Comparison of HI and CO Dynamics of THINGS Galaxies

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Introduction

- THINGS
  - High resolution HI survey of 34 nearby galaxies
  - VLA B,C & D arrays
- HERACLES: HEterodyne Receiver Array CO Line Extragalactic Survey
  - Atlas of CO emission for 18 THINGS galaxies
  - HERA multipixel receiver on the IRAM 30m telescope
  - High spatial and velocity resolution

This Talk...

- Preliminary Comparison of THINGS & Heracles dynamics for NGC0925, NGC2976, NGC2403, NGC2903, NGC5055

- Used 13” Heracles beta cubes to construct Hermite h_3 and IWM velocity fields

- Derived CO rotation curve for from scratch

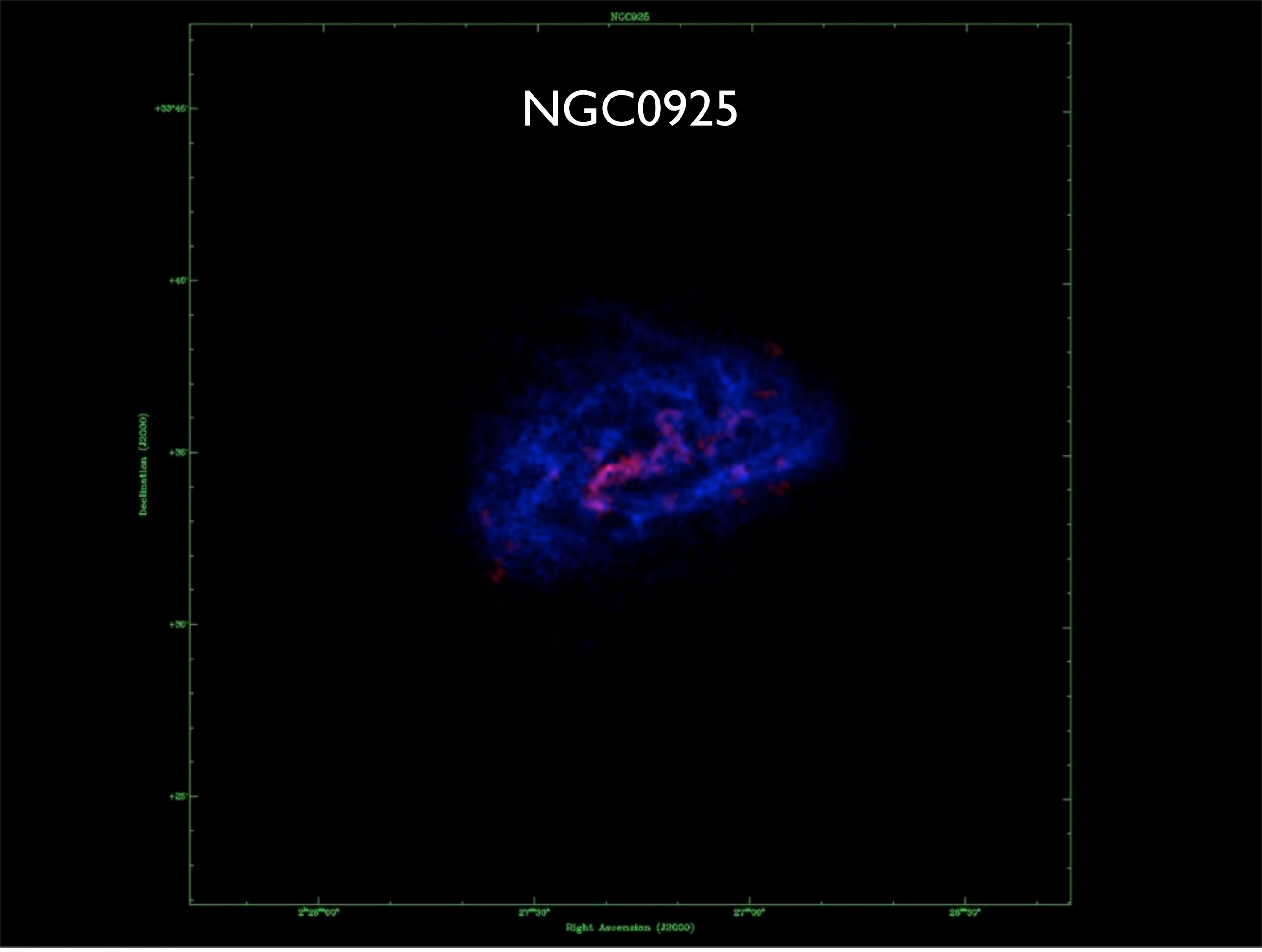
- Extracted major axis position-velocity diagram

For each galaxy you will see...

