

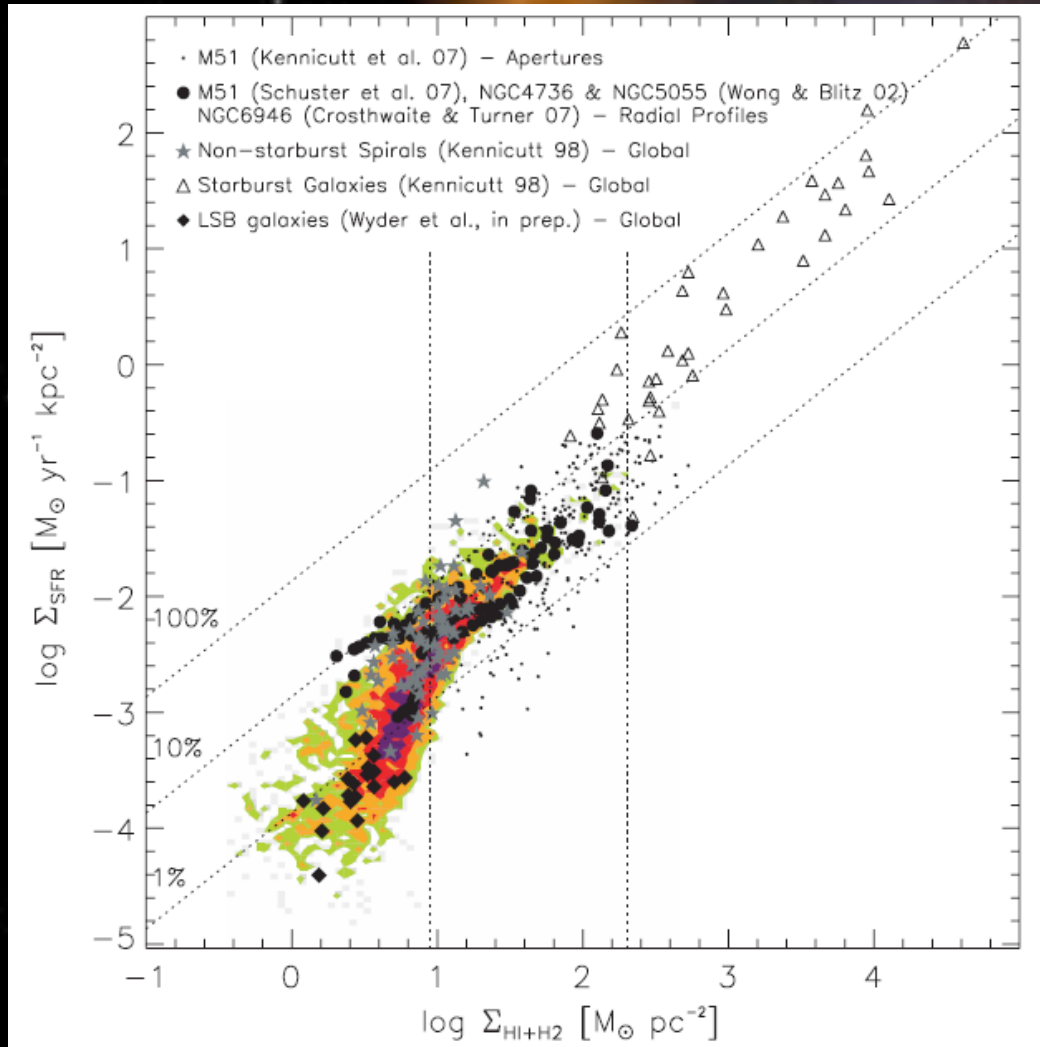
SUNBIRD LIRGS: Combining SALT with MUSE & ALMA

Moses Mogotsi

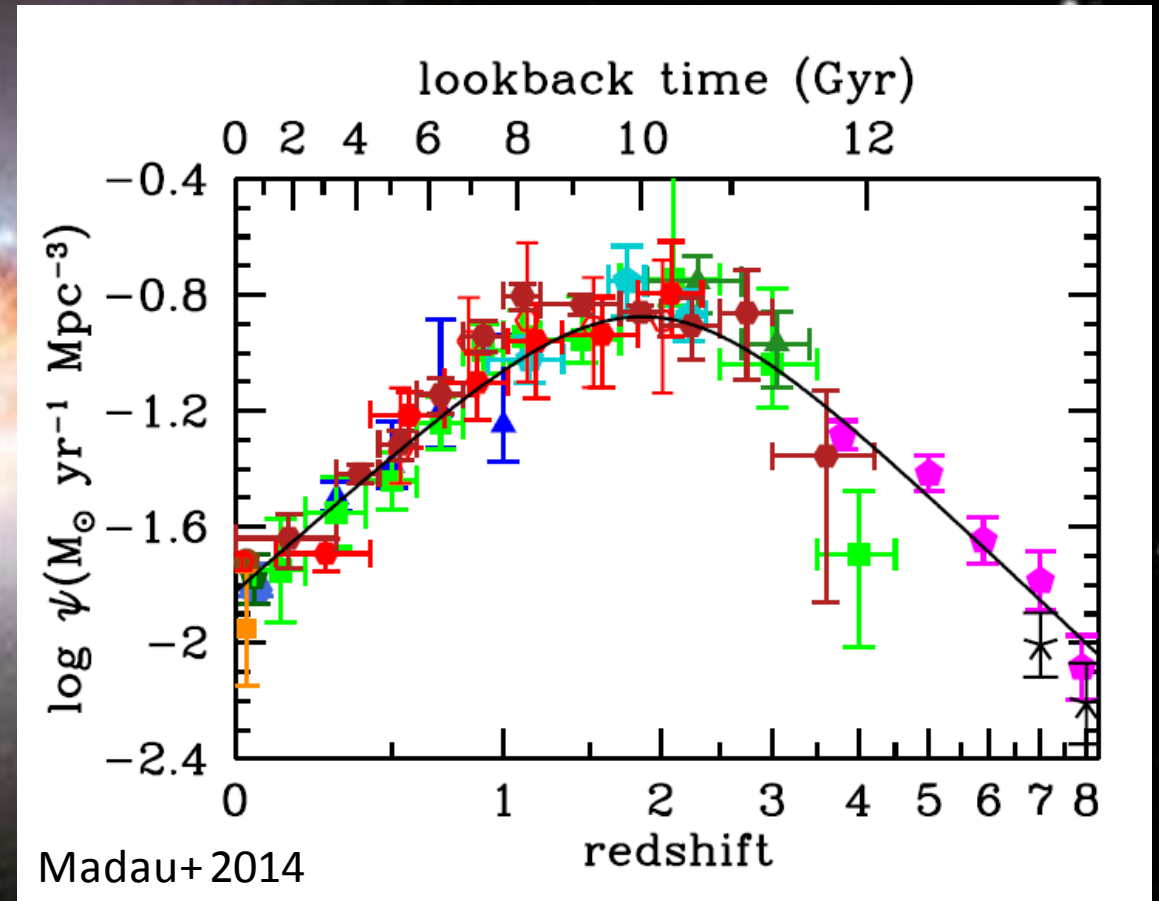
+ Väisänen P.¹, Ramphul R.¹, Tafere M., Kuncarayacti H.², Kotilainen J.², Kool E.³,
& SUNBIRD Team

¹South African Astronomical Observatory (SAAO); ²University of Turku;
³Macquarie University

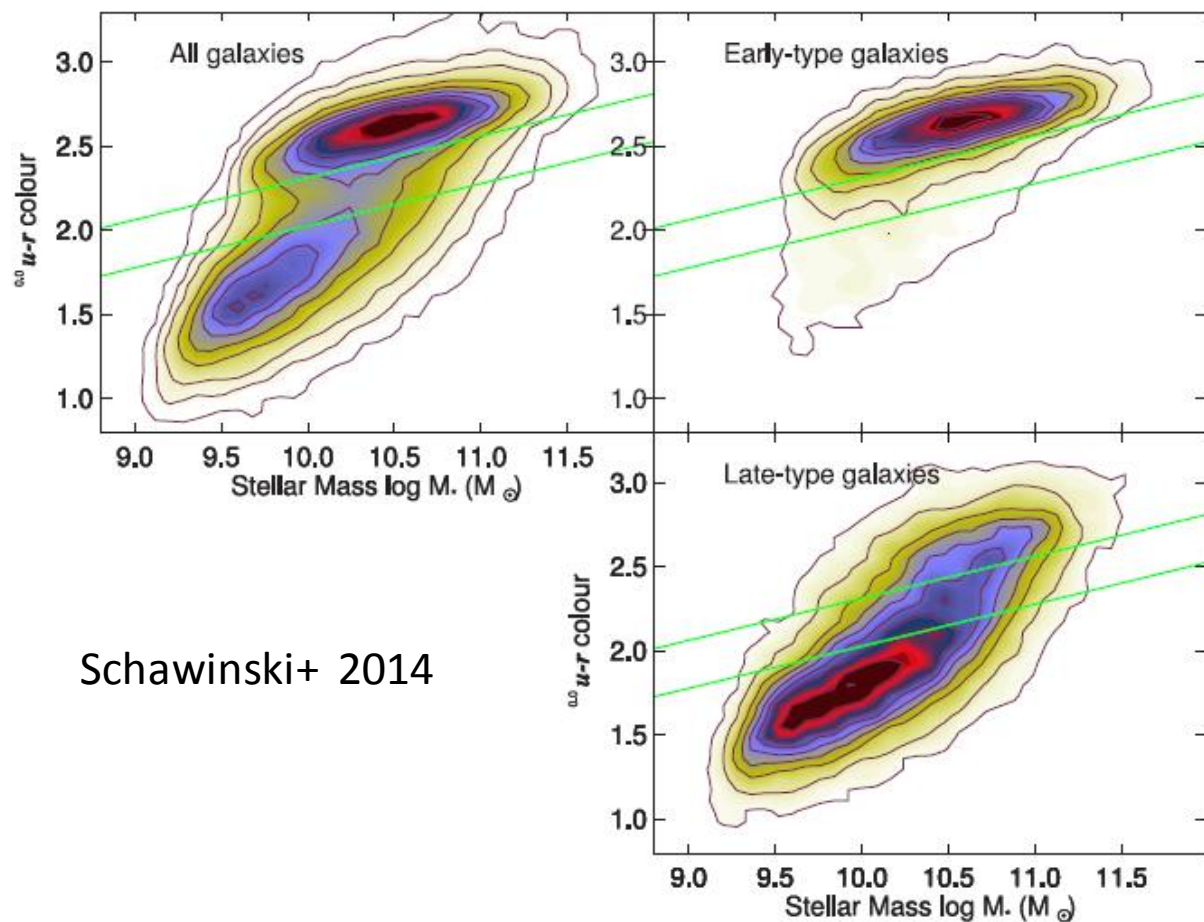
Star Formation



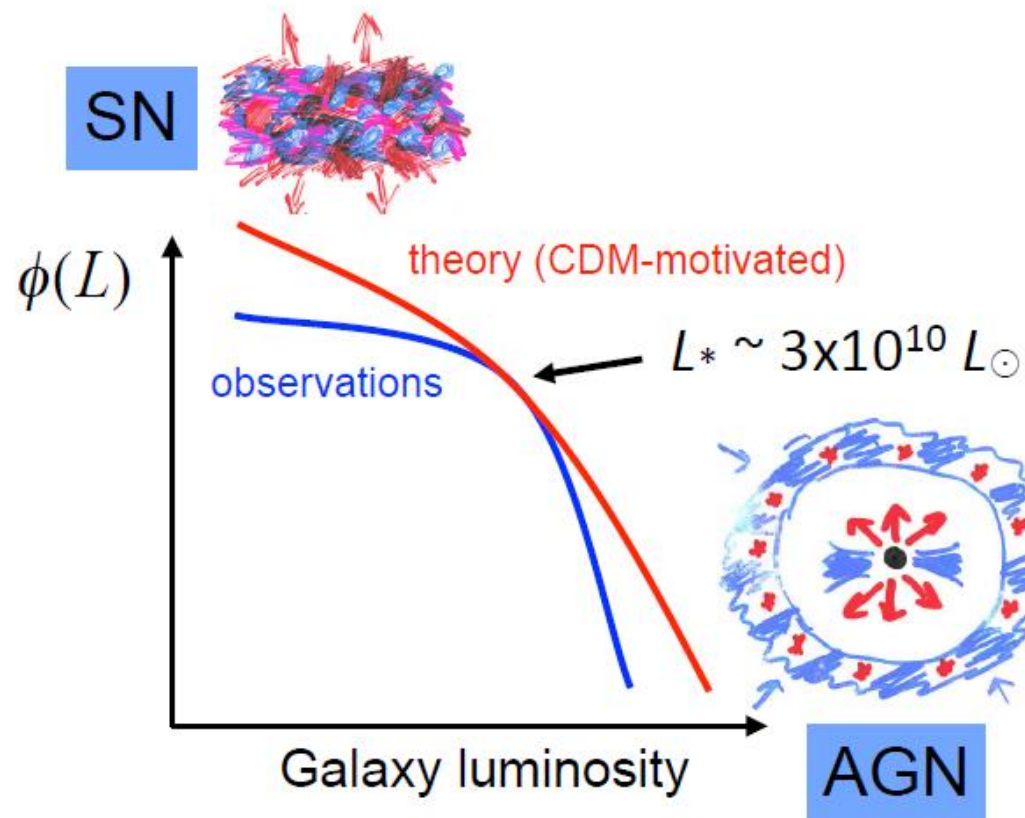
Bigiel+ 2008



Madau+ 2014



Schawinski+ 2014

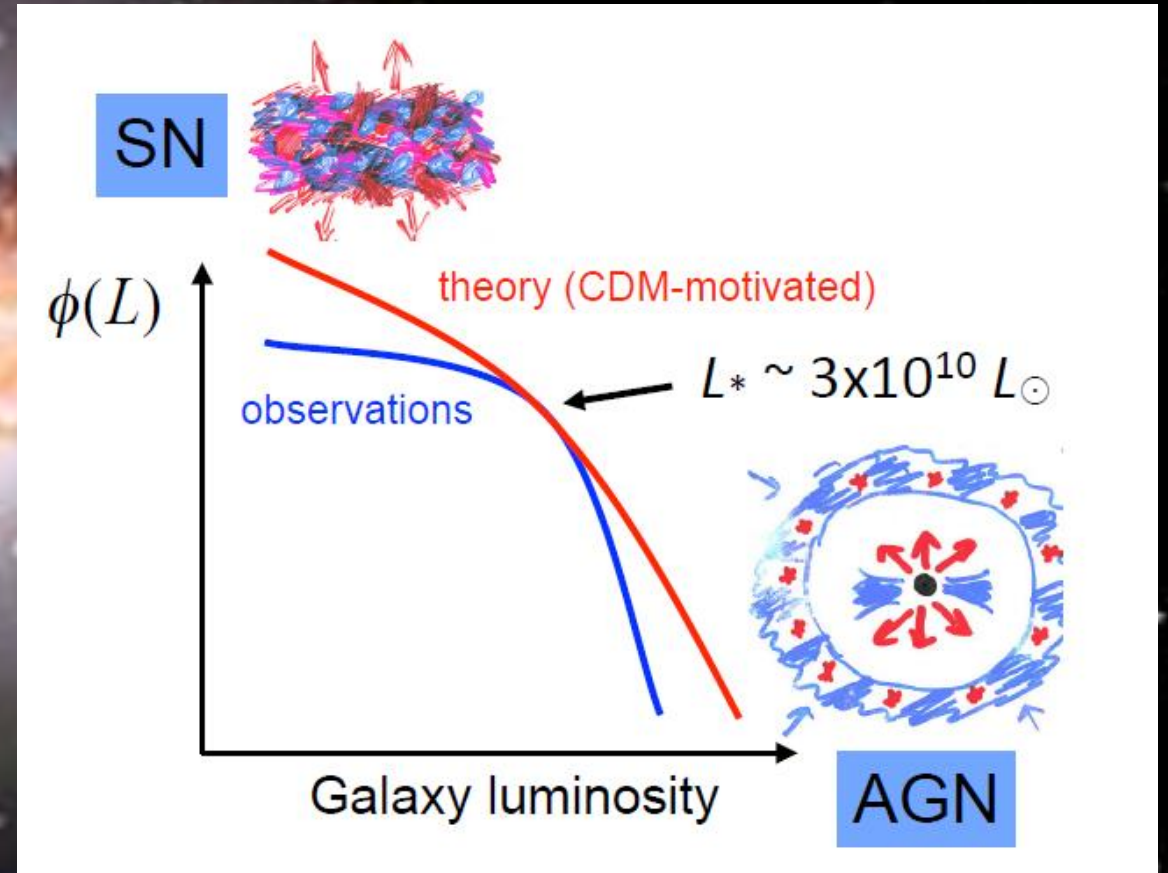
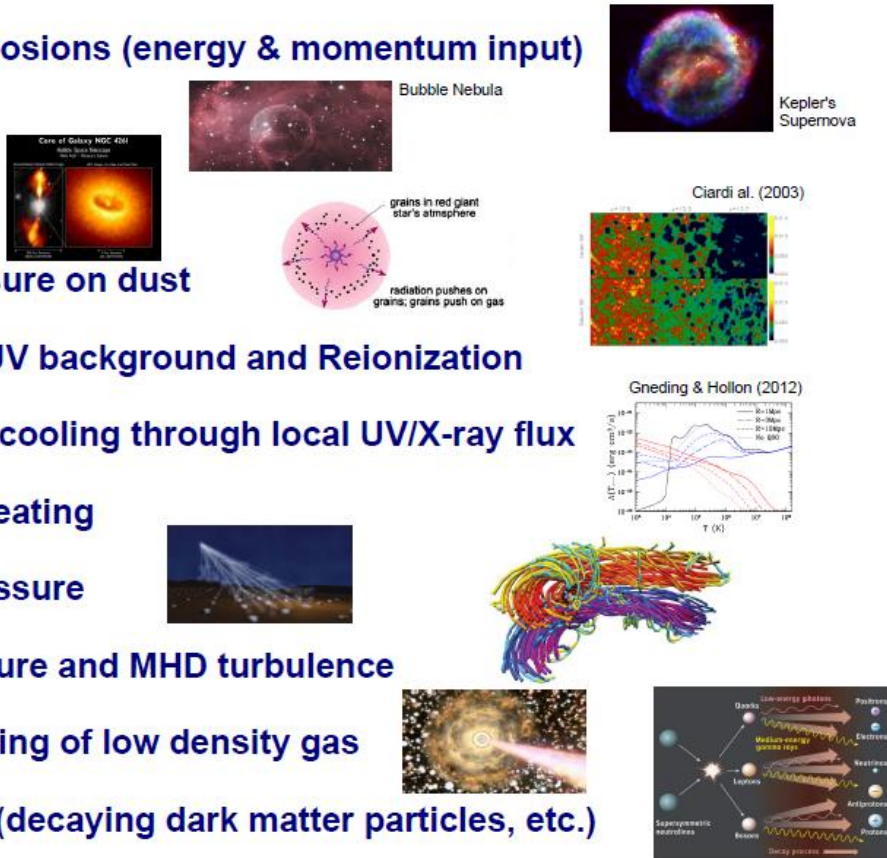


Silk & Mannon 2012

Feedback

What physics is responsible for feedback in the first place?

