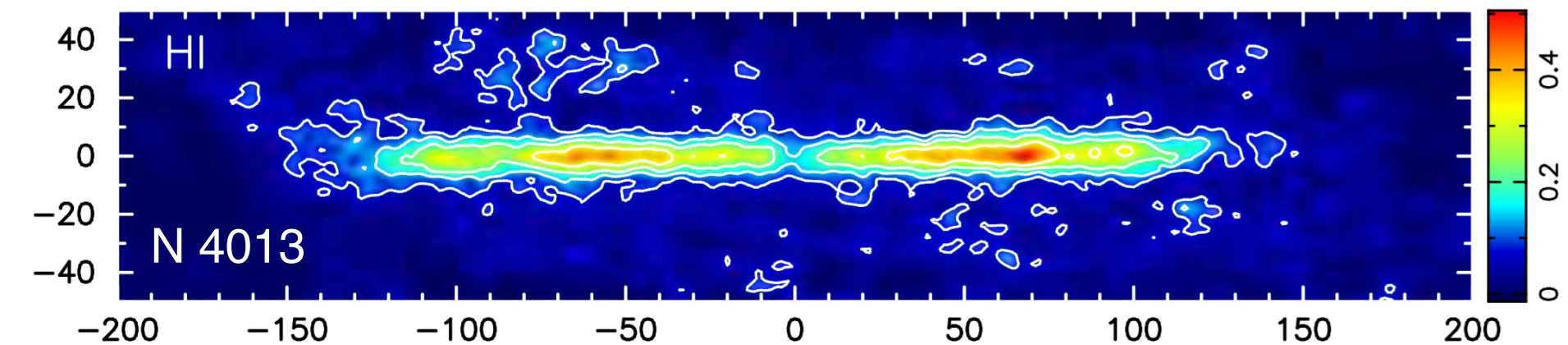
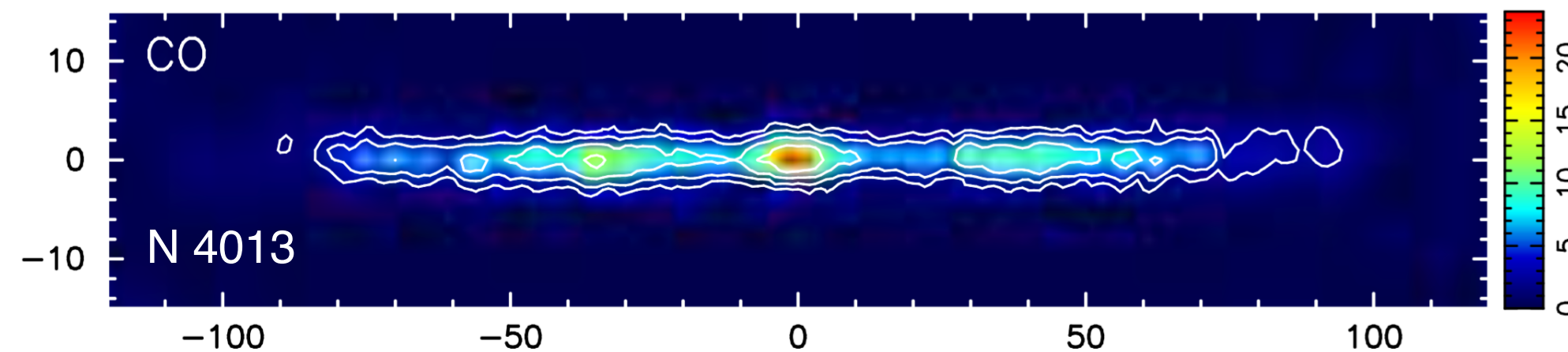
^{12}CO ($J=1\rightarrow 0$) as a H_2



VLA H I



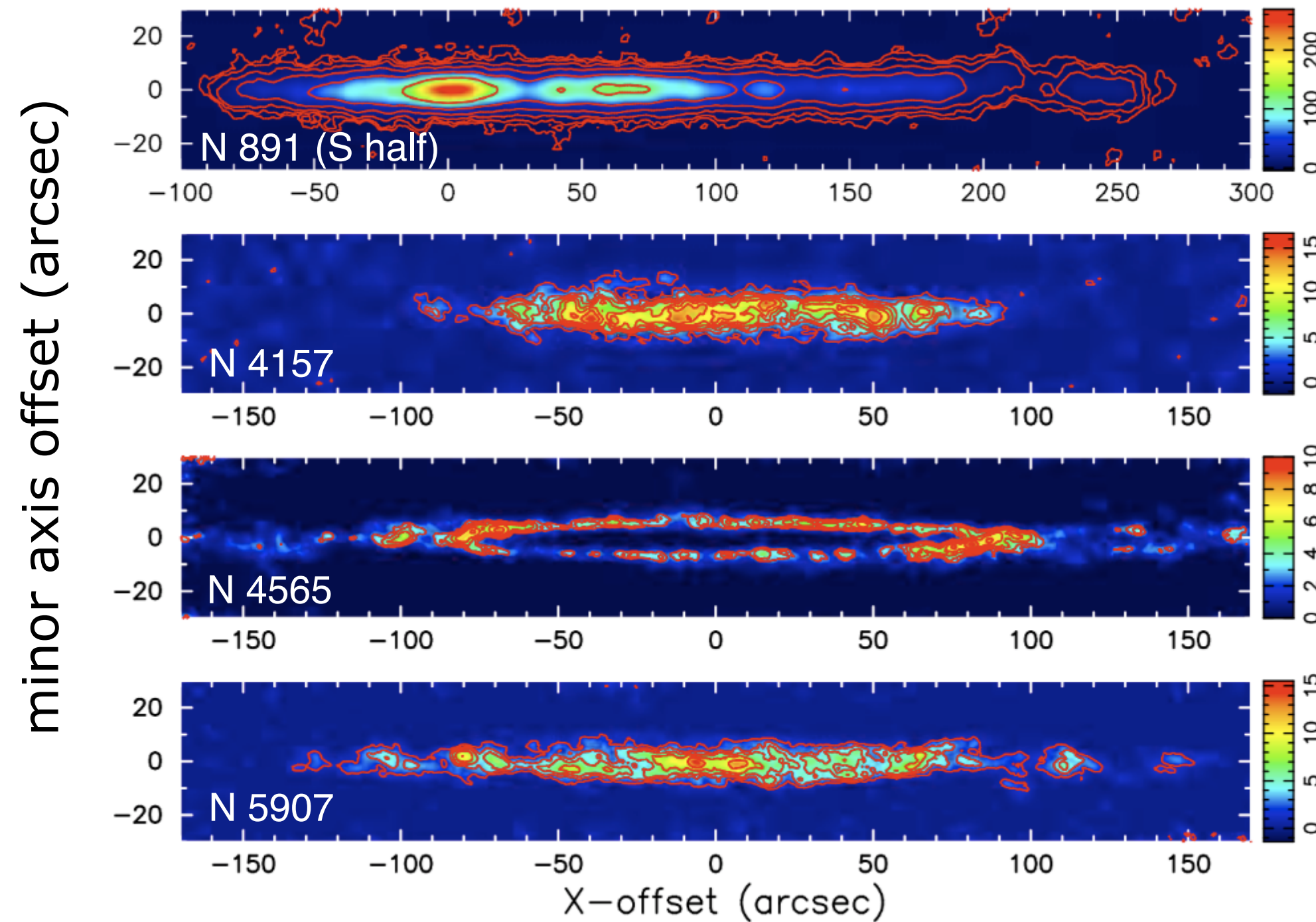
Kijeong Yim, Tony Wong, Rich Rand, [Thijs van der Hulst](#),
Christopher Howk, Eric Murphy, Robert Benjamin 2011 & 2014