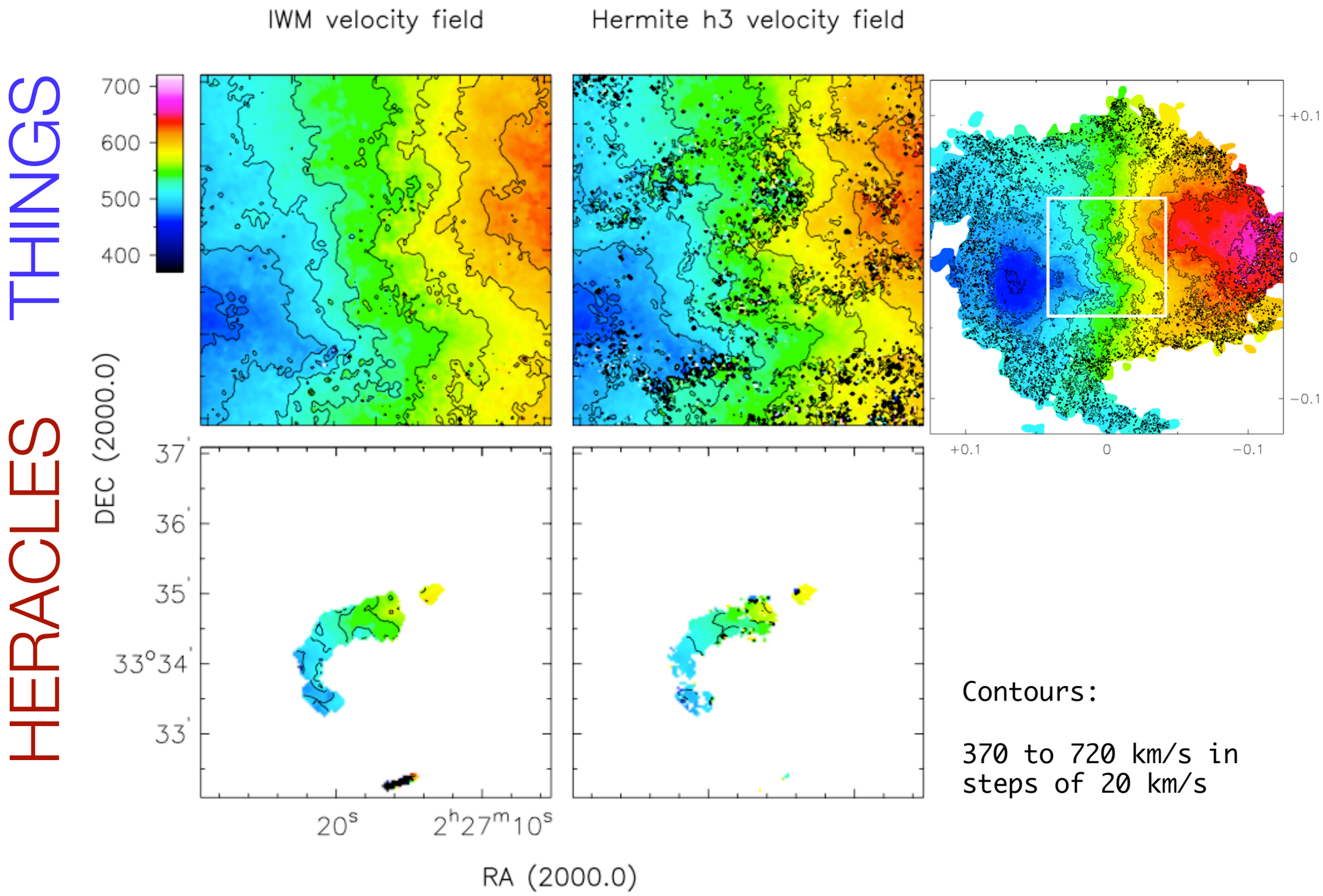
For each galaxy you will see pretty pictures

- Velocity fields
    - Comparison between IWM and her3 Velocity Fields
- Position-velocity diagrams across major axes
    - Comparing the HI and CO distributions
- Rotation curves

NGC0925


NGC925
+33°45'
+40'
+35'
+30'
+25'
Declination (J2000)
2h28m00s
27m30s
27m00s
26m30s
Right Ascension (J2000)