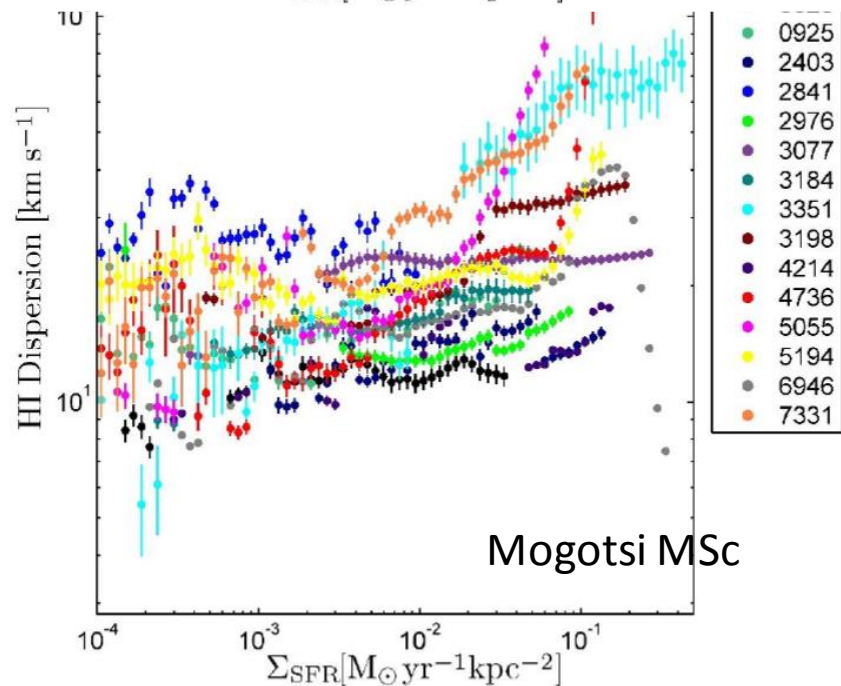
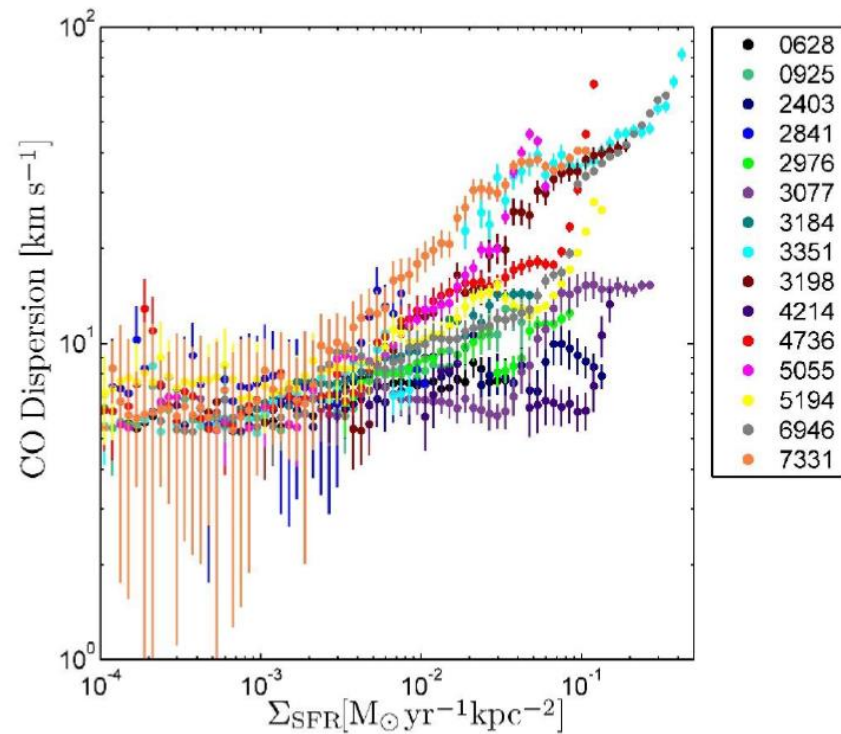
- Supernova explosions (energy & momentum input)
- Stellar winds
- AGN activity
- Radiation pressure on dust
- Photoionizing UV background and Reionization
- Modification of cooling through local UV/X-ray flux
- Photoelectric heating
- Cosmic ray pressure
- Magnetic pressure and MHD turbulence
- TeV-blazar heating of low density gas
- Exotic physics (decaying dark matter particles, etc.)



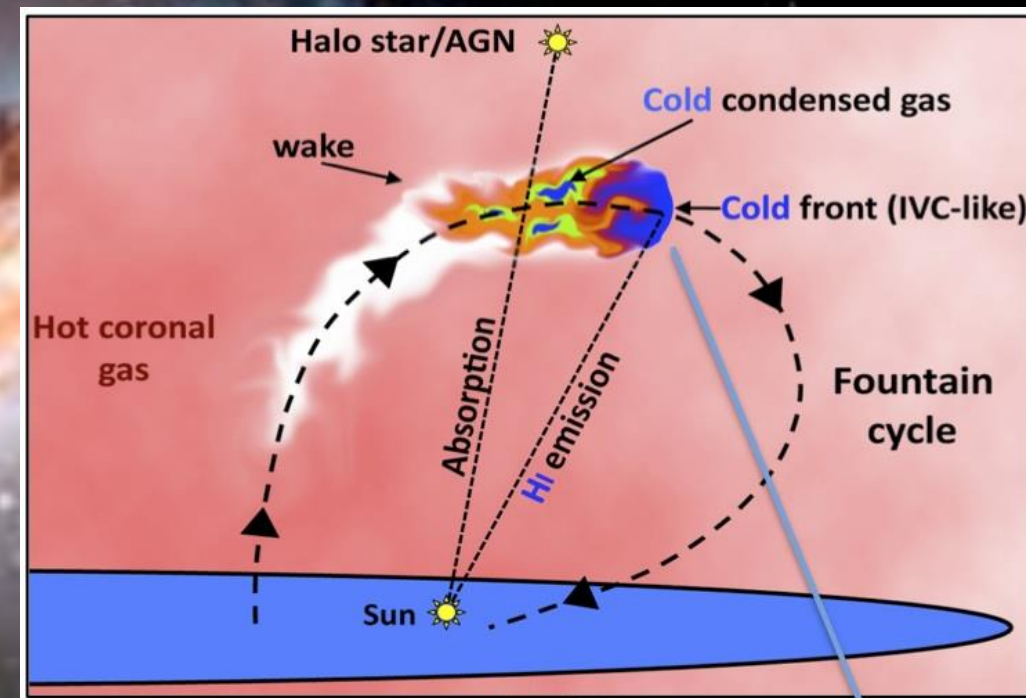
V Springel Talk

Silk & Mannon 2012

SF Feedback?