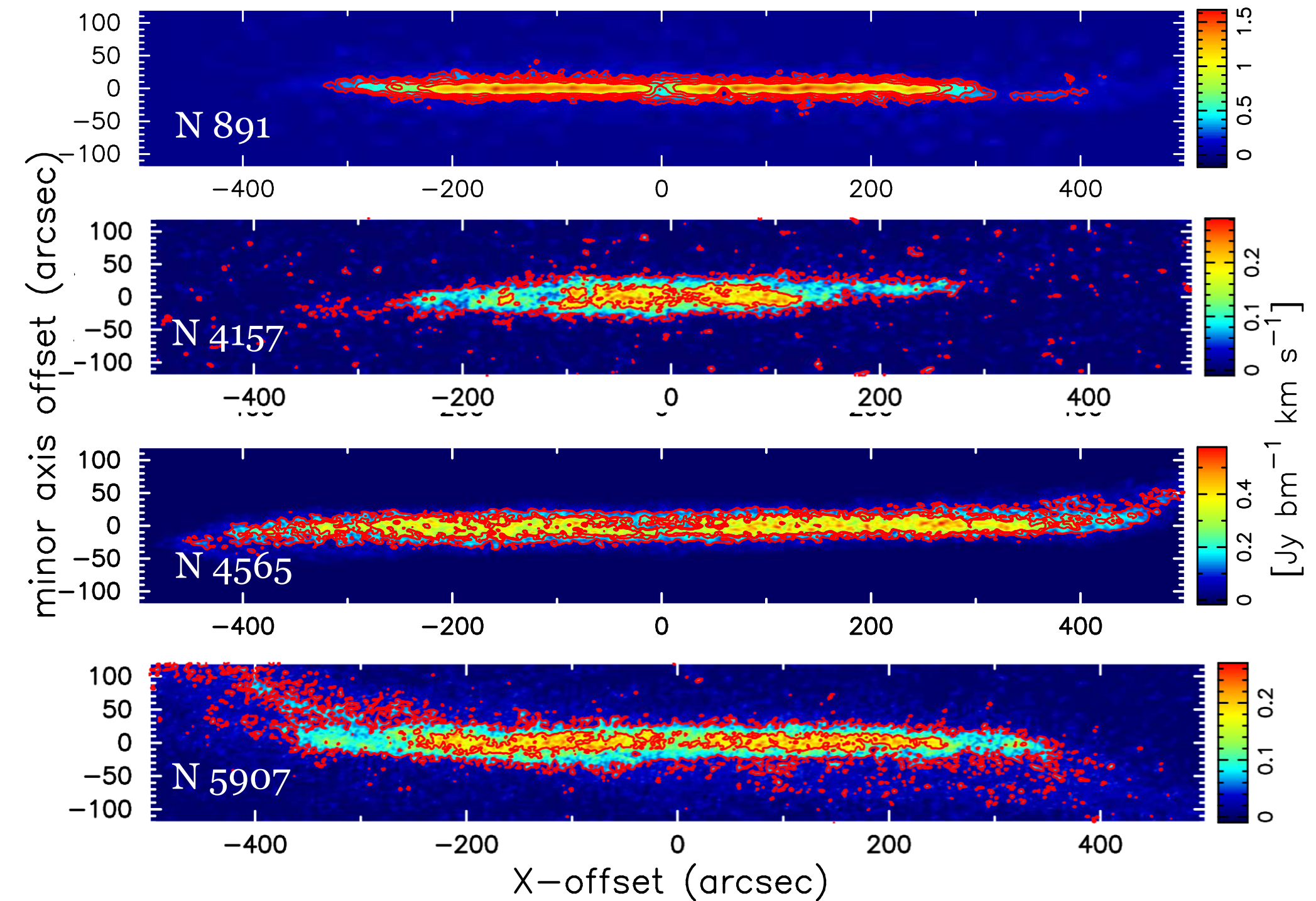
Yim et al. in preparation

Observations

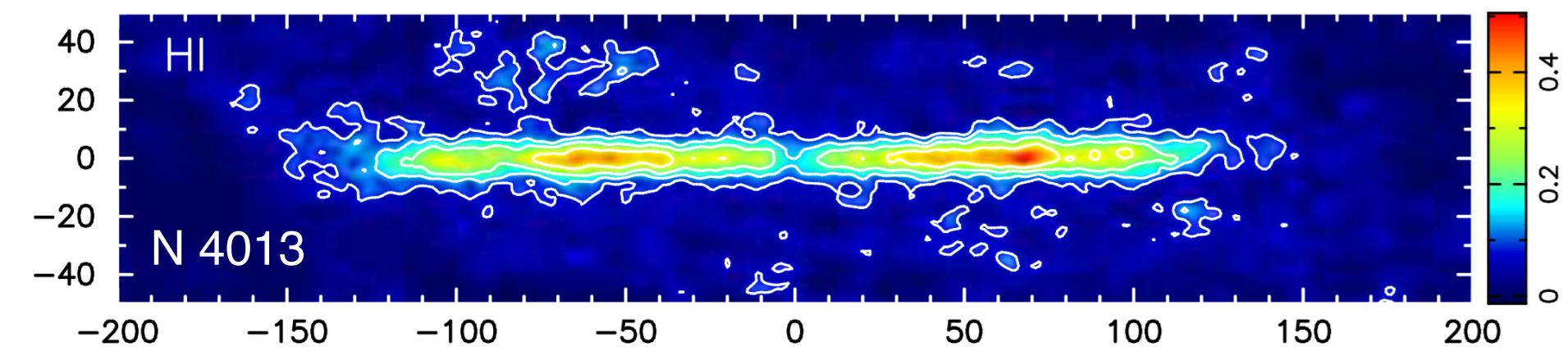
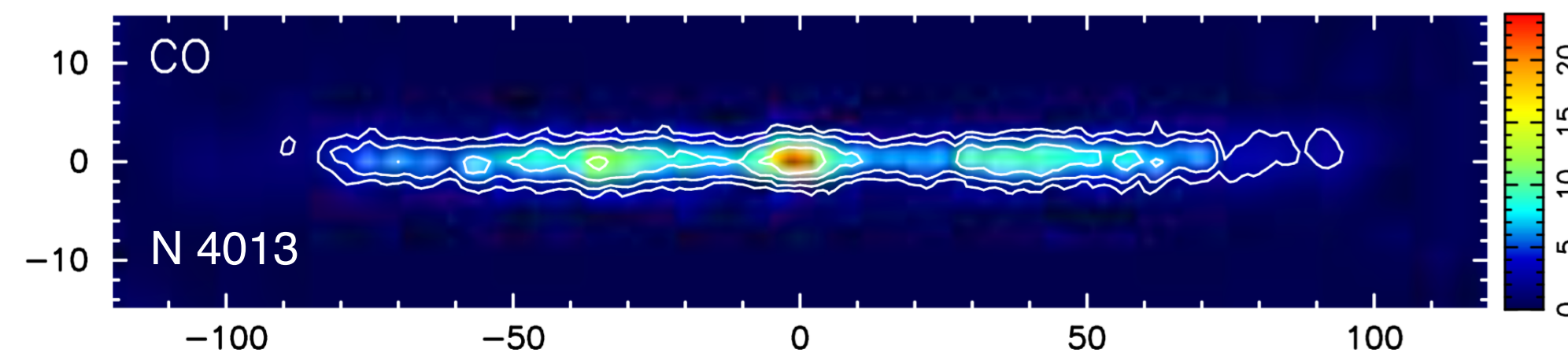
^{12}CO ($J=1\rightarrow 0$) as a H_2