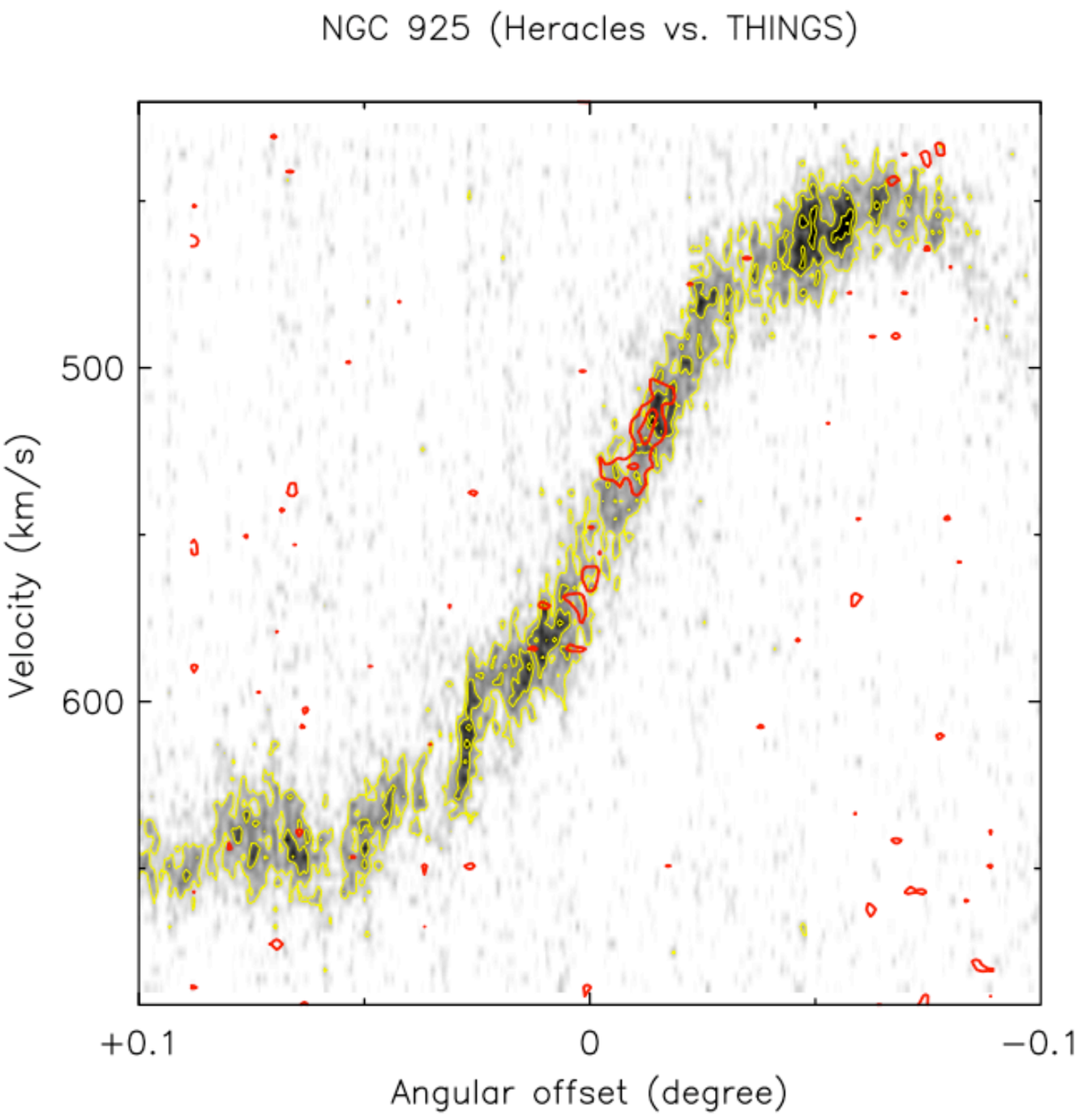
NGC0925 Velocity Fields



Contours:

370 to 720 km/s in steps of 20 km/s

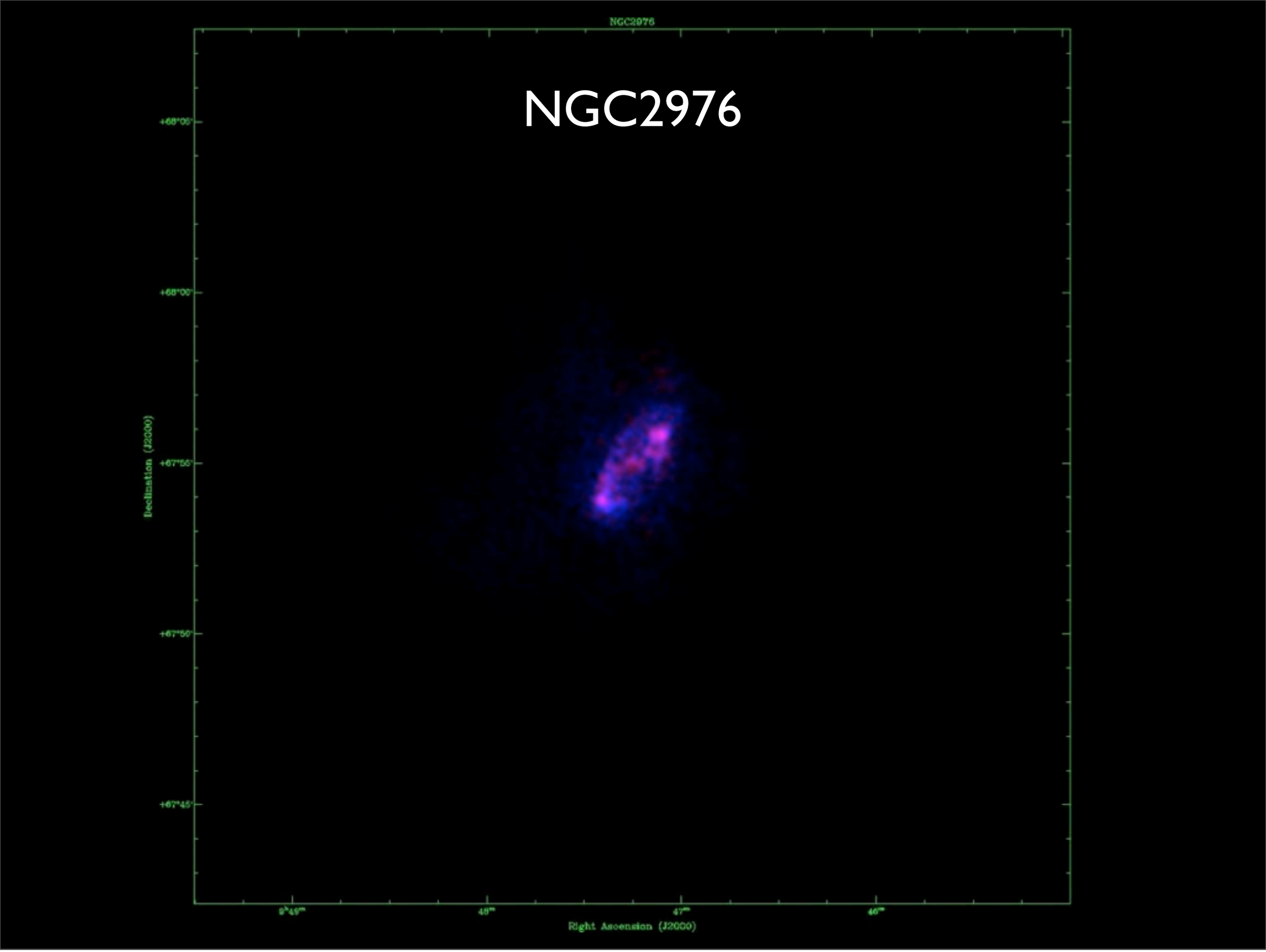
NGC0925 Position Velocity



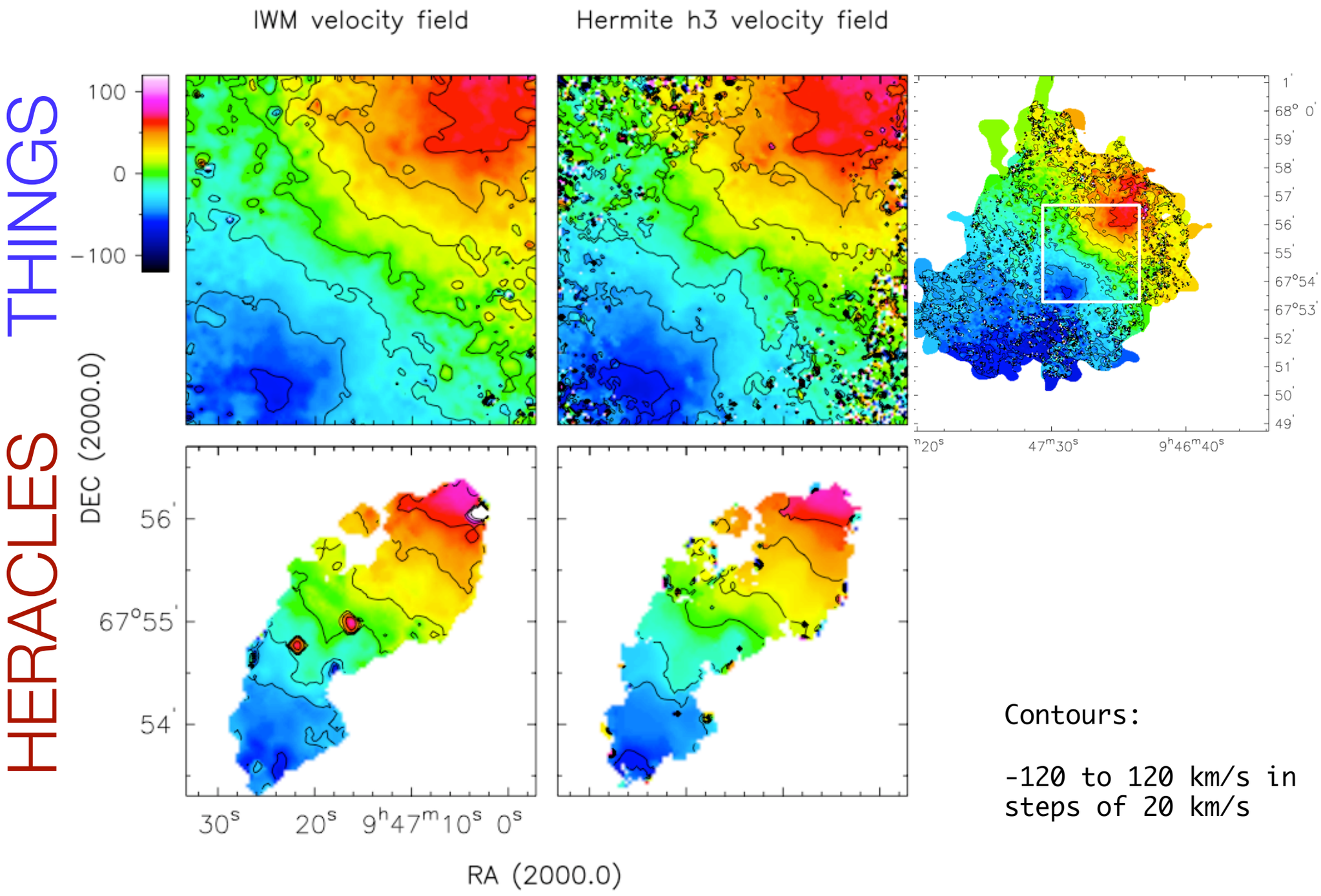
HERACLES

THINGS

contours start
from +3σ
in steps of
+3σ


NGC2976
NGC2976
+68°05'
+68°00'
+67°55'
+67°50'
+67°45'
Declination (J2000)
9h49m
48m
47m
46m
Right Ascension (J2000)