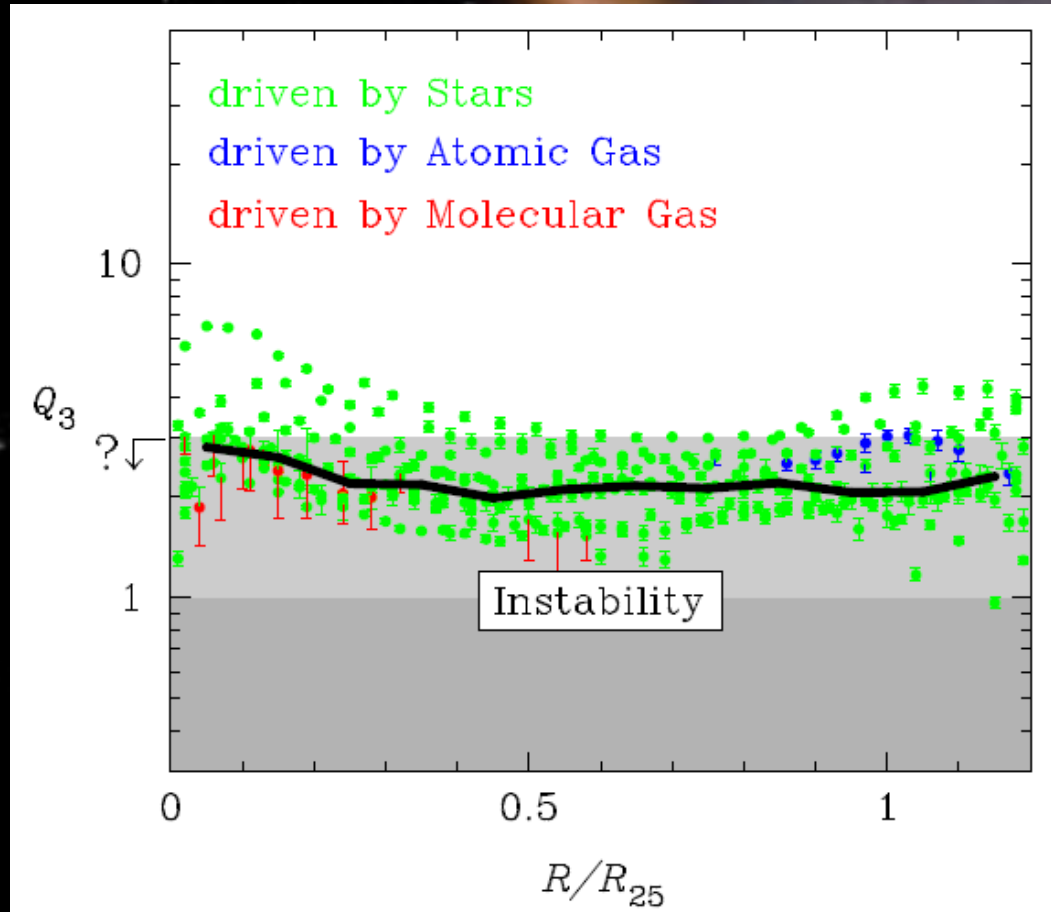


Mogotsi MSc

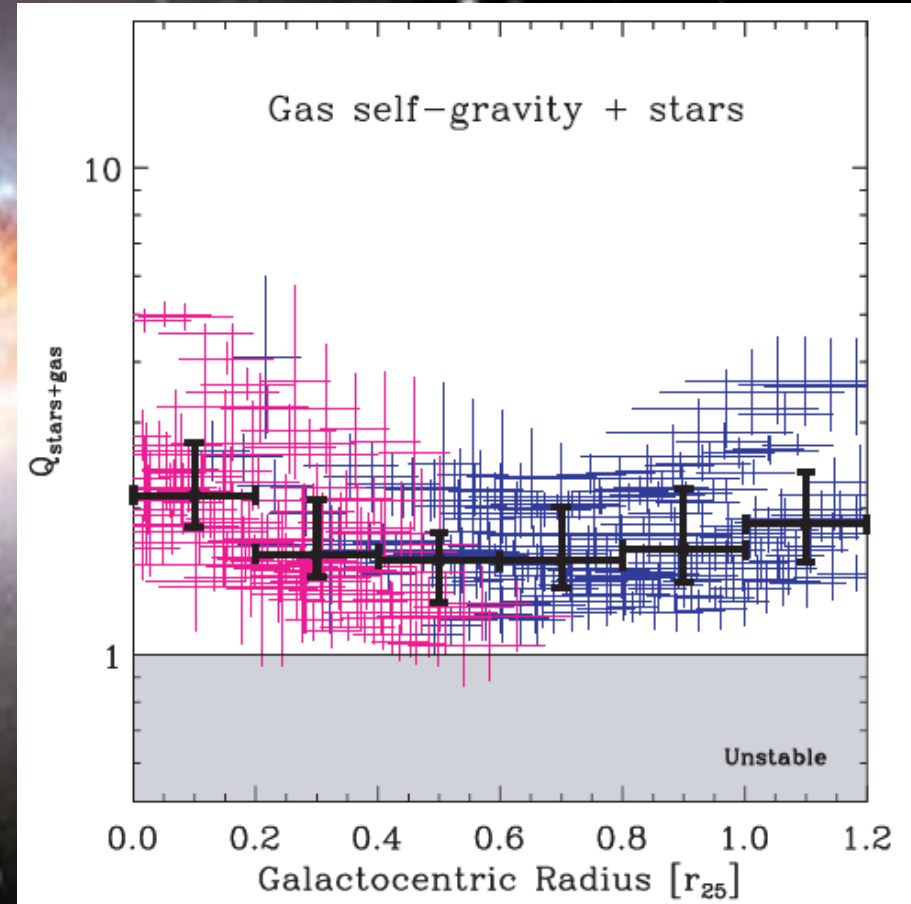


Fraternali+ 2014

Disc Stability



Romeo & Mogotsi 2017

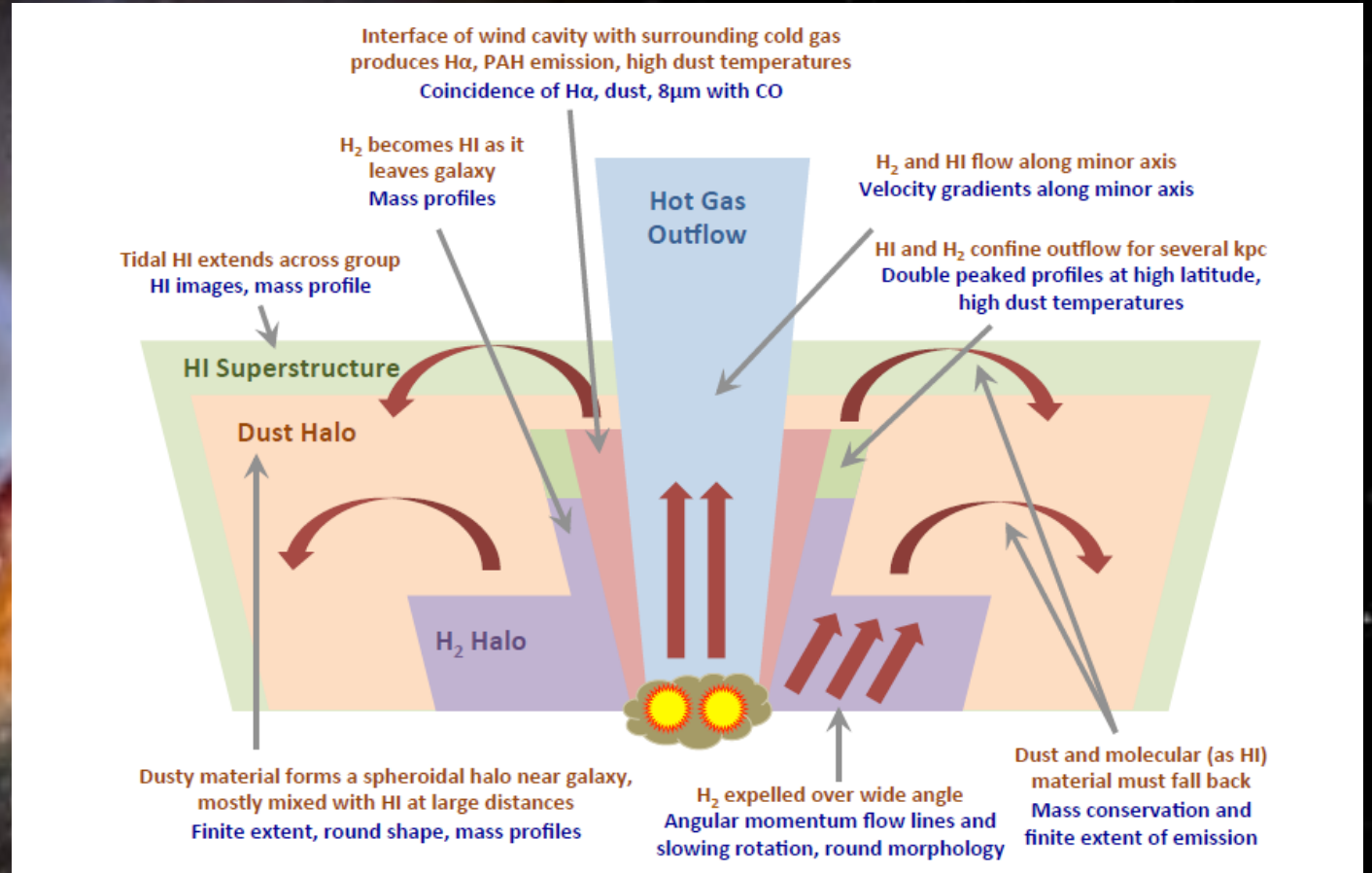


Leroy+ 2008

Outflows



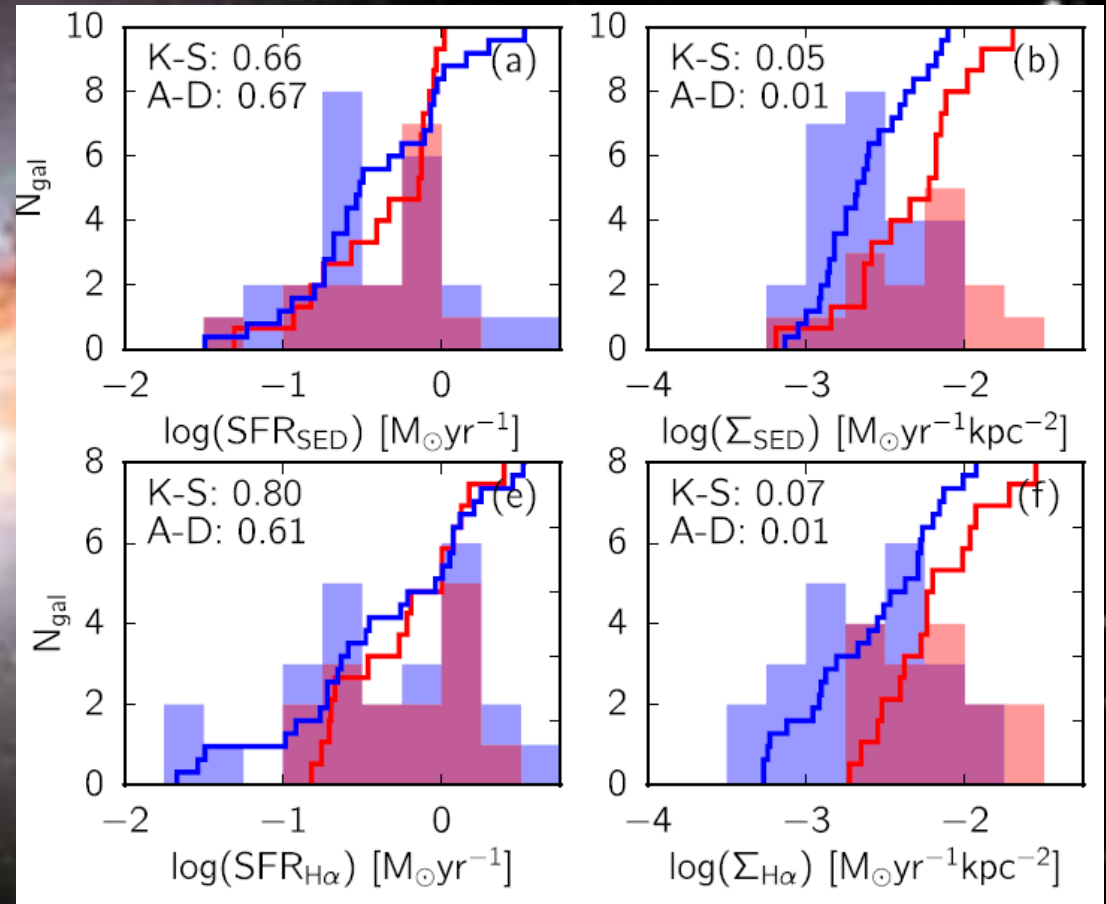
Smith, Gallagher, & Westmoquette



Leroy+ 2015

Galaxies are Windy...

- Wind-dominated (red) versus non-dominated (blue)
- Find winds across large ranges of SFR
- Wind dominated galaxies tend to only found at high SFR



Ho+ 2016

LIRGS/ULIRGS

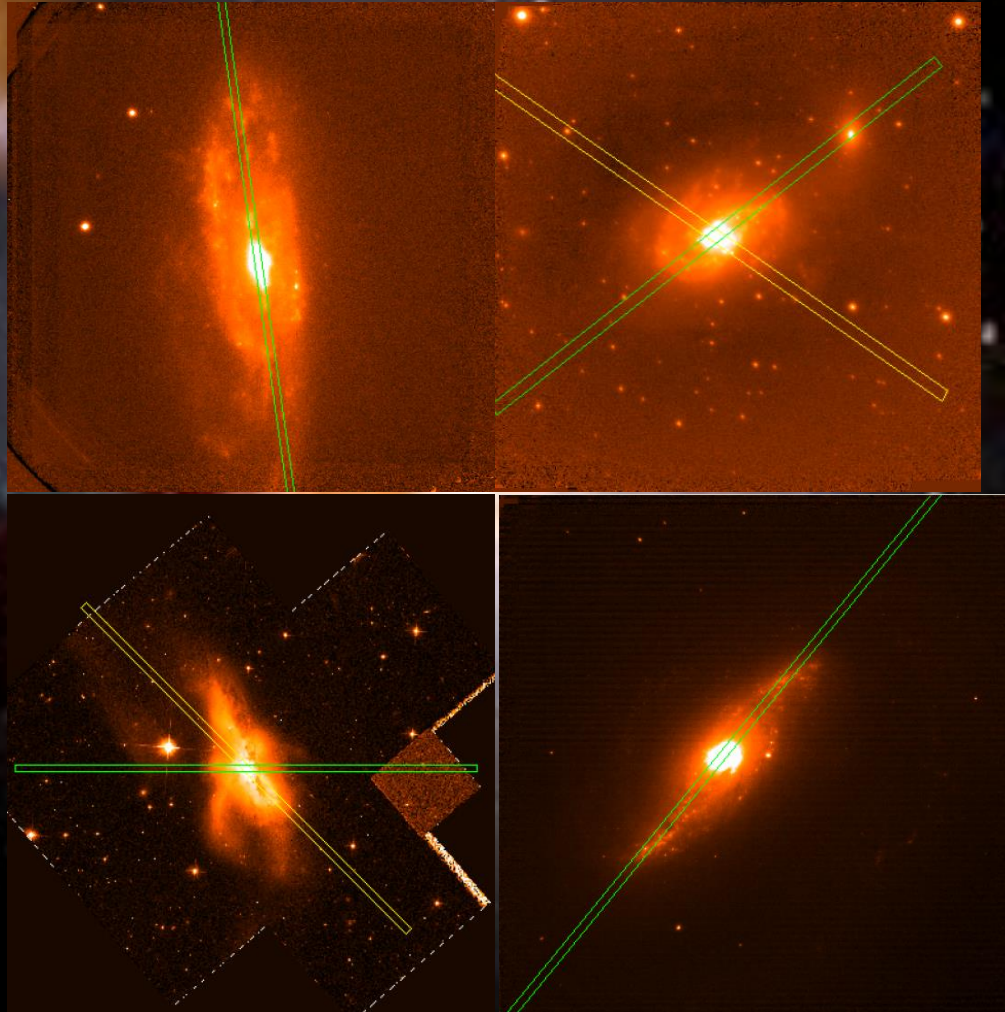
- Luminous Infrared Galaxies (LIRGS) and Ultraluminous Infrared Galaxies (ULIRGS)
- LIRGS: $10^{11}L_{\text{sol}} < \text{LIR} < 10^{12}L_{\text{sol}}$ Sanders & Mirabel (1996)
- ULIRGS: $10^{12}L_{\text{sol}} < \text{LIR} < 10^{13}L_{\text{sol}}$
- Gas Rich
- Most show signs of interaction or merger (higher fraction of mergers at higher luminosity)

SUNBIRD Kinematics Observations

- SUpErNovae and StarBursts and in the InfraReD
- SALT RSS Observations of starbursts, LIRGS, ULIRGS...
- 54 Targets
- 155 Observations
- PG900 : Stellar Populations
- PG1800, PG2300 : Kinematics

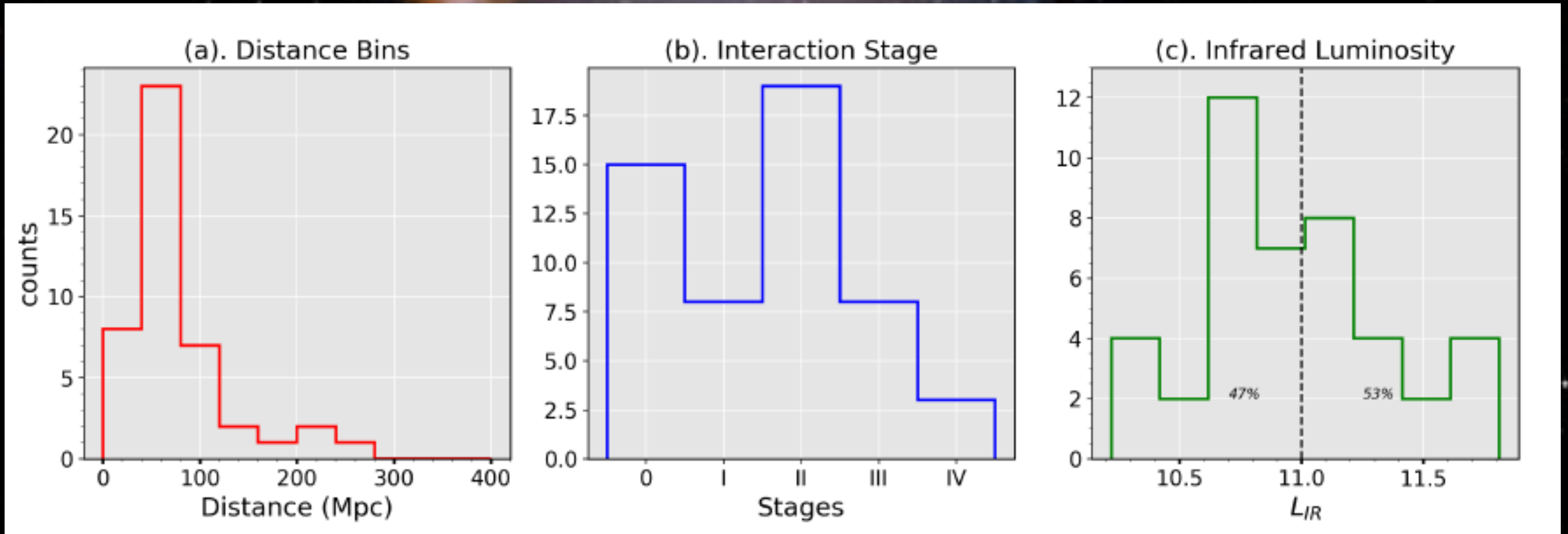


SUNBIRD SALT



Images: Tafere MSc Thesis

SUNBIRD Observations (SALT)



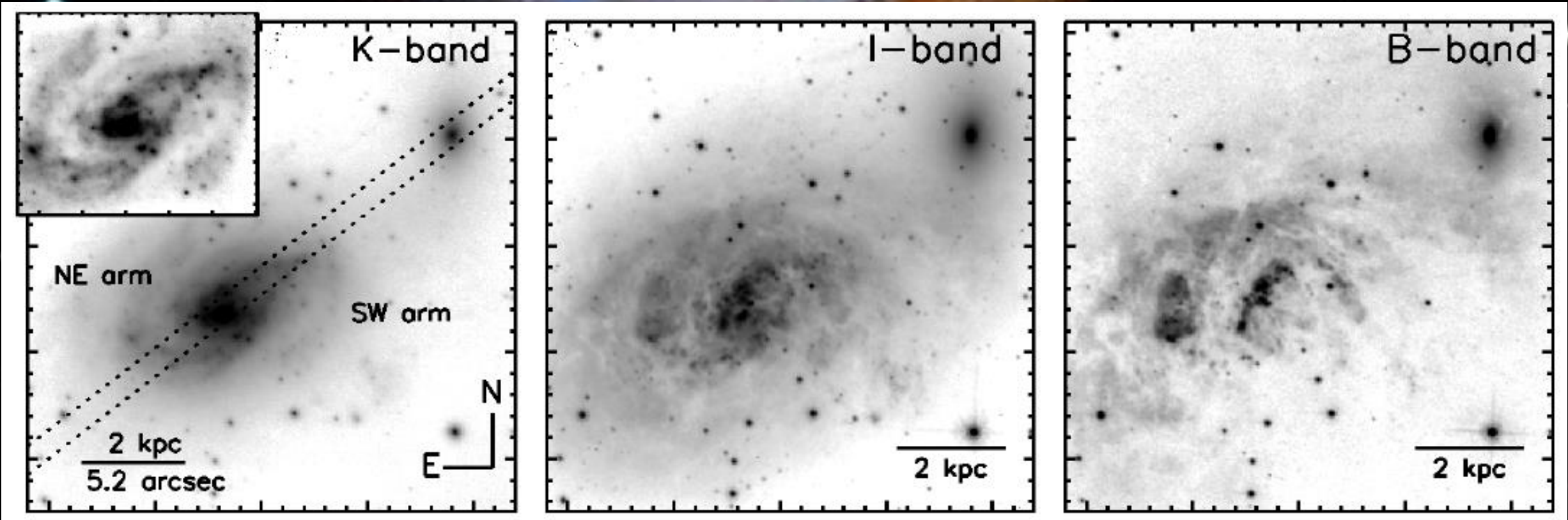
Rajin Ramphul PhD Thesis

IRAS18293-3413

- $D=75.7\text{Mpc}$

- Stellar Mass = $10^{10.63}\text{ Msol}$

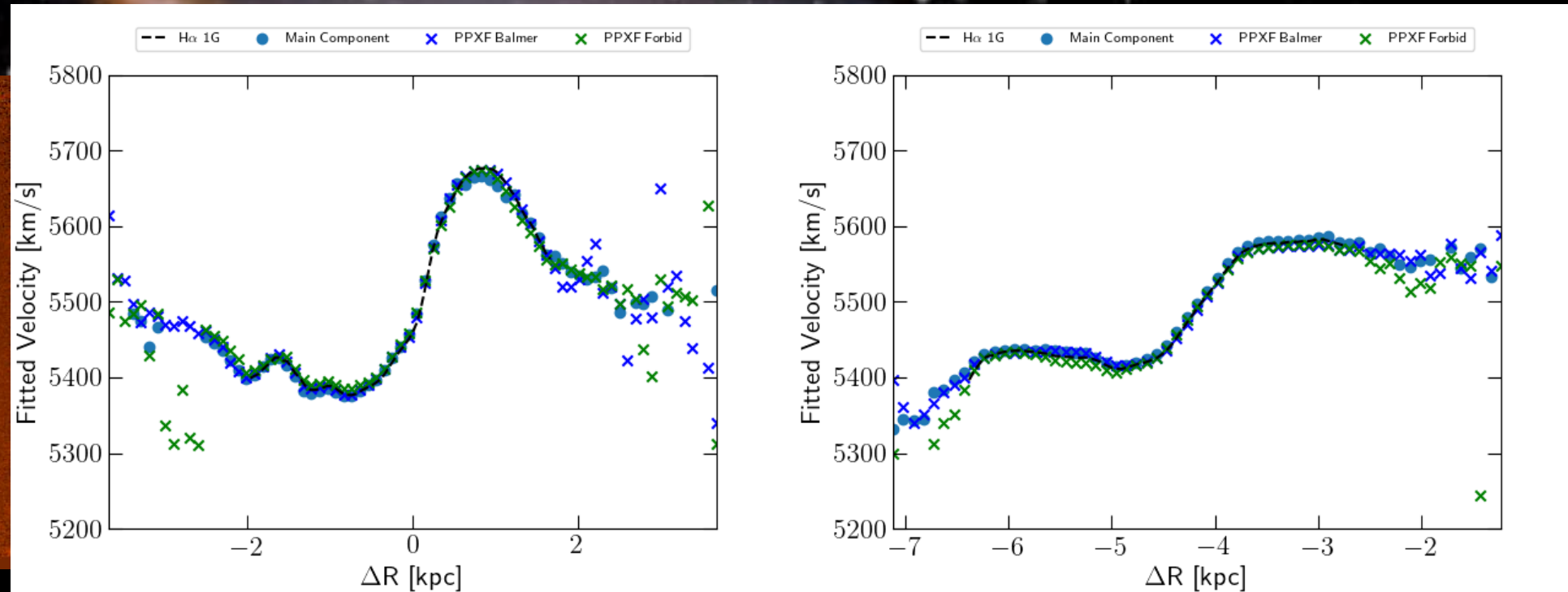
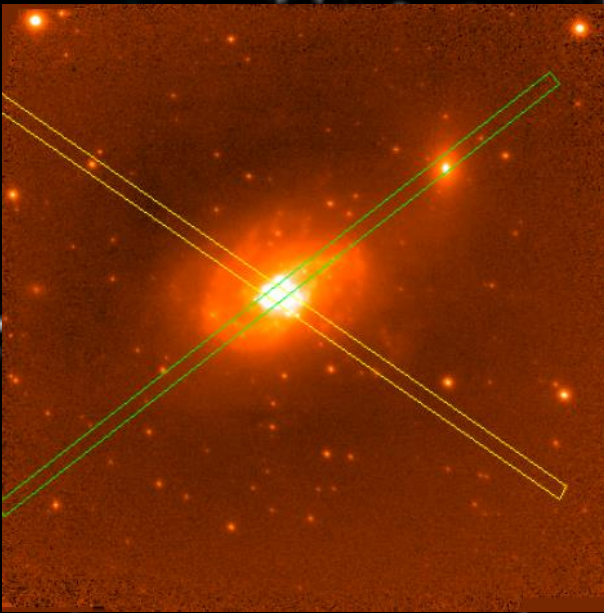
- $\text{SFR} = 10^{2.04}\text{ Msol/yr}$