VLA H I

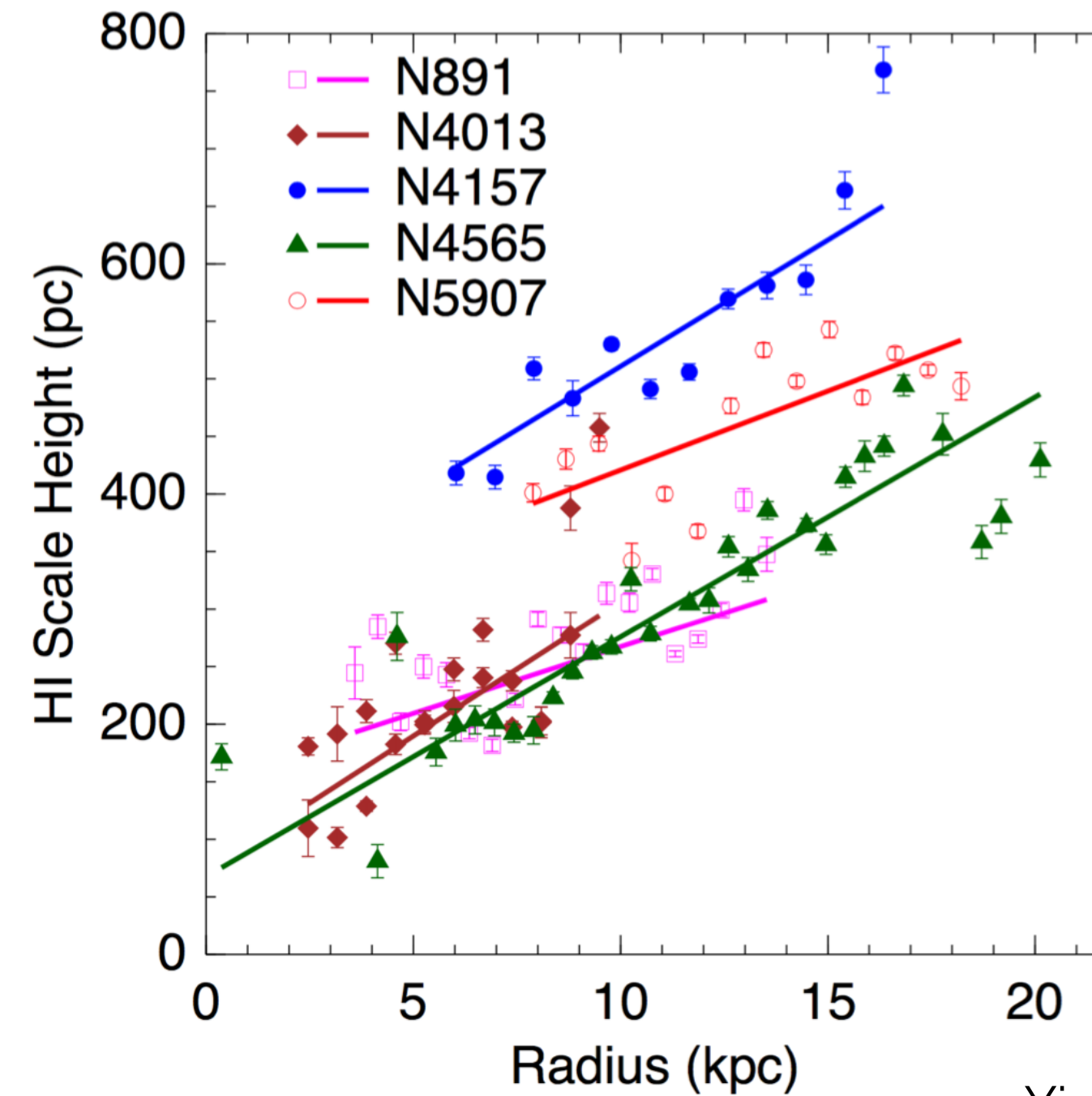
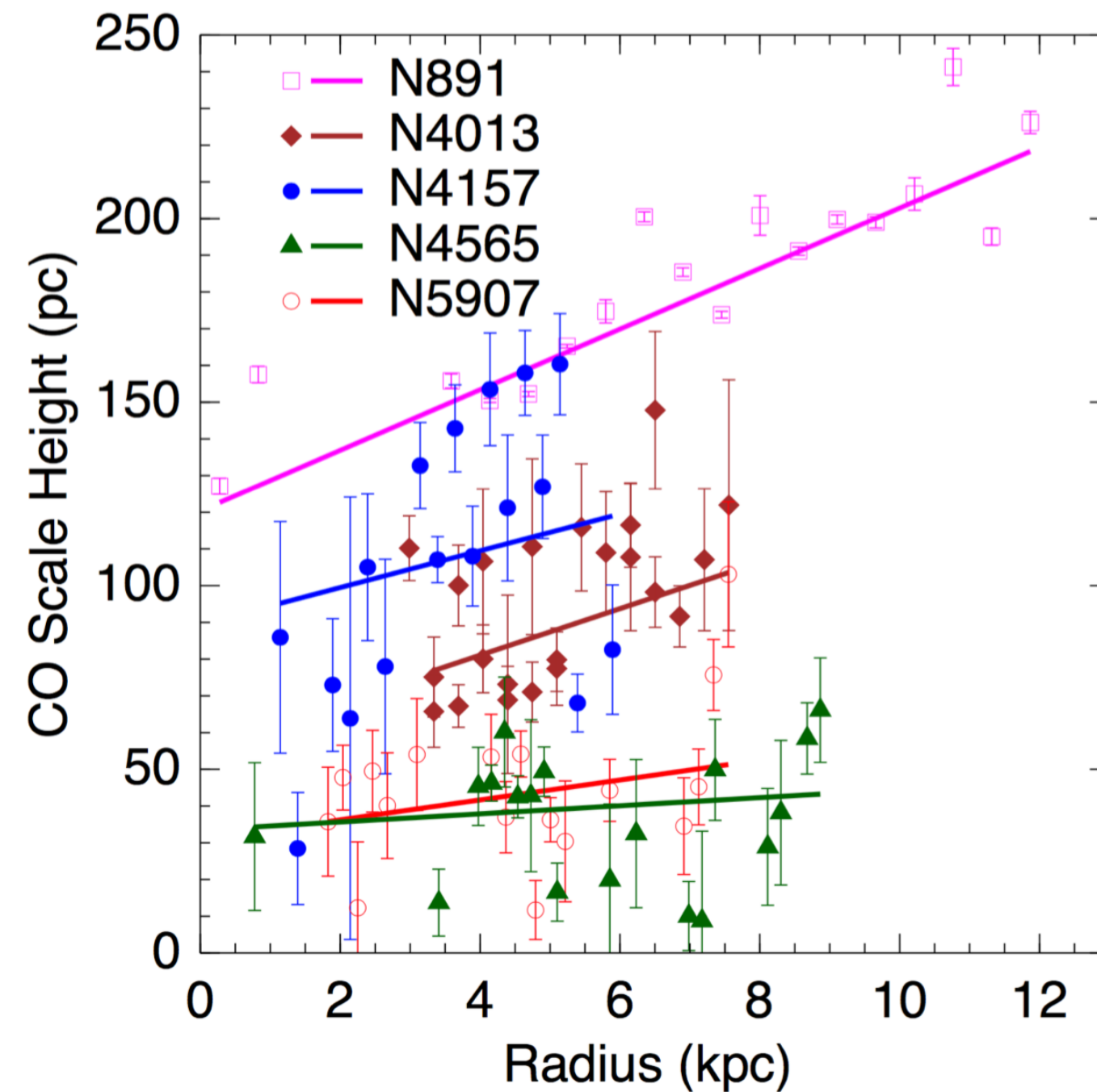


Kijeong Yim, Tony Wong, Rich Rand, [Thijs van der Hulst](#),
Christopher Howk, Eric Murphy, Robert Benjamin 2011 & 2014