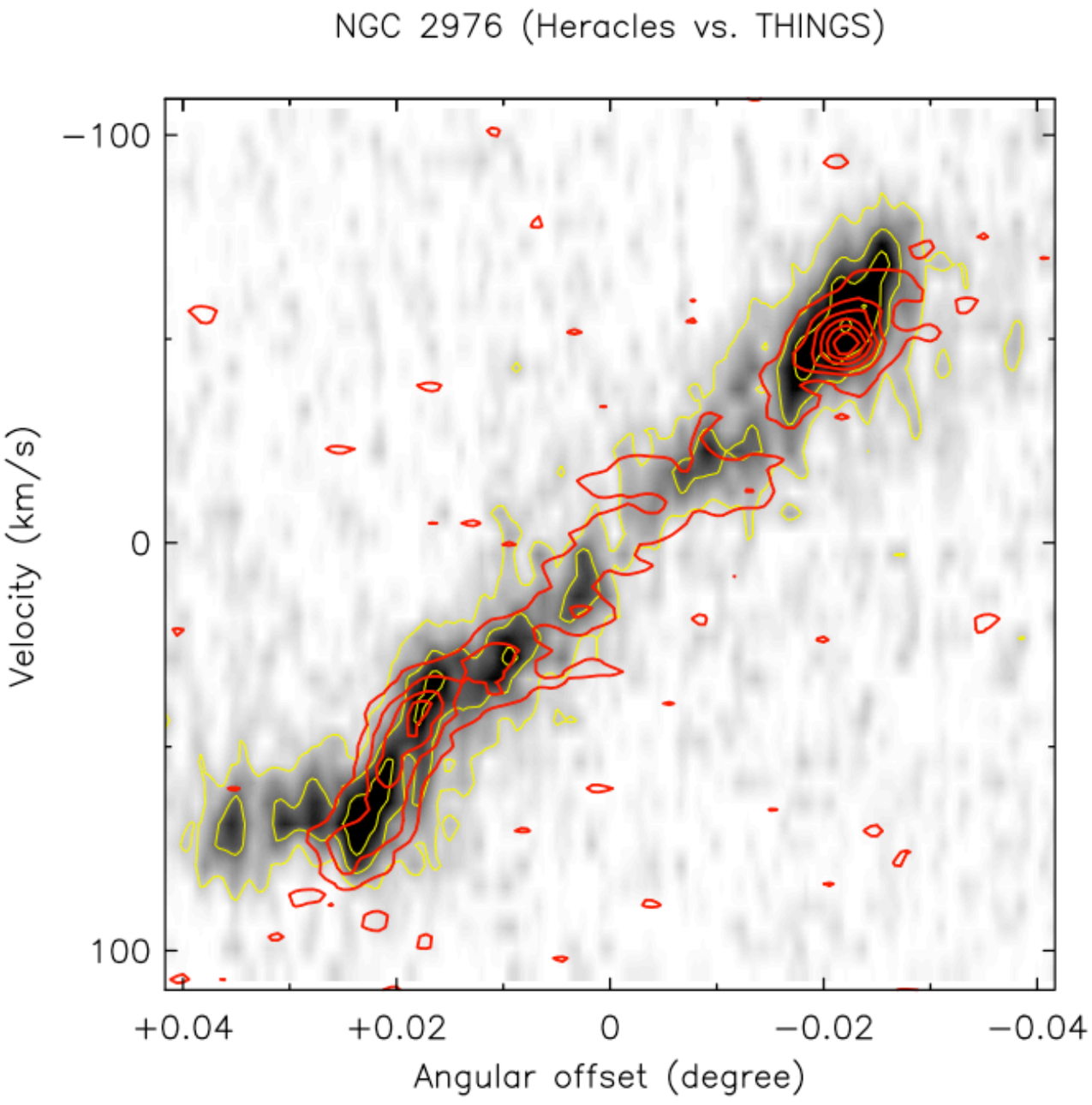
NGC2976 Velocity Fields



Contours:

-120 to 120 km/s in steps of 20 km/s

NGC2976 Position Velocity

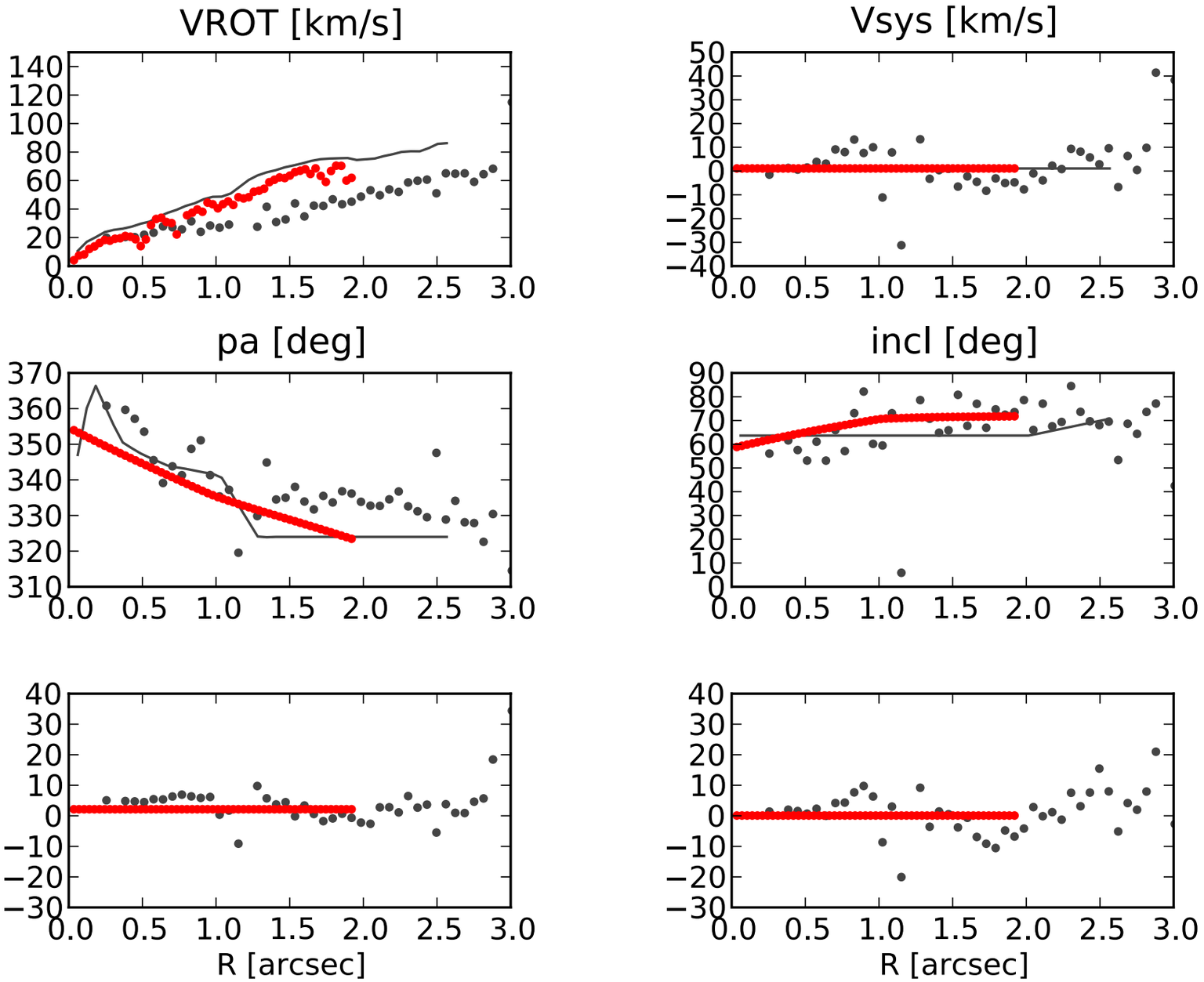


HERACLES

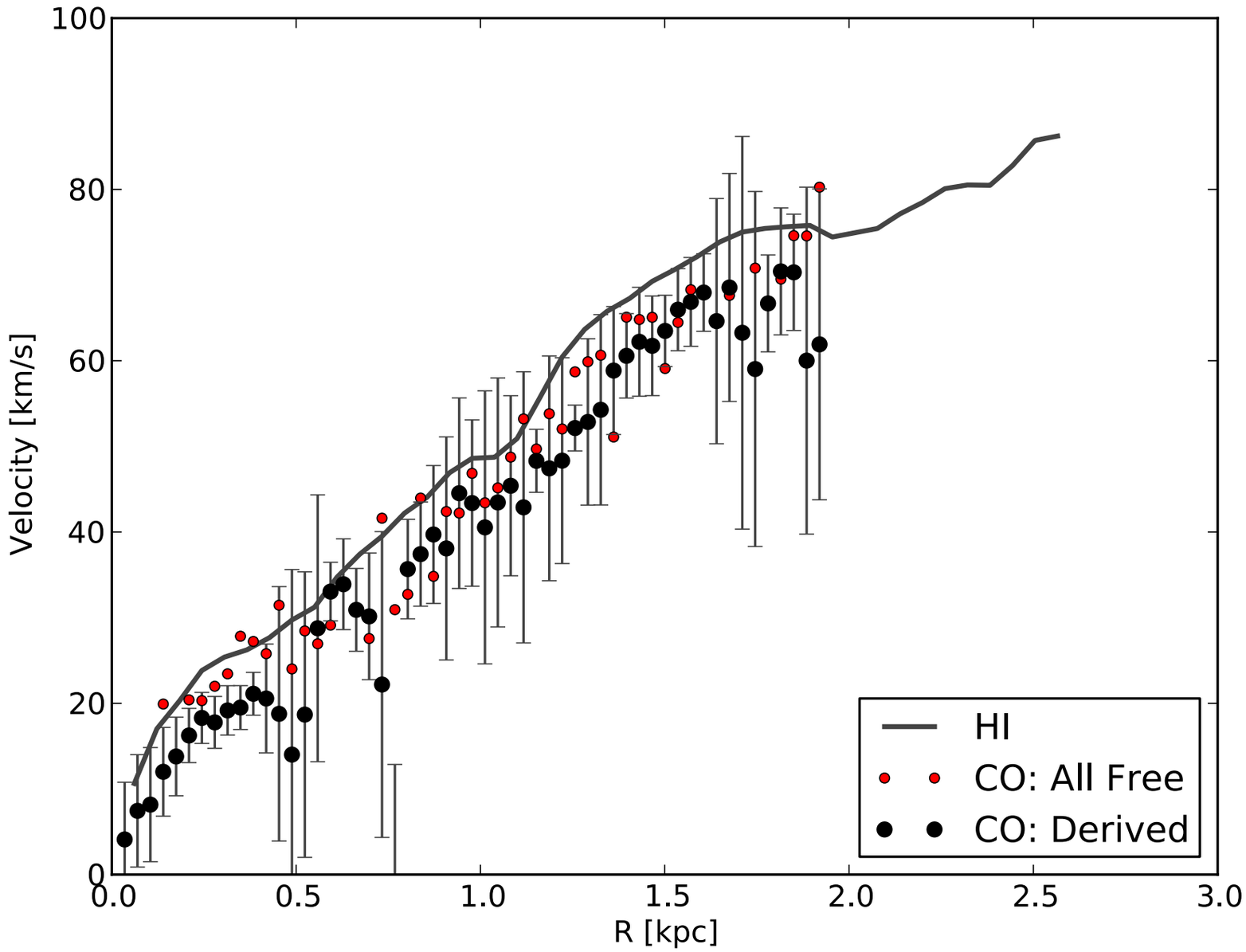