IRAS18293-3413 SALT H α

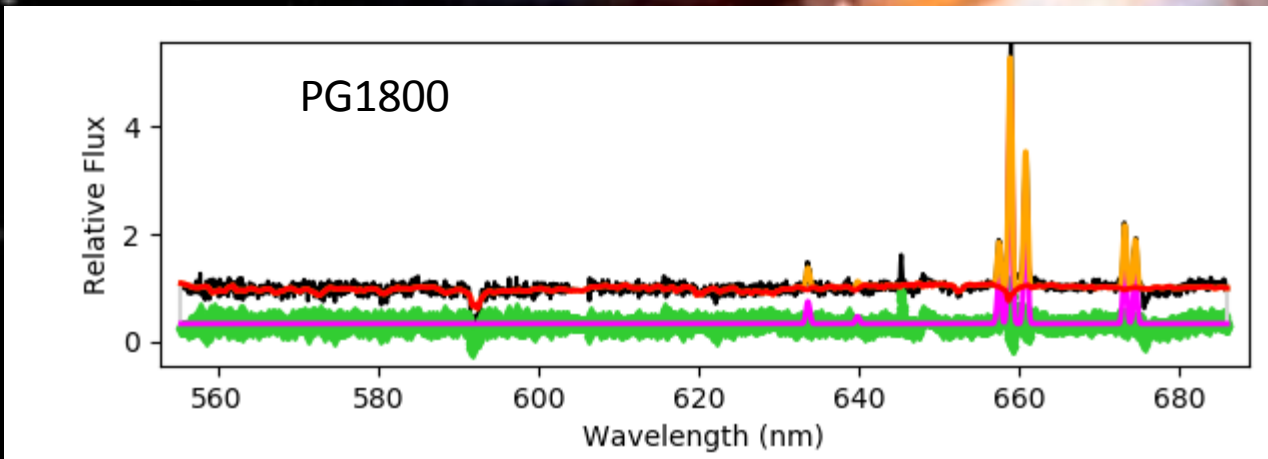
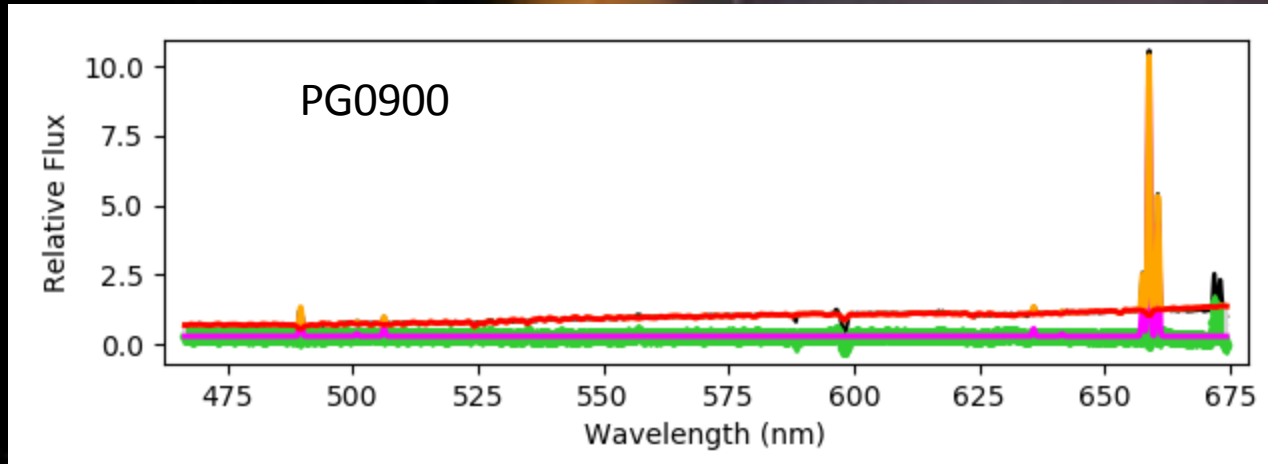
PA=128

PA=55



Mogotsi+ (in prep)

Spectral Line Modelling

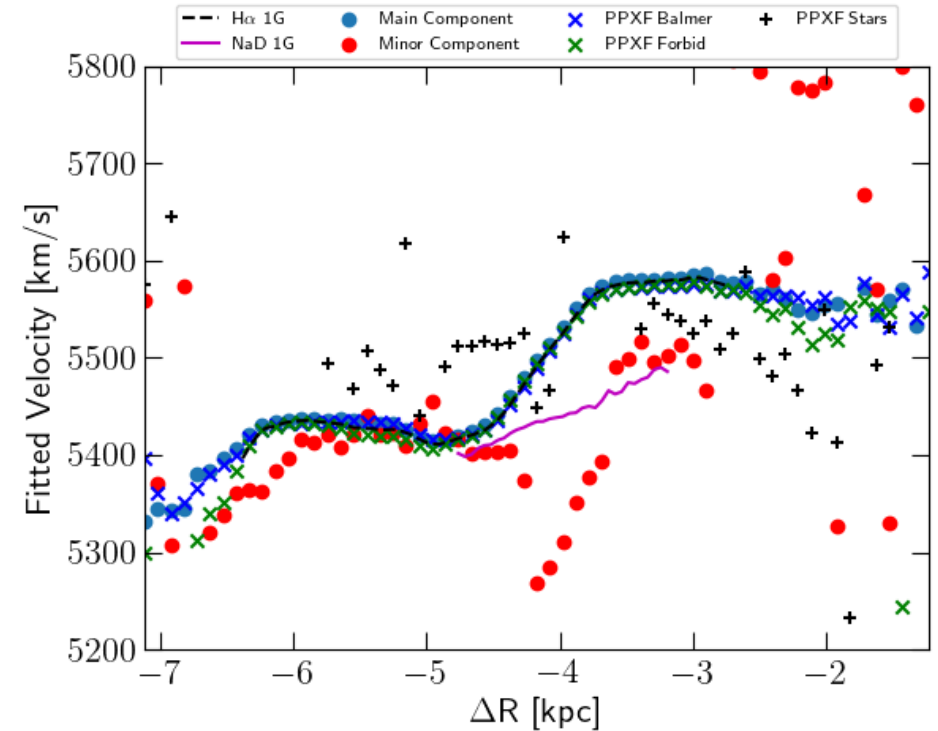
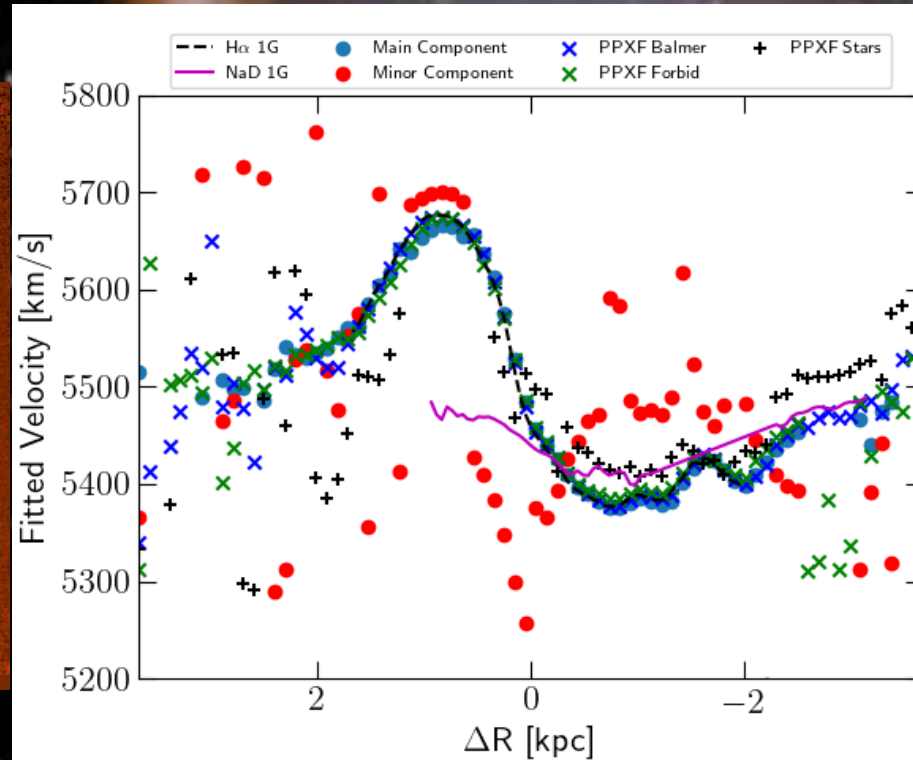
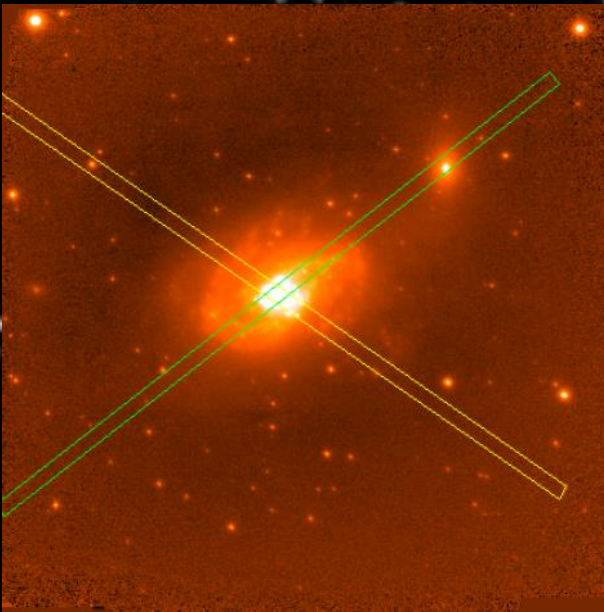


- Multiple Spectral Line
 - Ionized Gas
 - Neutral Gas
- Continuum Modelling
 - Stars (plus relevant lines)

IRAS18293-3413 SALT

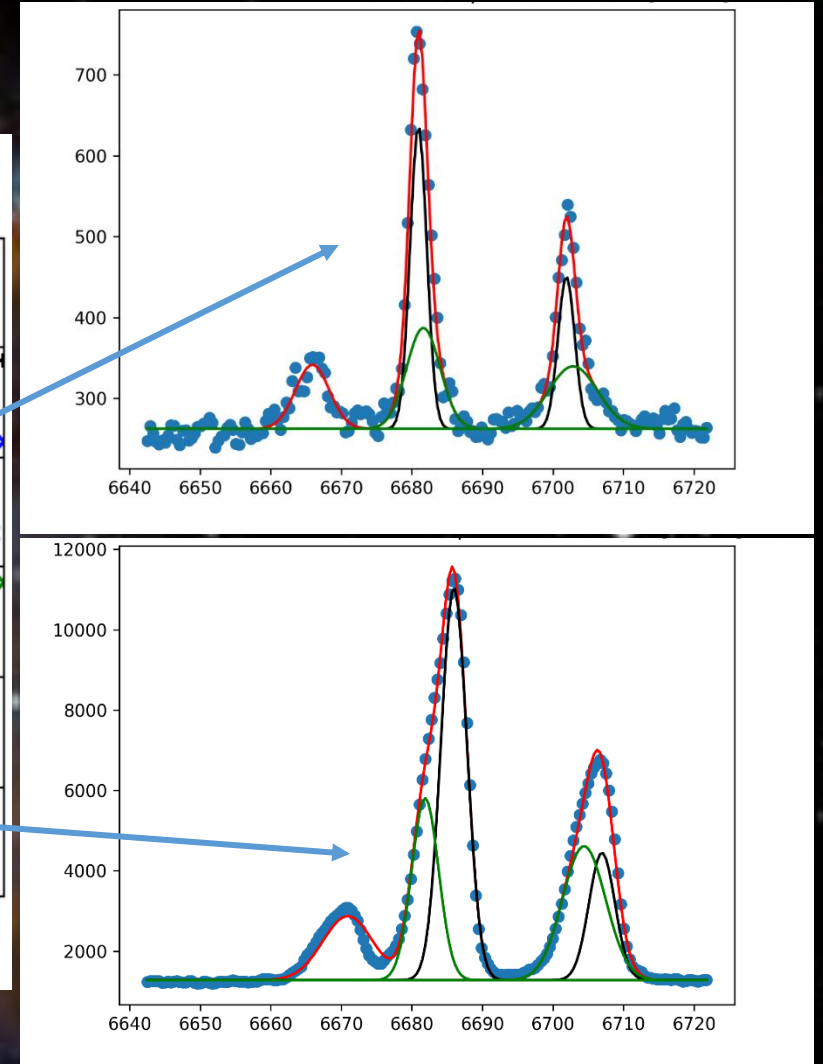
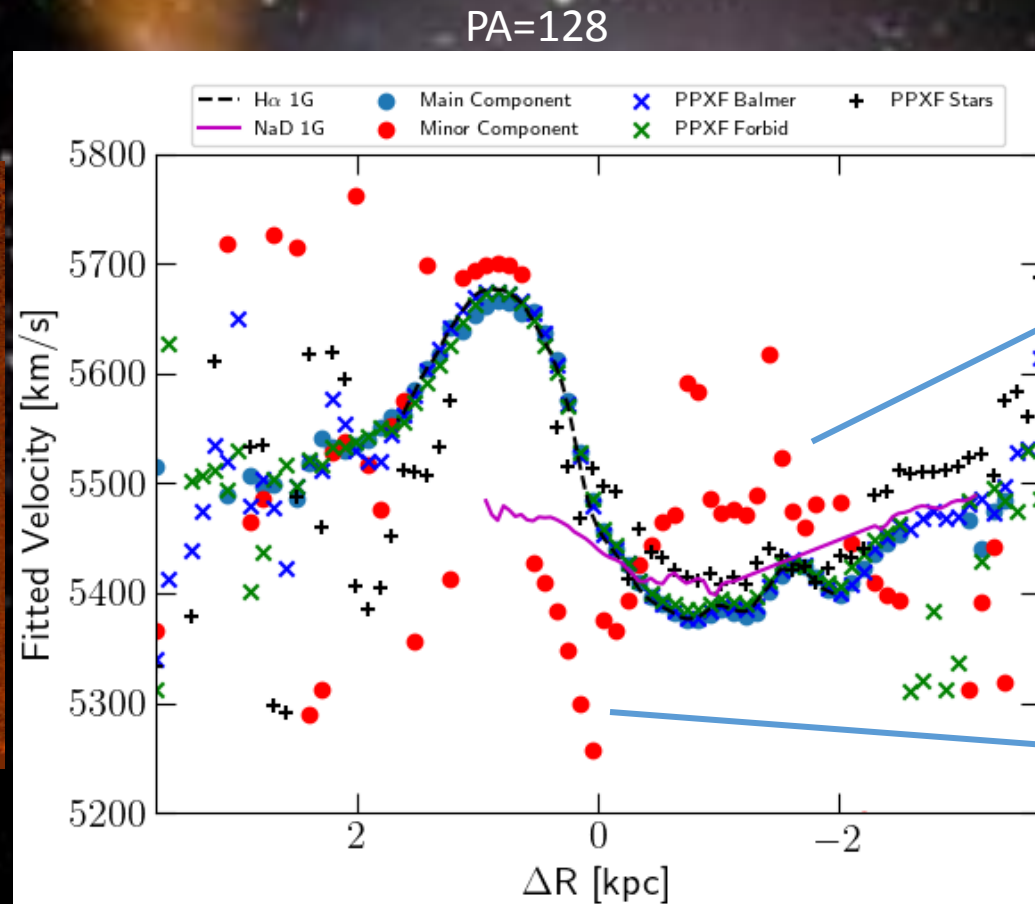
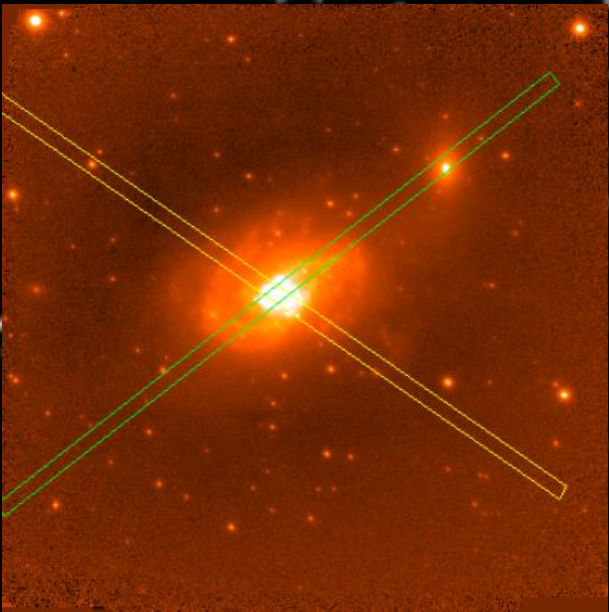
PA=128