Yim et al. in preparation

Radial Variation in Gas Disk Thickness

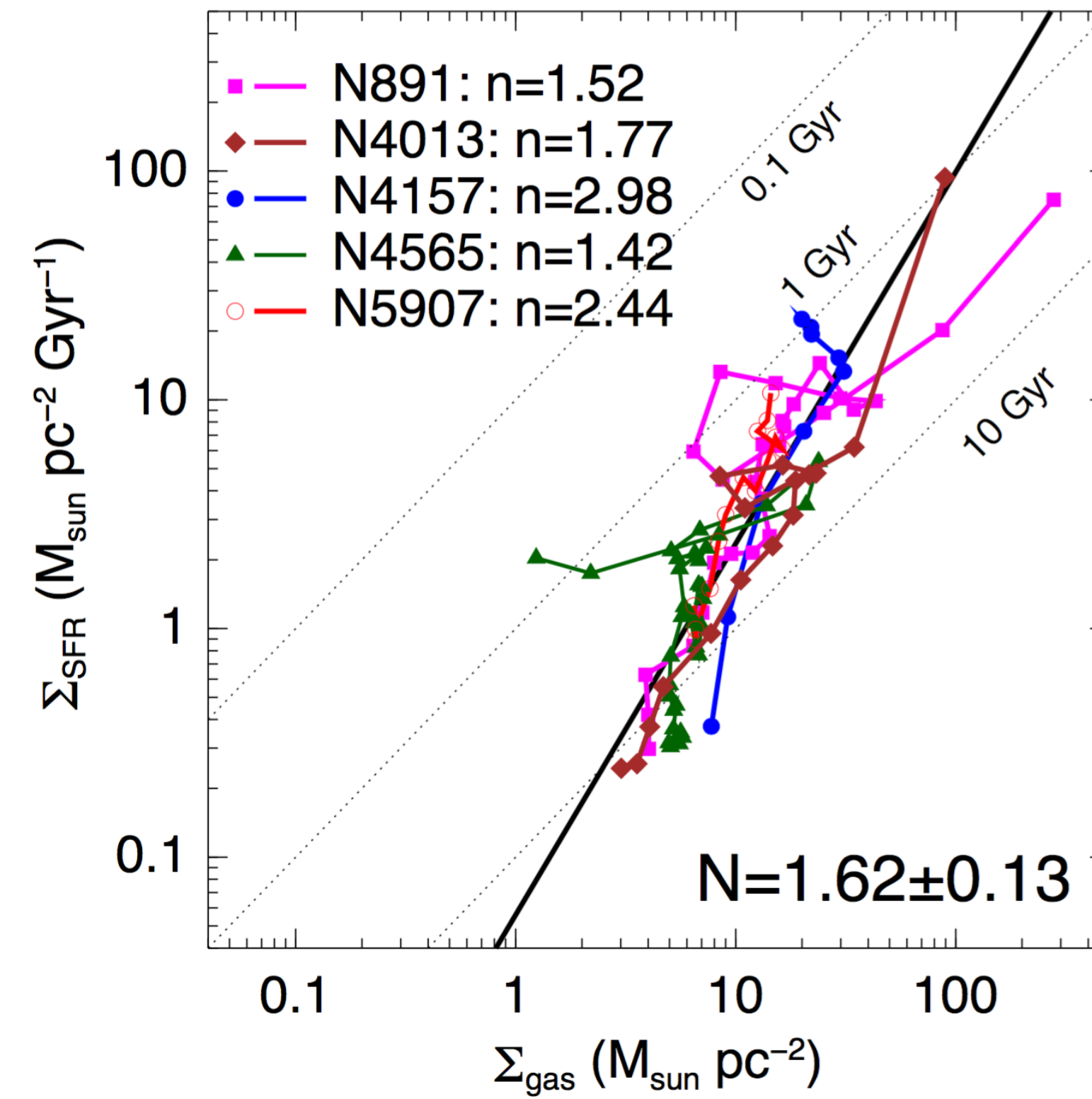
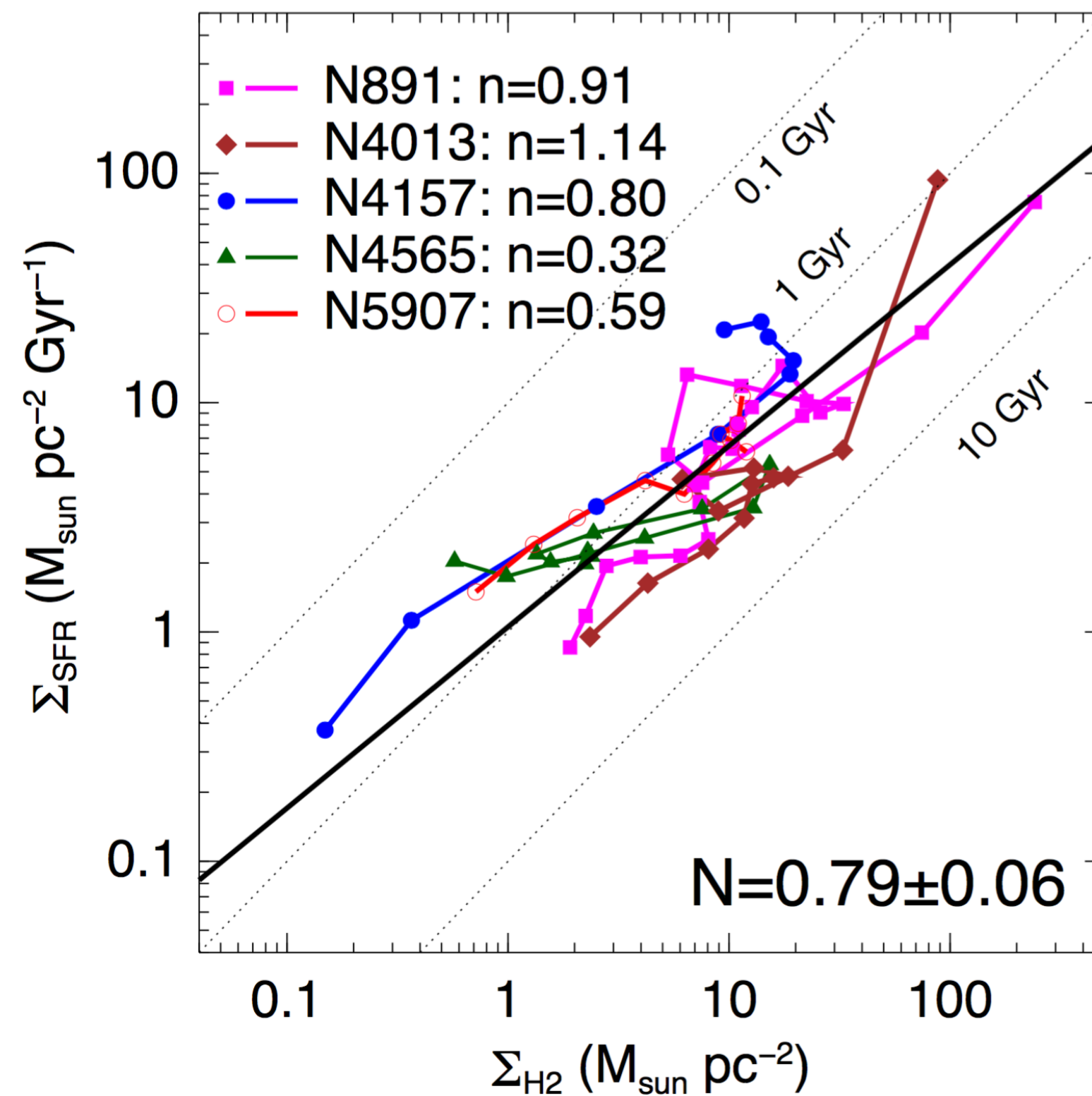