PA=55



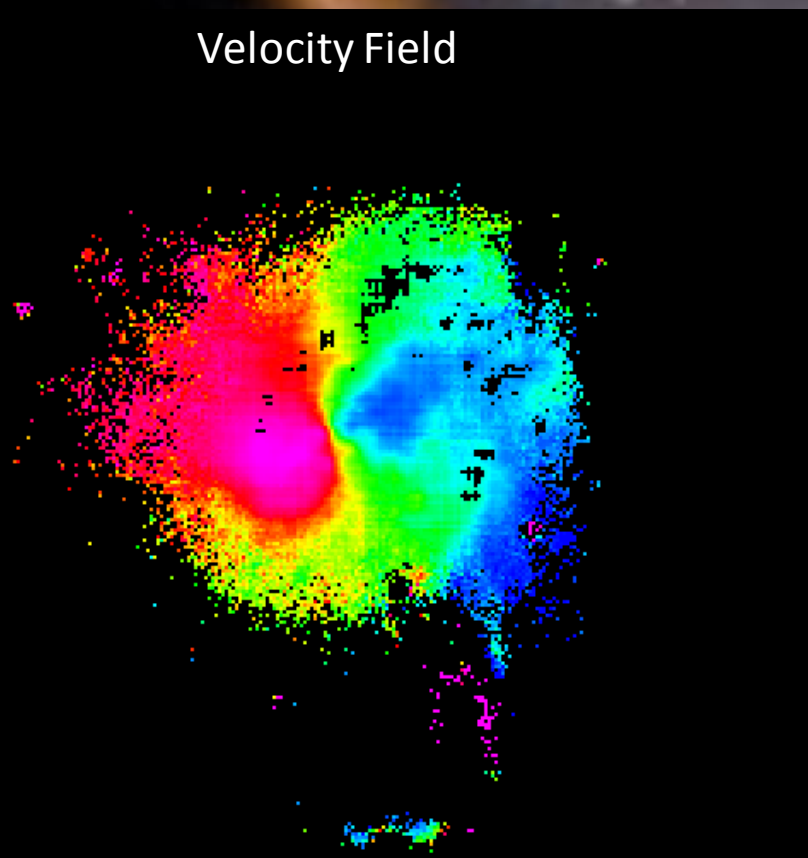
Mogotsi+ (in prep)

IRAS18293-3413 SALT

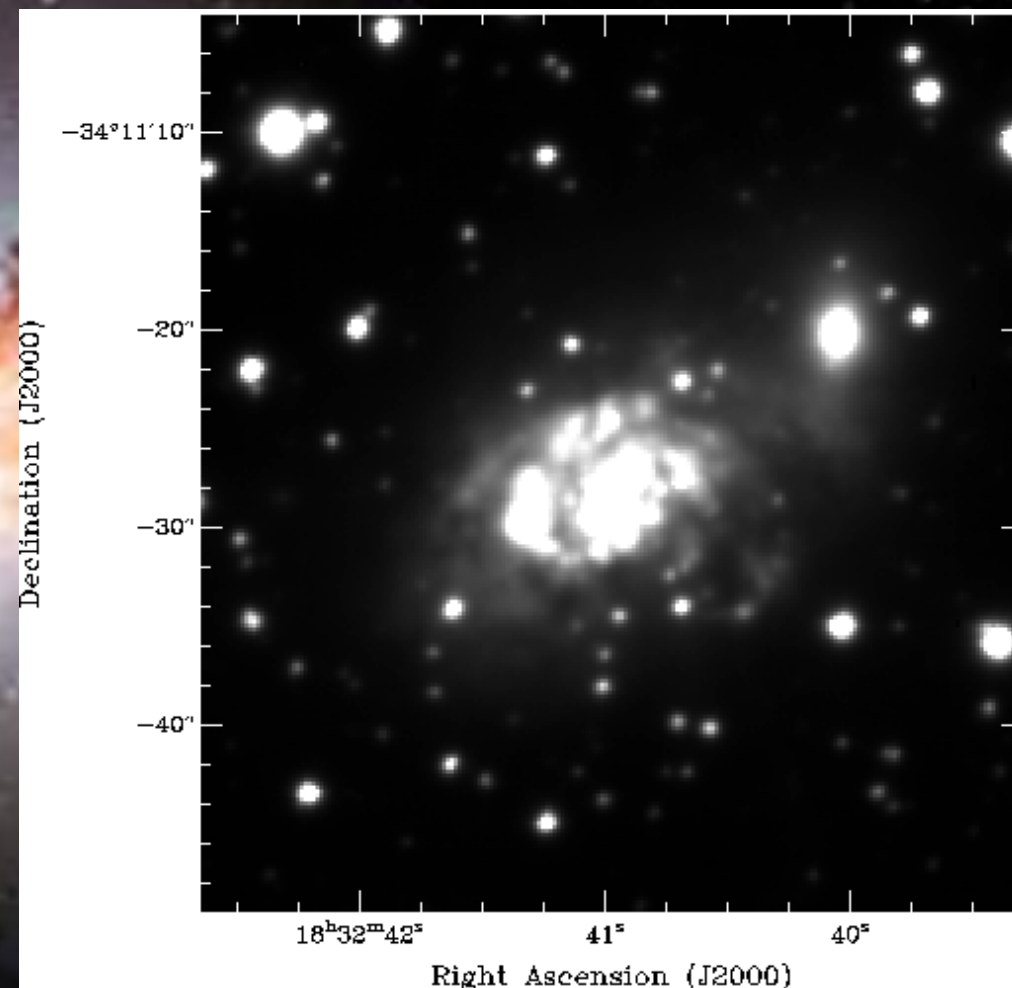


Mogotsi+ (in prep)

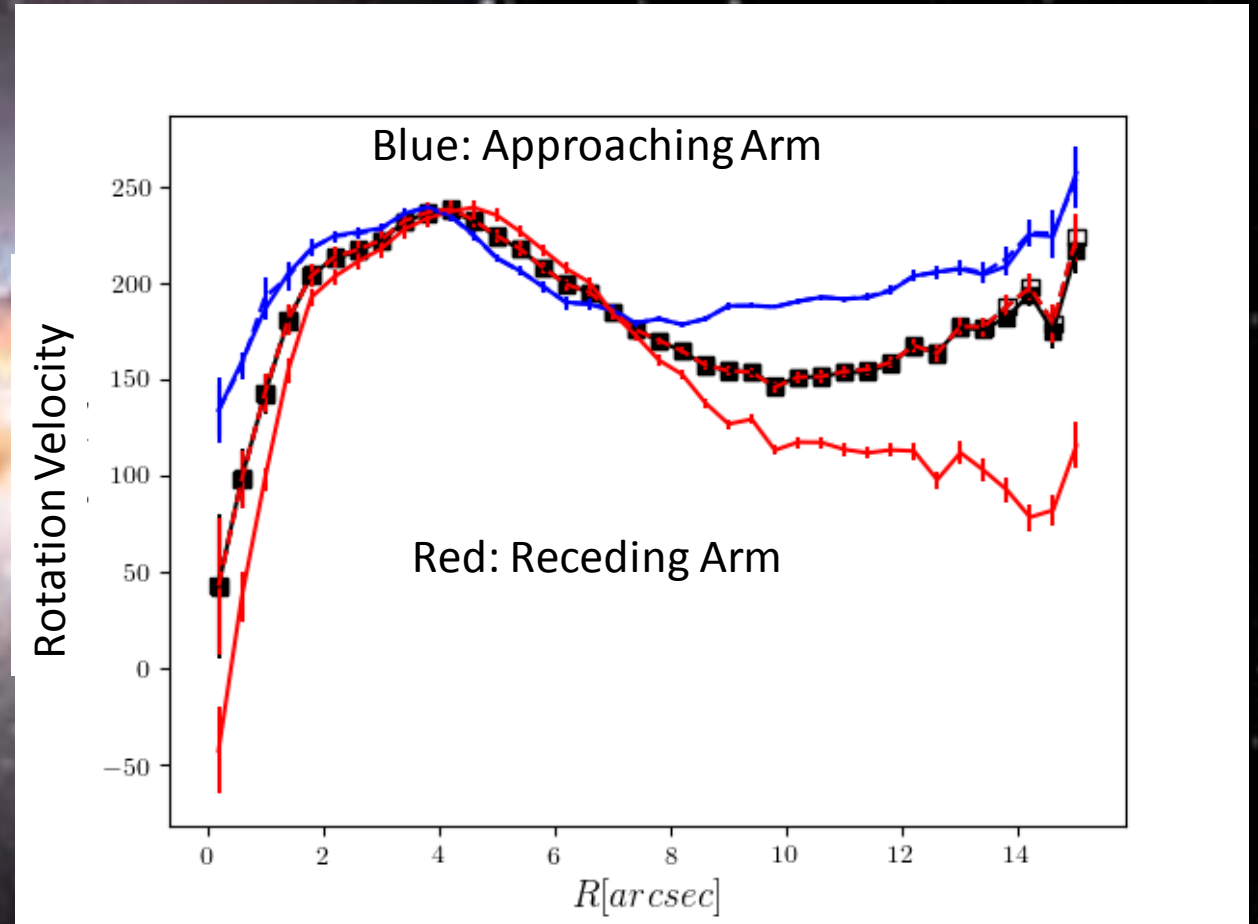
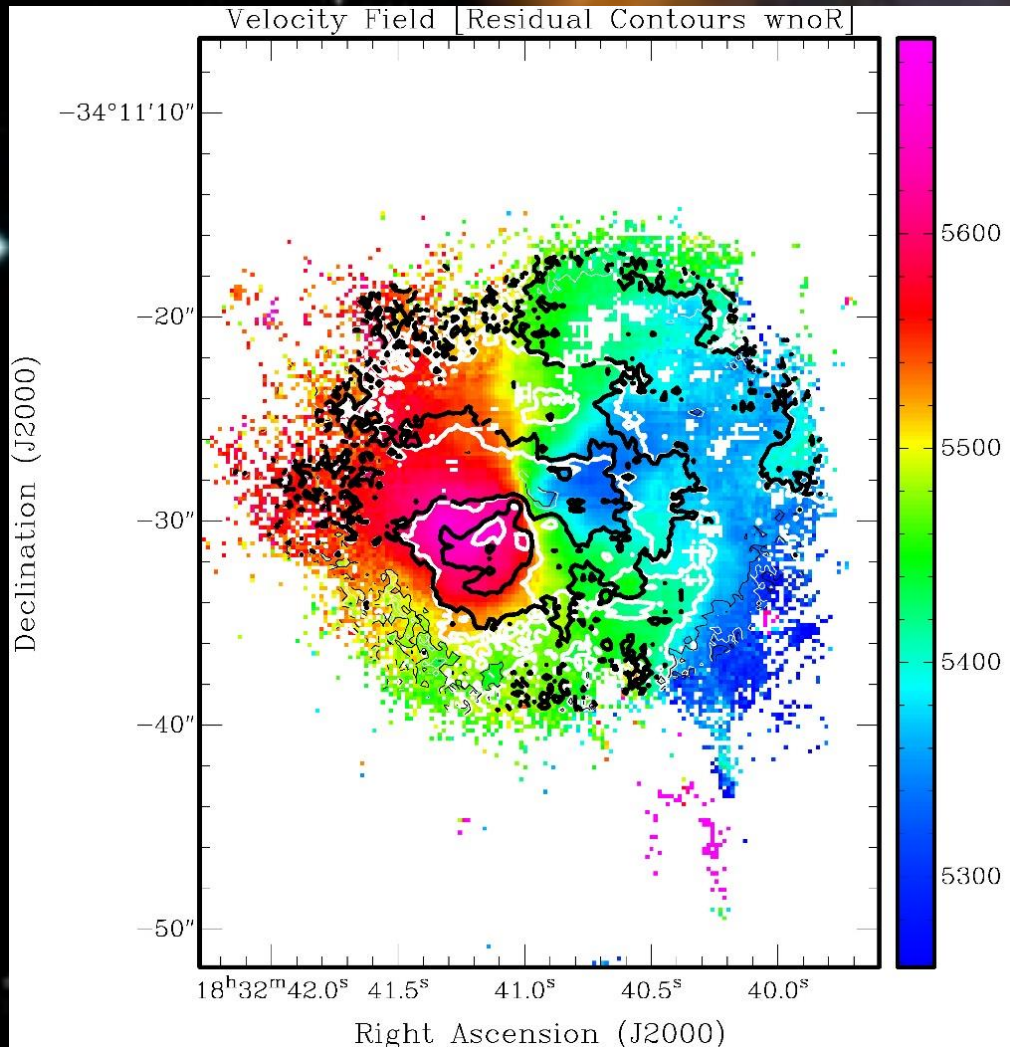
IRAS18293-3413 MUSE follow-up



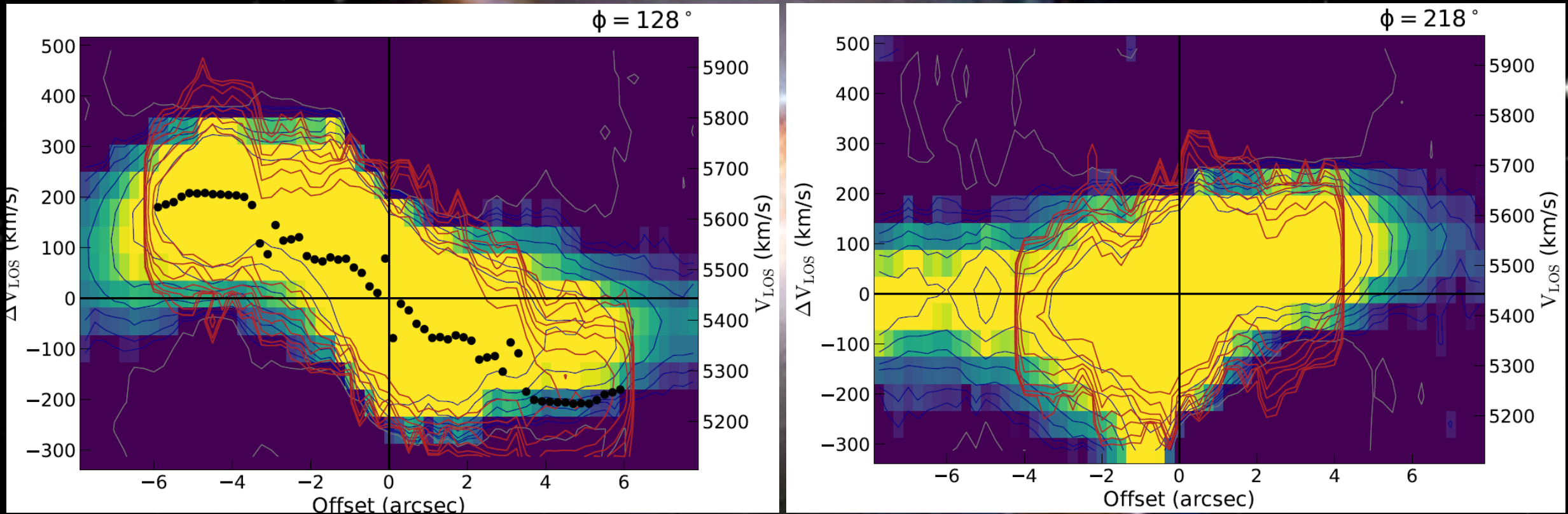
Mogotsi+ (in prep)



Modelling the Galaxy

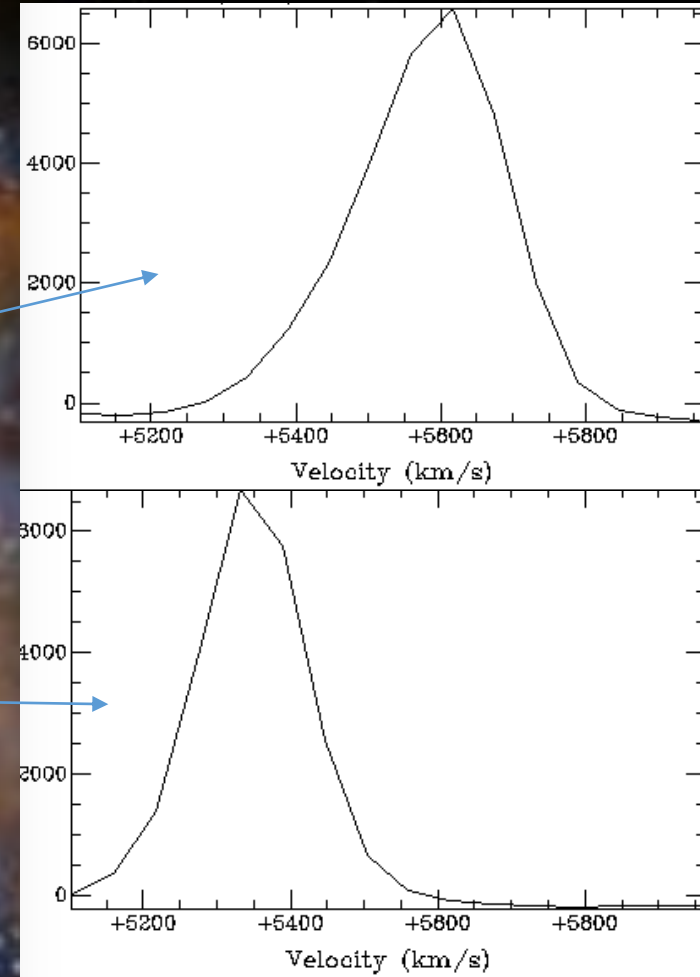
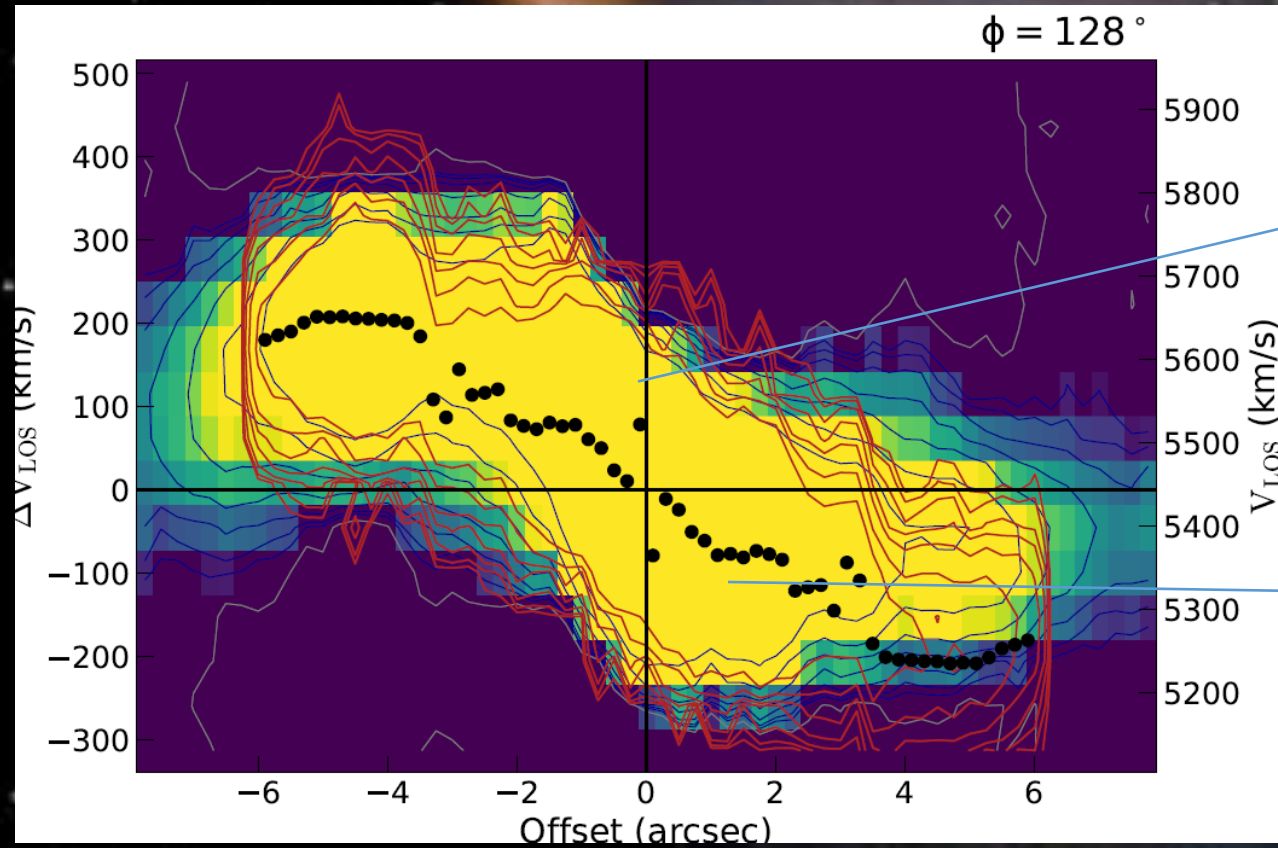


A closer look at the Data



Mogotsi+ (in prep)

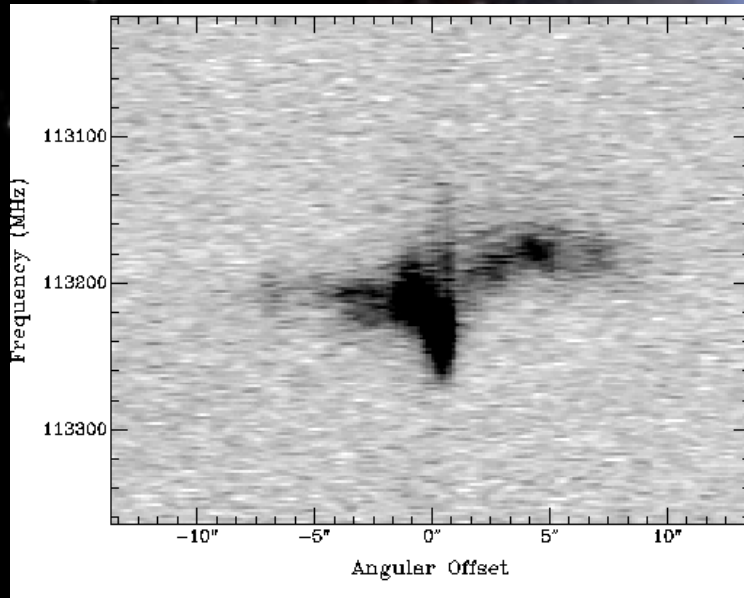
MUSE Profiles



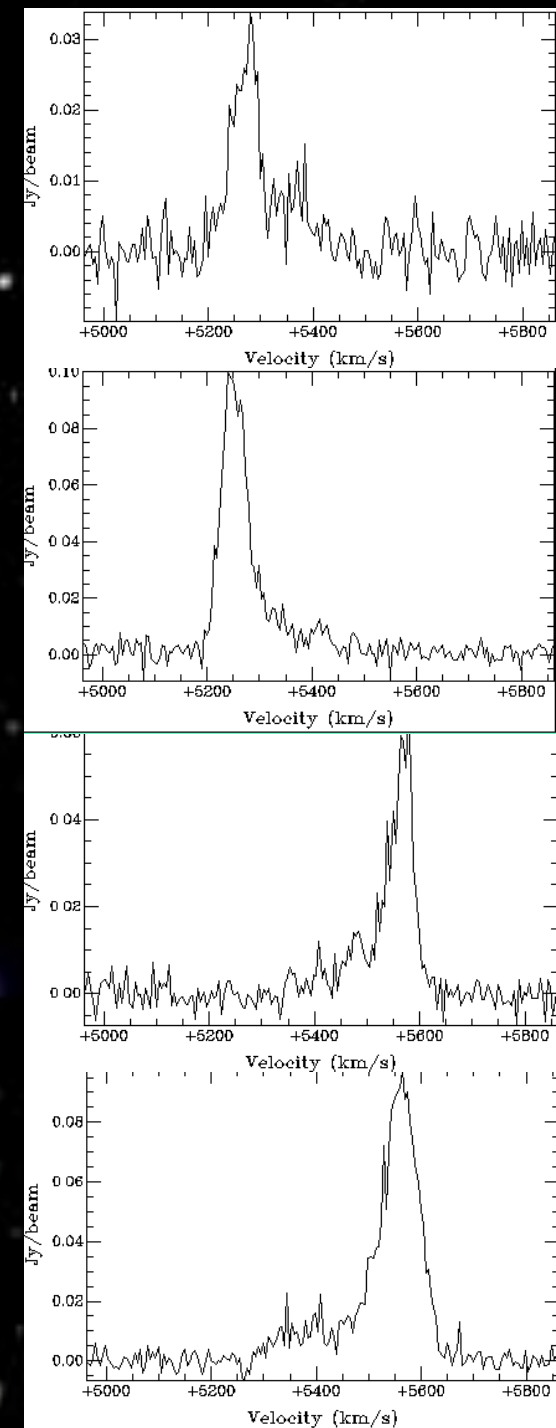
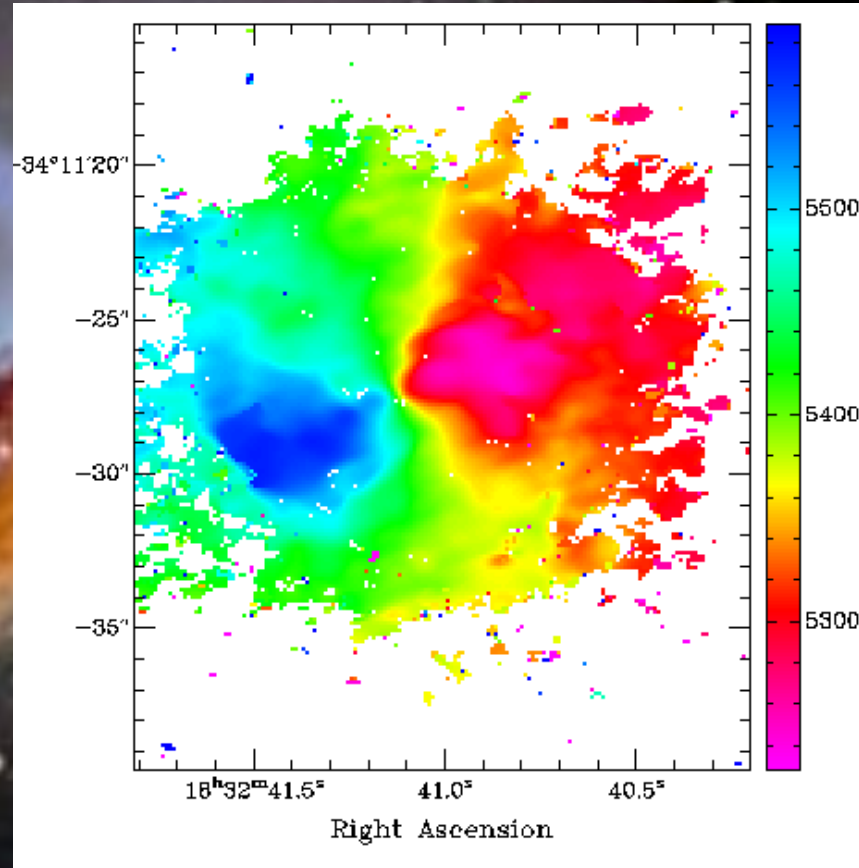
Mogotsi+ (in prep)

IRAS18293-3413 CO

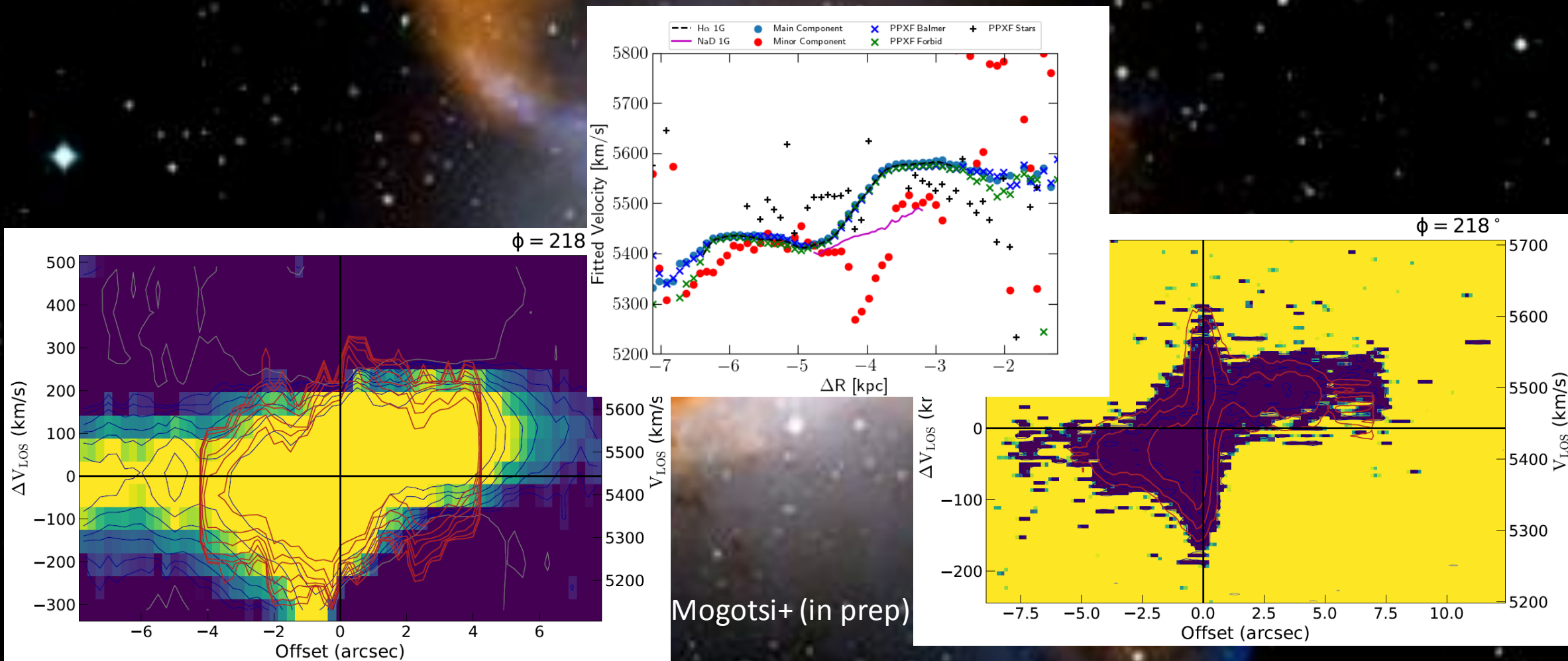
Minor Axis velocity excess



Mogotsi+ (in prep)