Yim et al. 2014 + NGC 4013

Gas Disk Thickness:

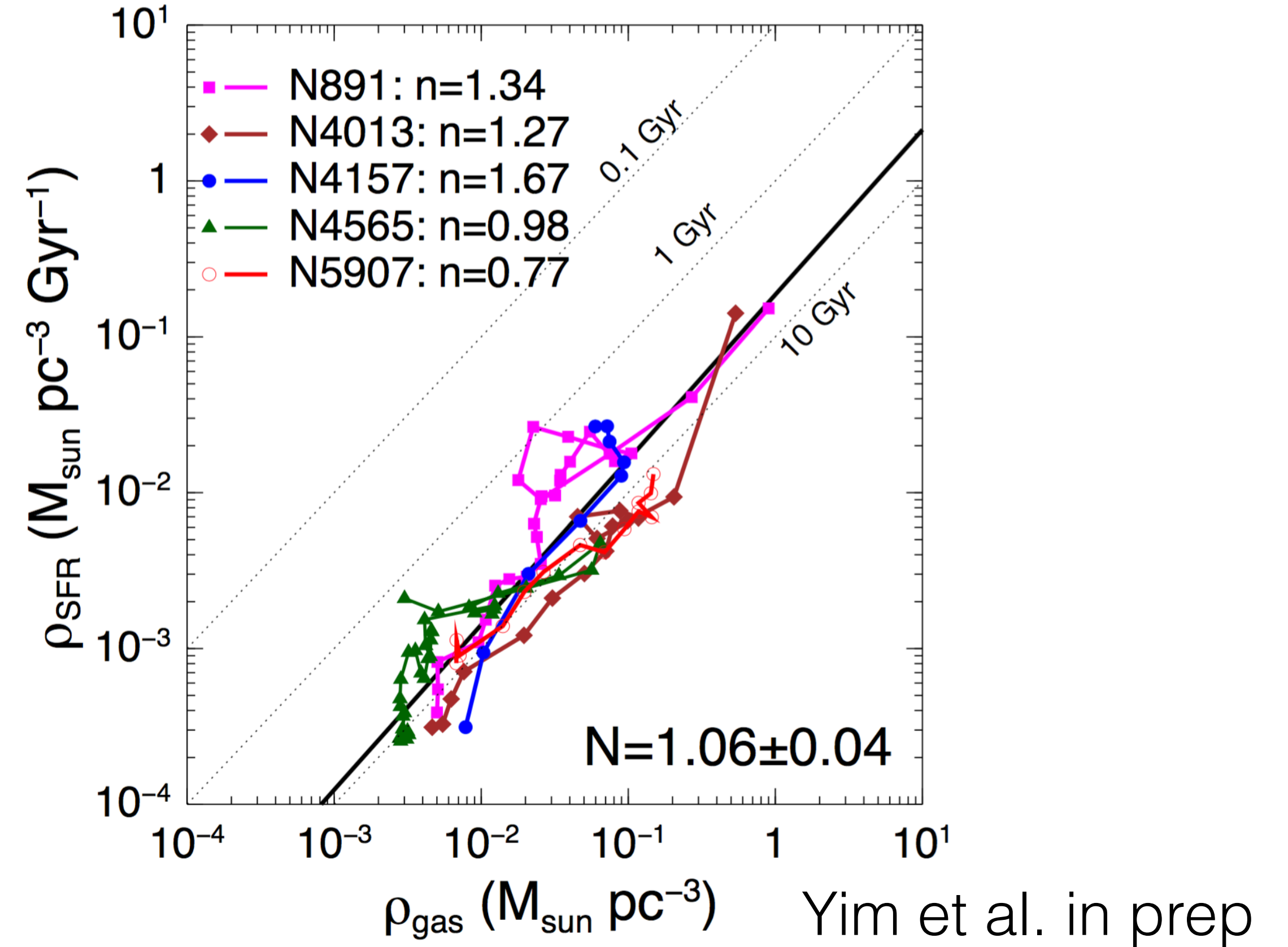
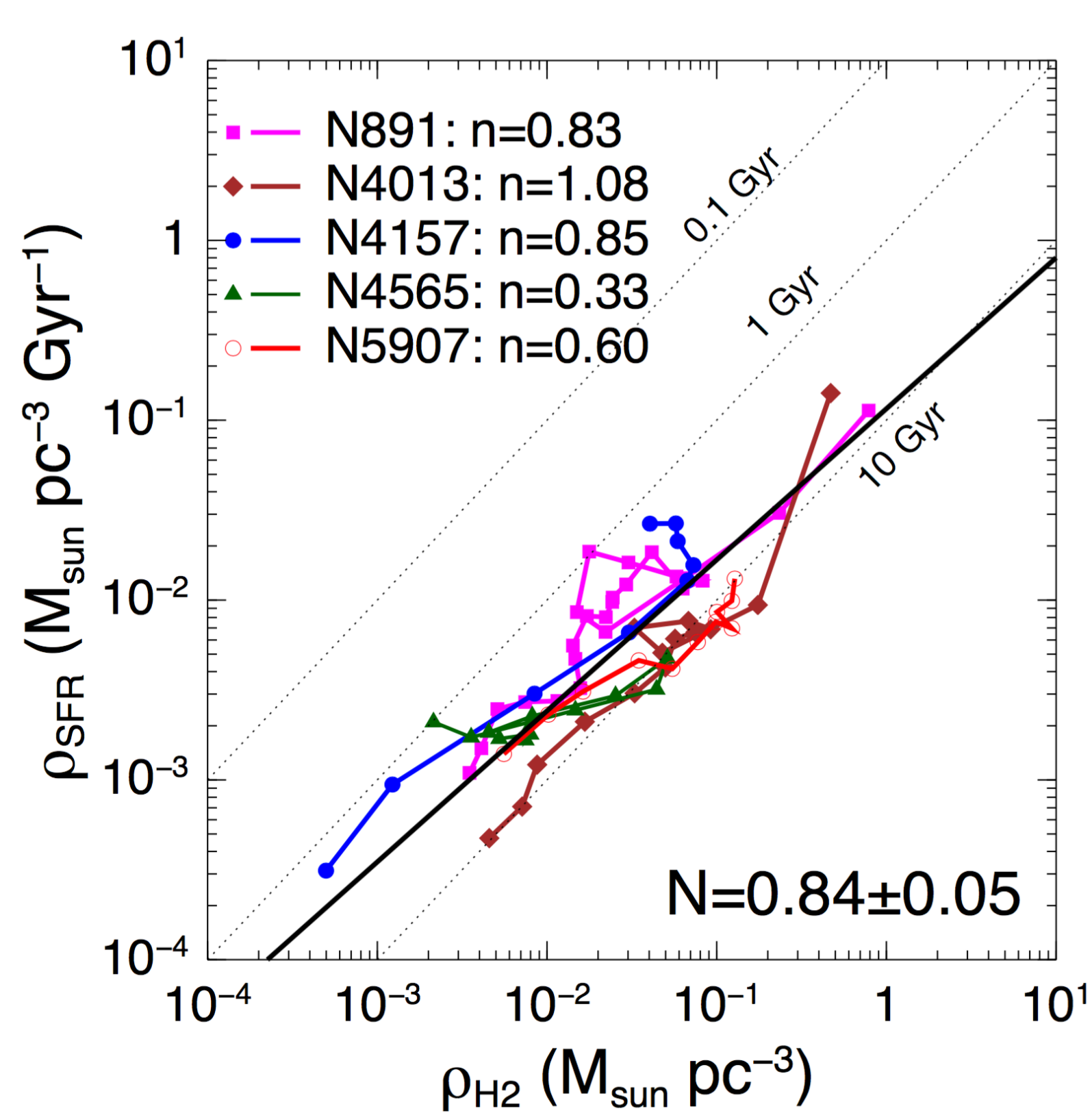
- Gaussian function fitting to the extreme velocity channels for the almost edge-on galaxies NGC 891 and NGC 4013
- Olling's method (1996) considering the projection effects for less edge-on galaxies (NGC 4157, 4565, & 5907)