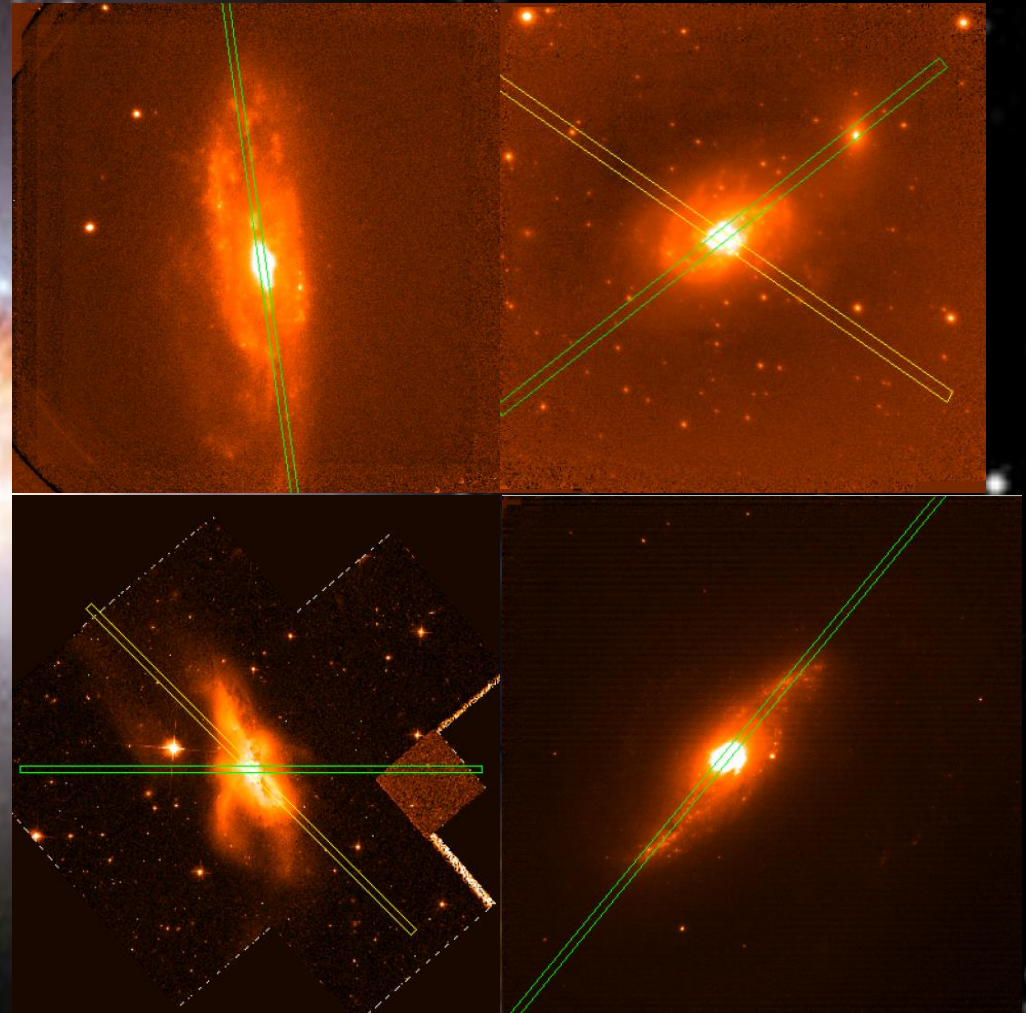


Minor Axis excess

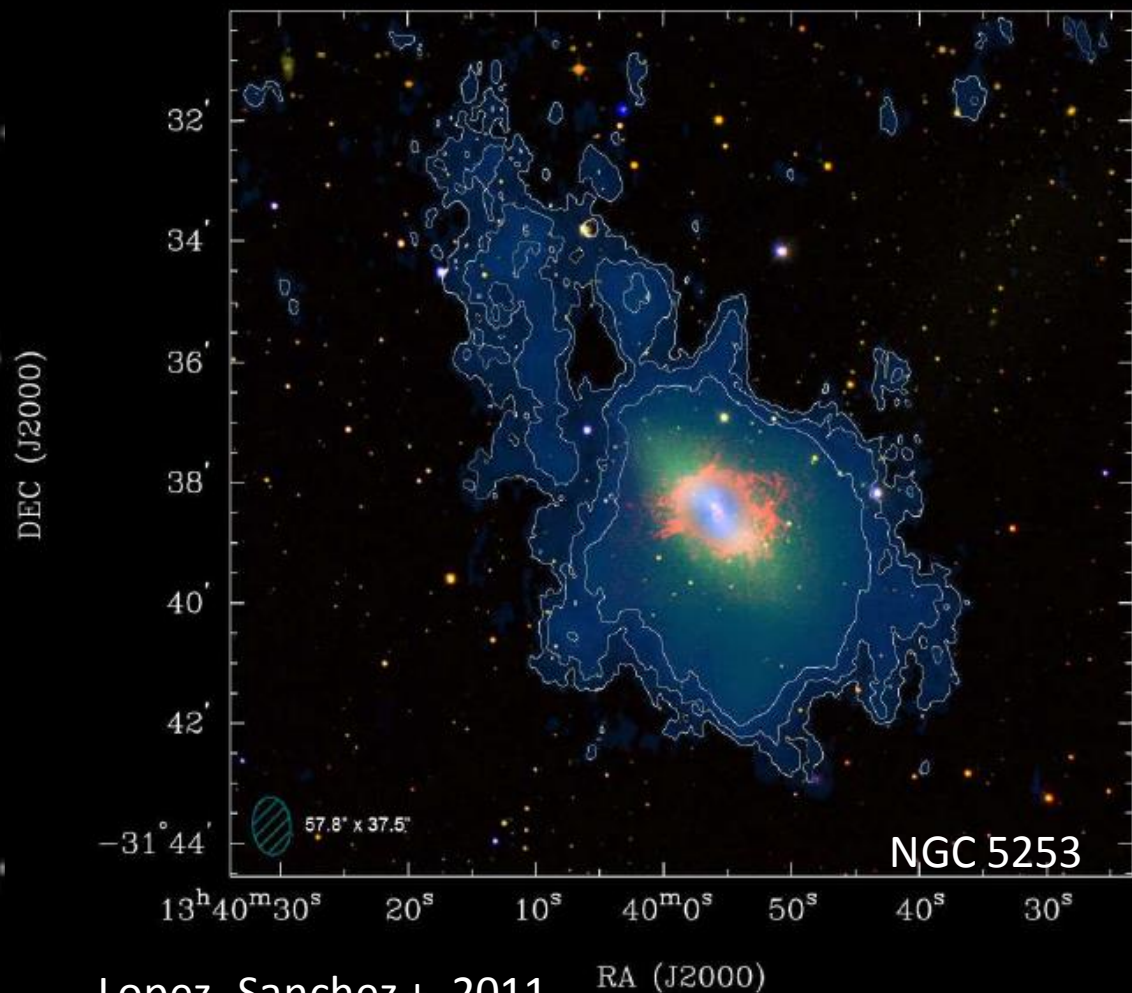


In Progress

- Analysis and modeling of the multi-component kinematics
- Full sample analysis
- Planning MUSE, ALMA and MeerKAT follow-up



Future: Accretion versus Outflow

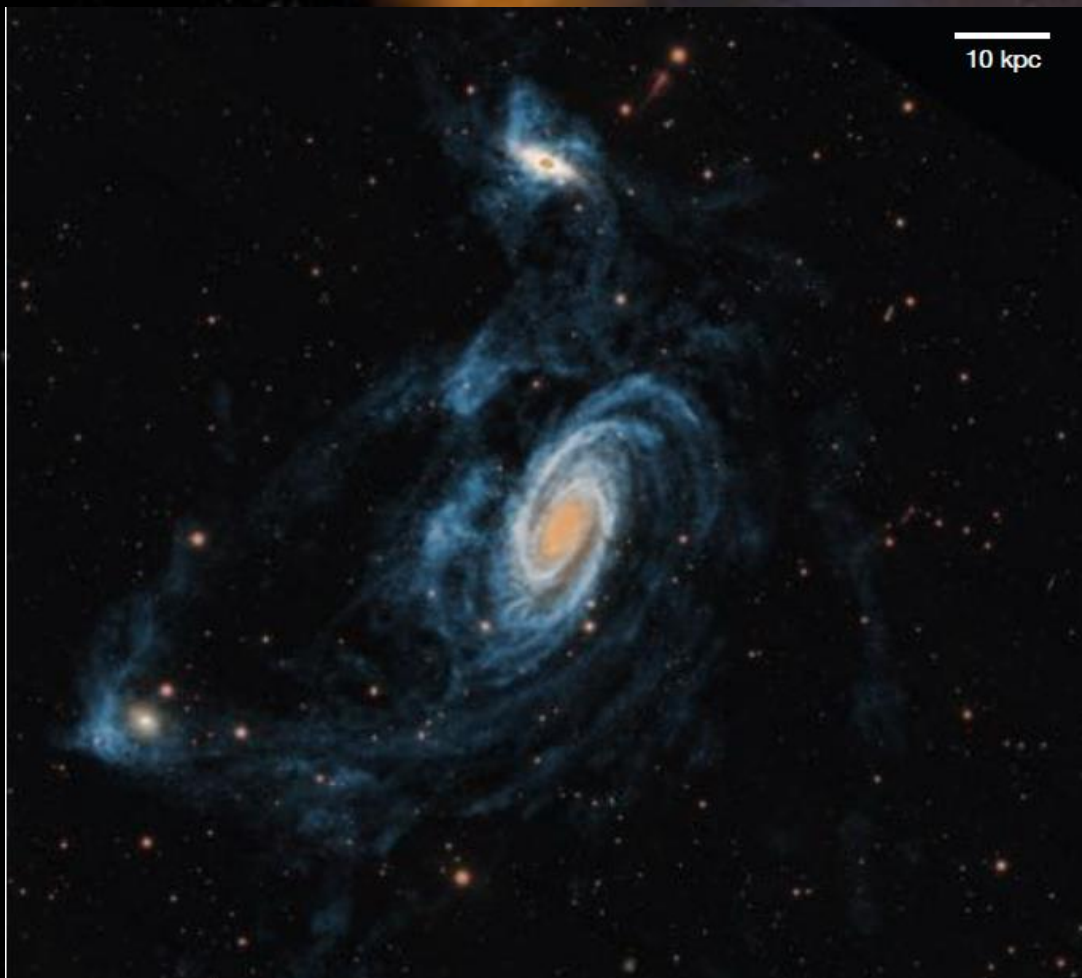


Lopez- Sanchez + 2011



MeerKAT

Multiwavelength Future... environments



de Blok+ 2018



Smith, Gallagher, & Westmoquette





Extras...

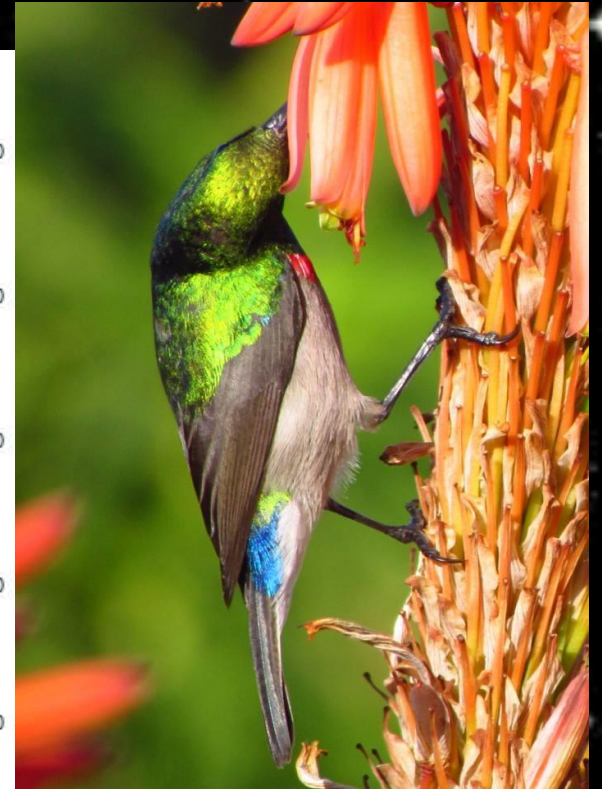
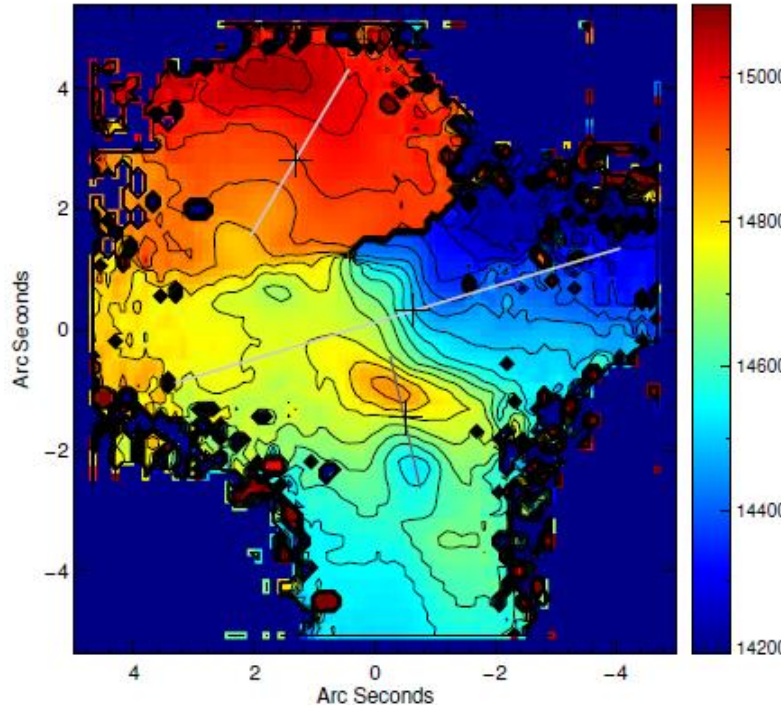
IRAS19115-2124 (aka The Bird)