Star Formation Law (Kennicutt-Schmidt Law)



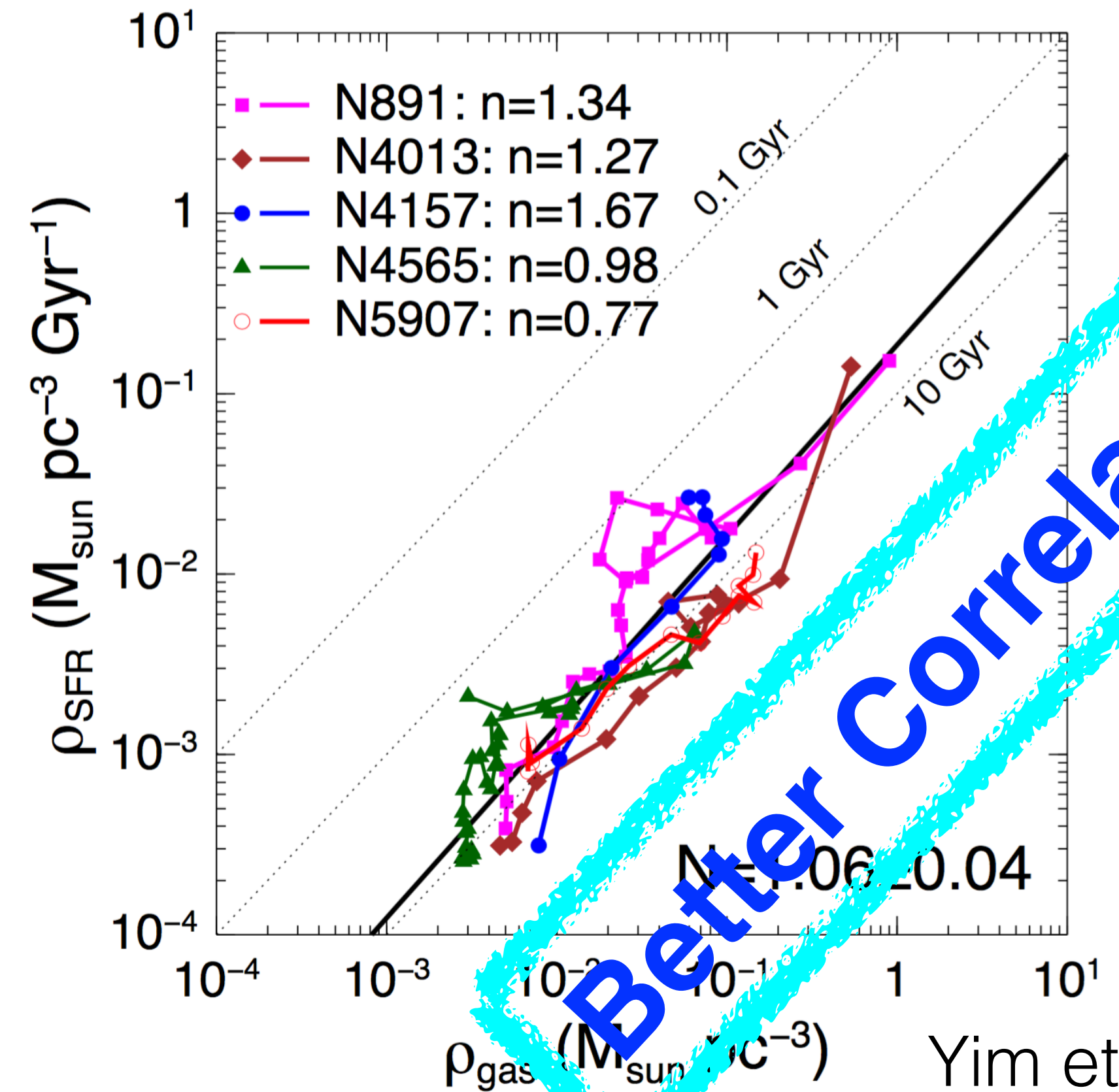
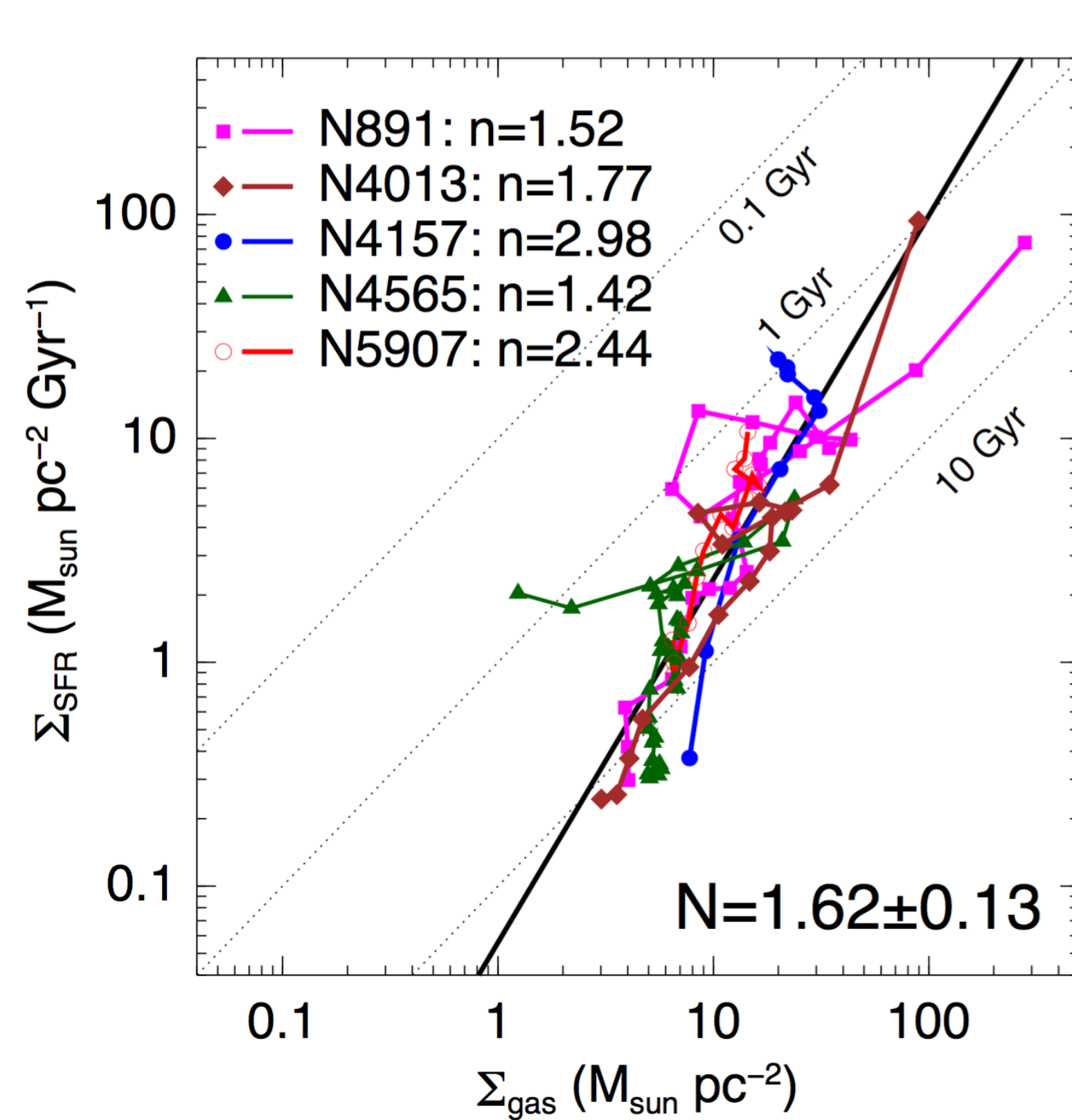
- Strong power-law correlation between Σ_{SFR} and Σ_{H_2}

Volumetric Star Formation Law



- Volume densities from surface mass densities and scale heights assuming a Gaussian distribution for gas & an exponential function for SFR
- Strong power-law correlations between ρ_{SFR} and ρ_{H_2} & ρ_{SFR} and ρ_{gas}

Volumetric Star Formation Law



Better Correlation!

Yim et al. in prep

- Volume densities from surface mass densities and scale heights assuming a Gaussian distribution for gas & an exponential function for SFR
- Strong power-law correlations between ρ_{SFR} and ρ_{H_2} & ρ_{SFR} and ρ_{gas}