- D=200 Mpc
- SFR $\sim 190 M_{\odot}/\text{yr}$



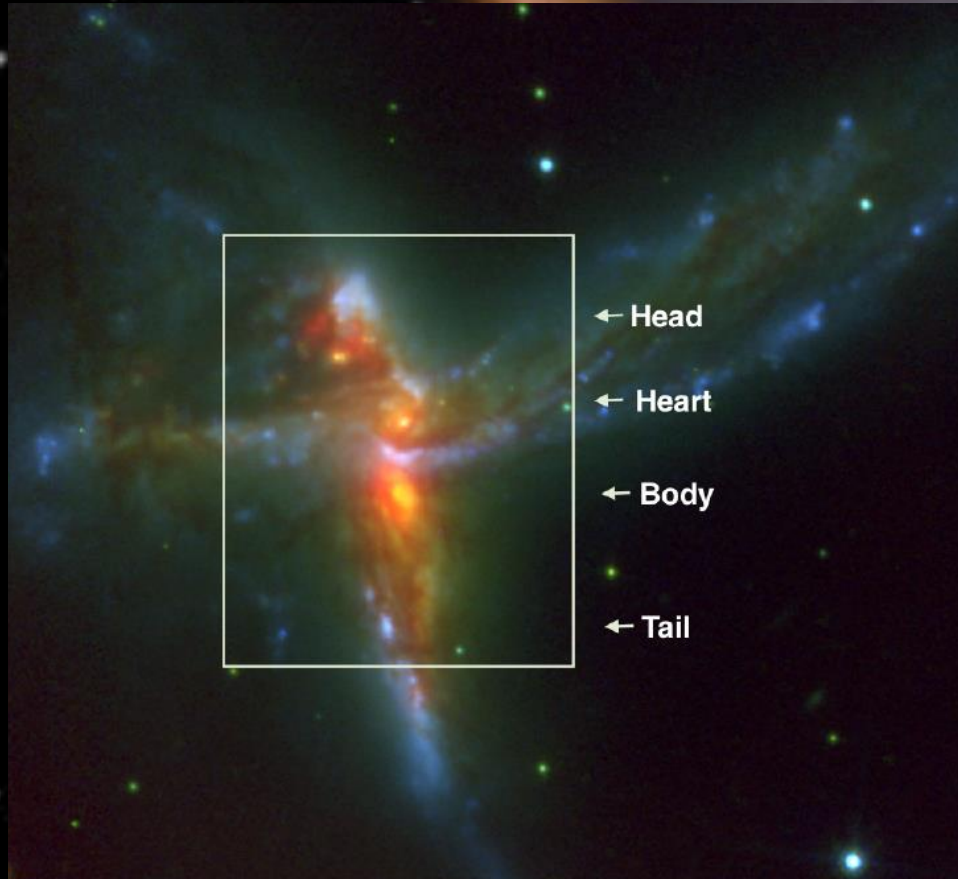
← Head
← Heart
← Body
← Tail

Vaisanen+ 2017

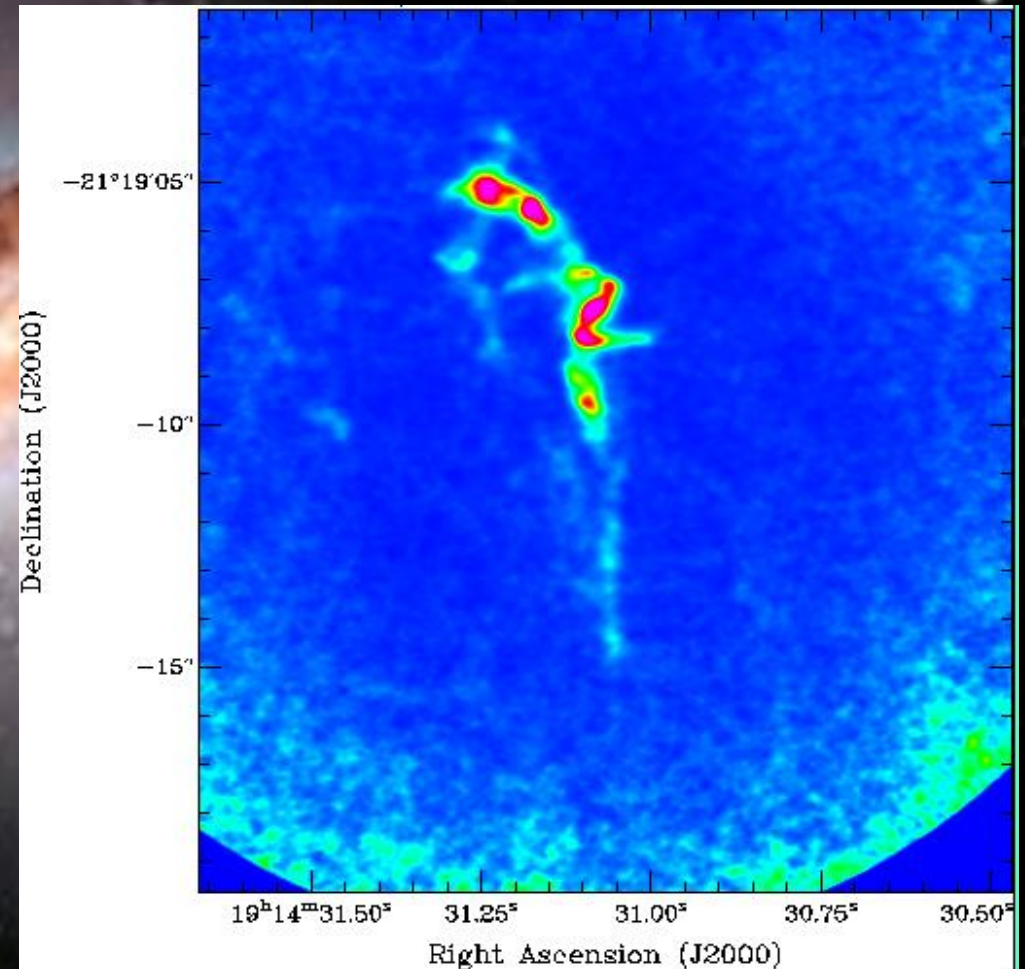


H2 1-0 (S1)

The Bird: CO (J=3-2)

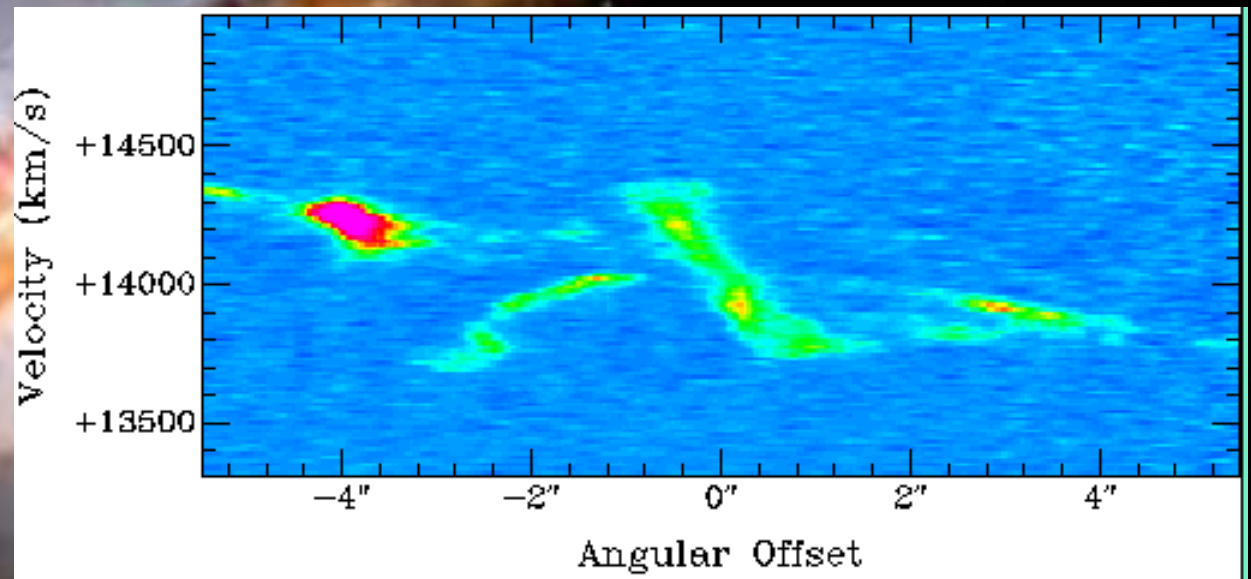
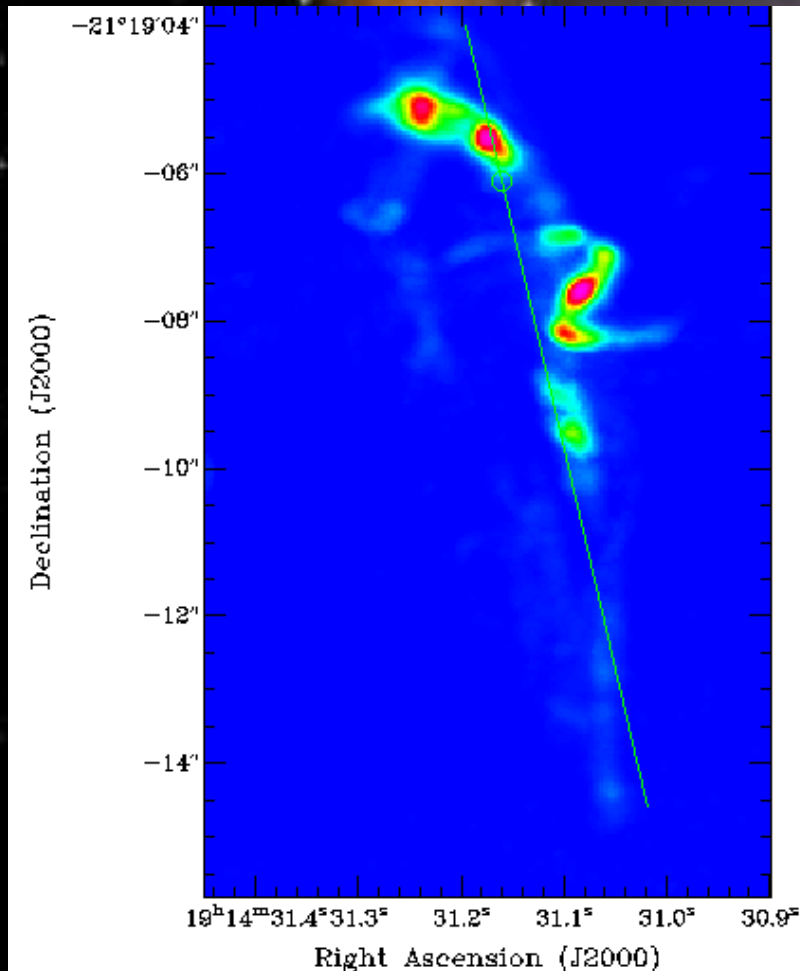


K-Band + HST I & B Bands



ALMA CO (J=3-2)

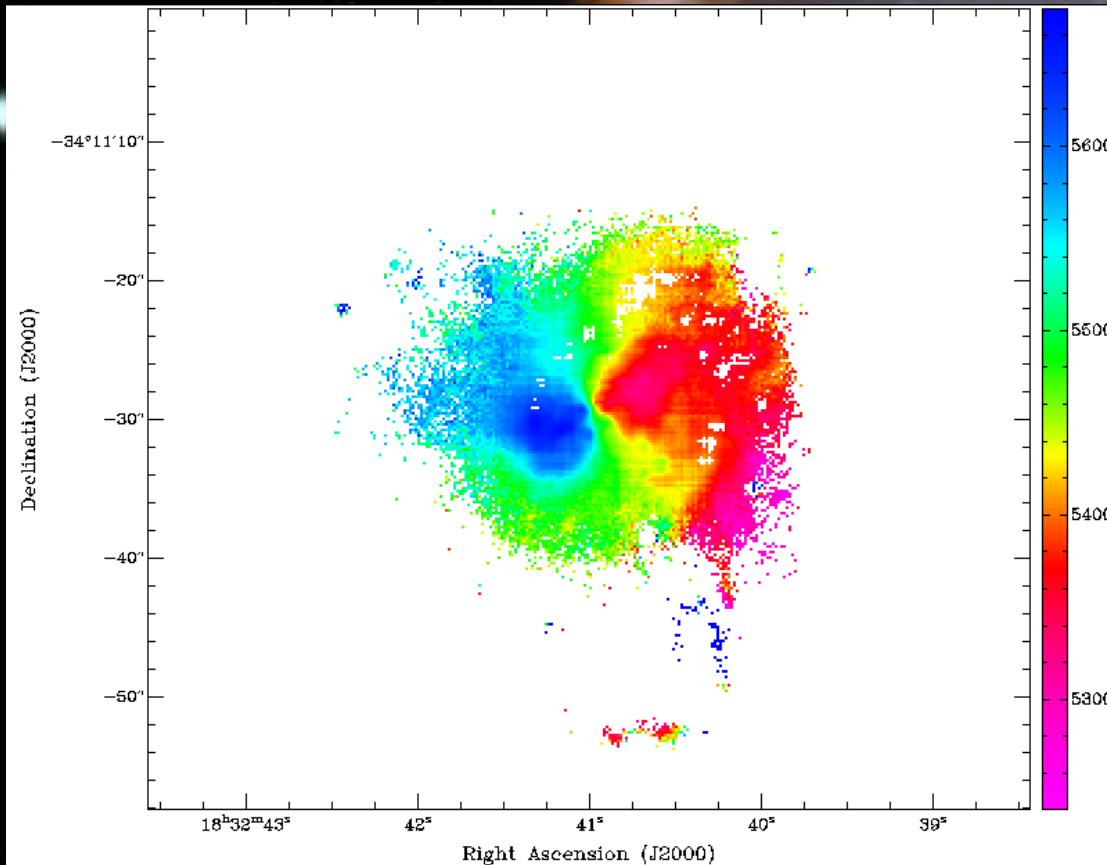
The Bird: CO (J=3-2)



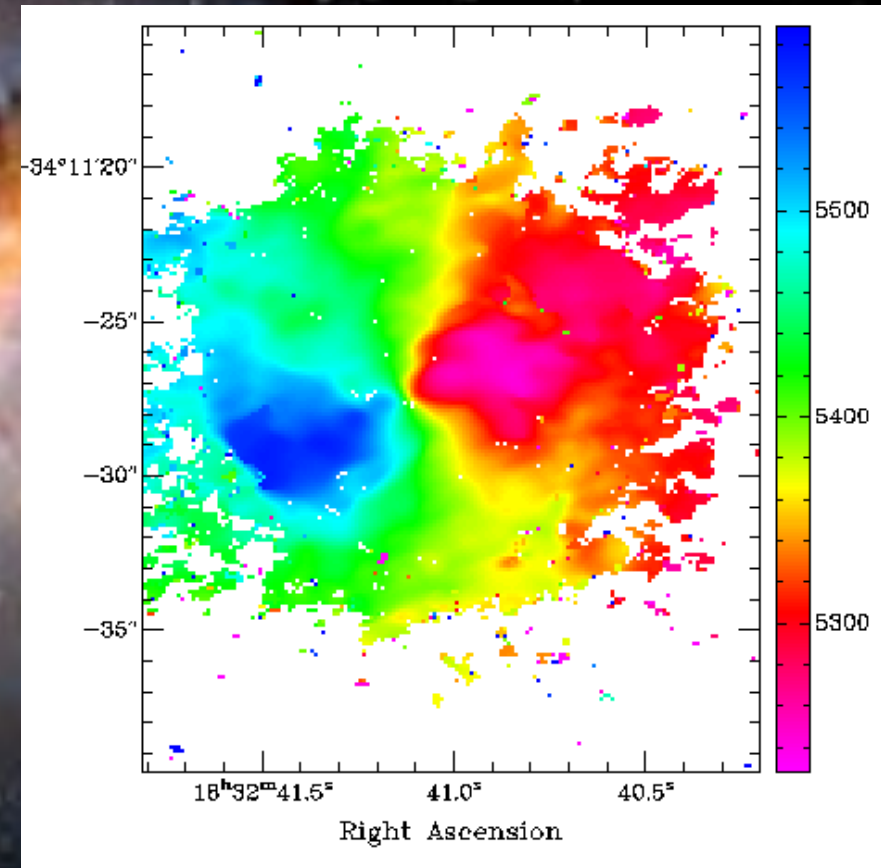


IRAS18293-3413 MUSE + ALMA

MUSE H α Velocity Field



ALMA CO(J=1-0) Velocity Field

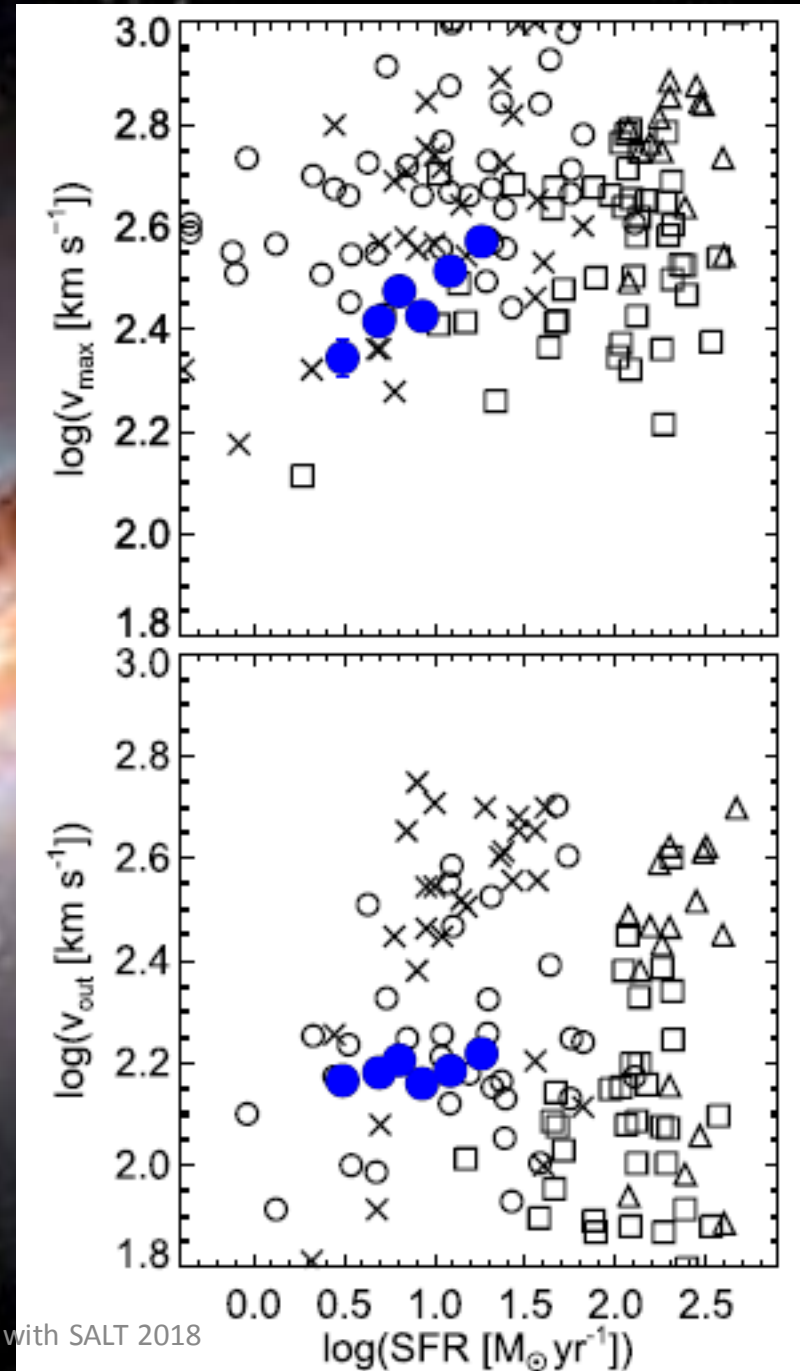


Outflow Measurements

- Maximum Outflow Velocity :
Max velocity at 90% of flux
 - Correlation
- Bulk Outflow Velocity : Mean
velocity of outflow component
 - No Correlation

Sugahara+ 2017

Moses Mogotsi - Advances with SALT 2018



IRAS18293-3413