THINGS

contours start
from +3σ
in steps of
+3σ

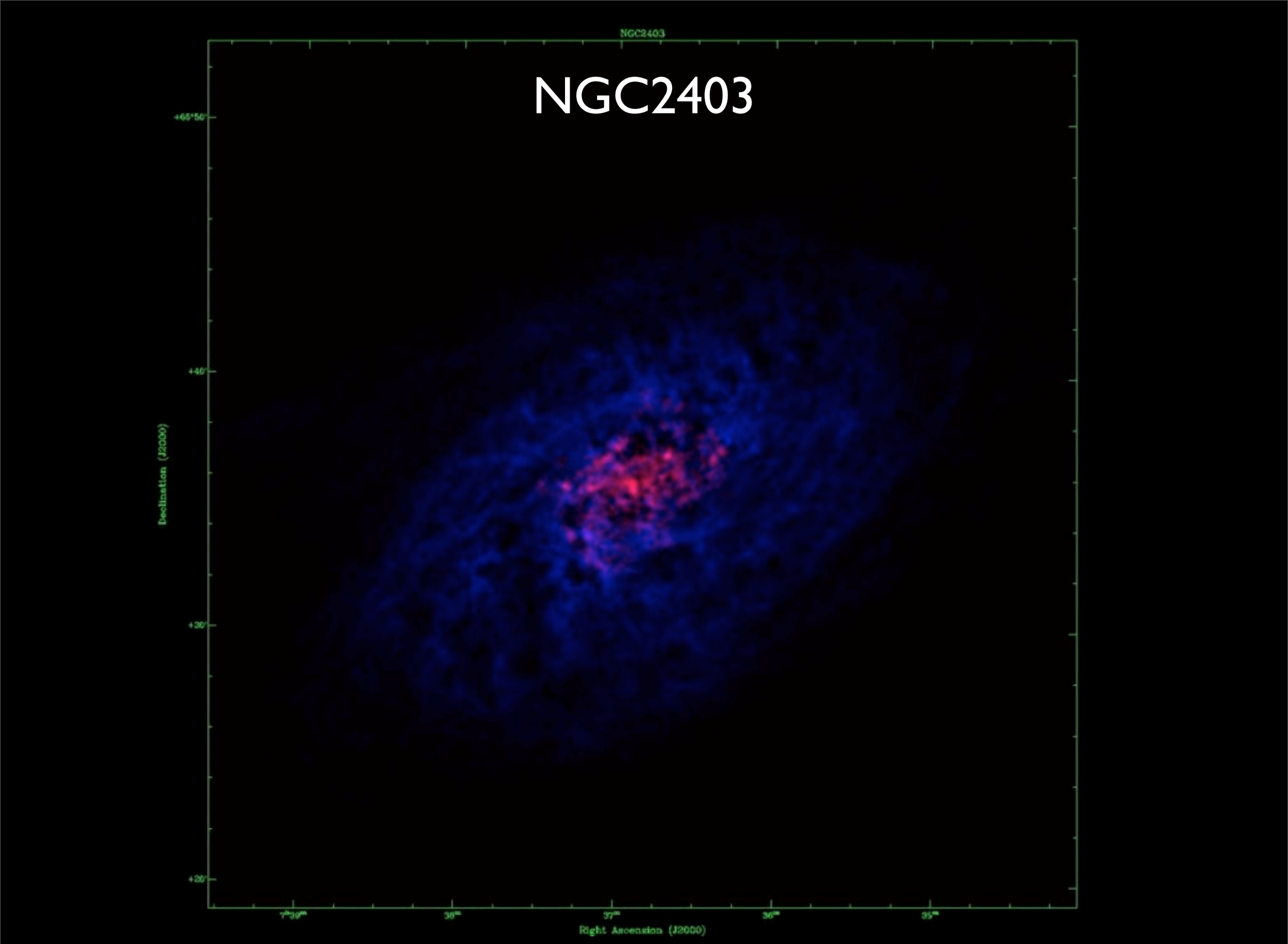
NGC2976 Tilted Ring Model



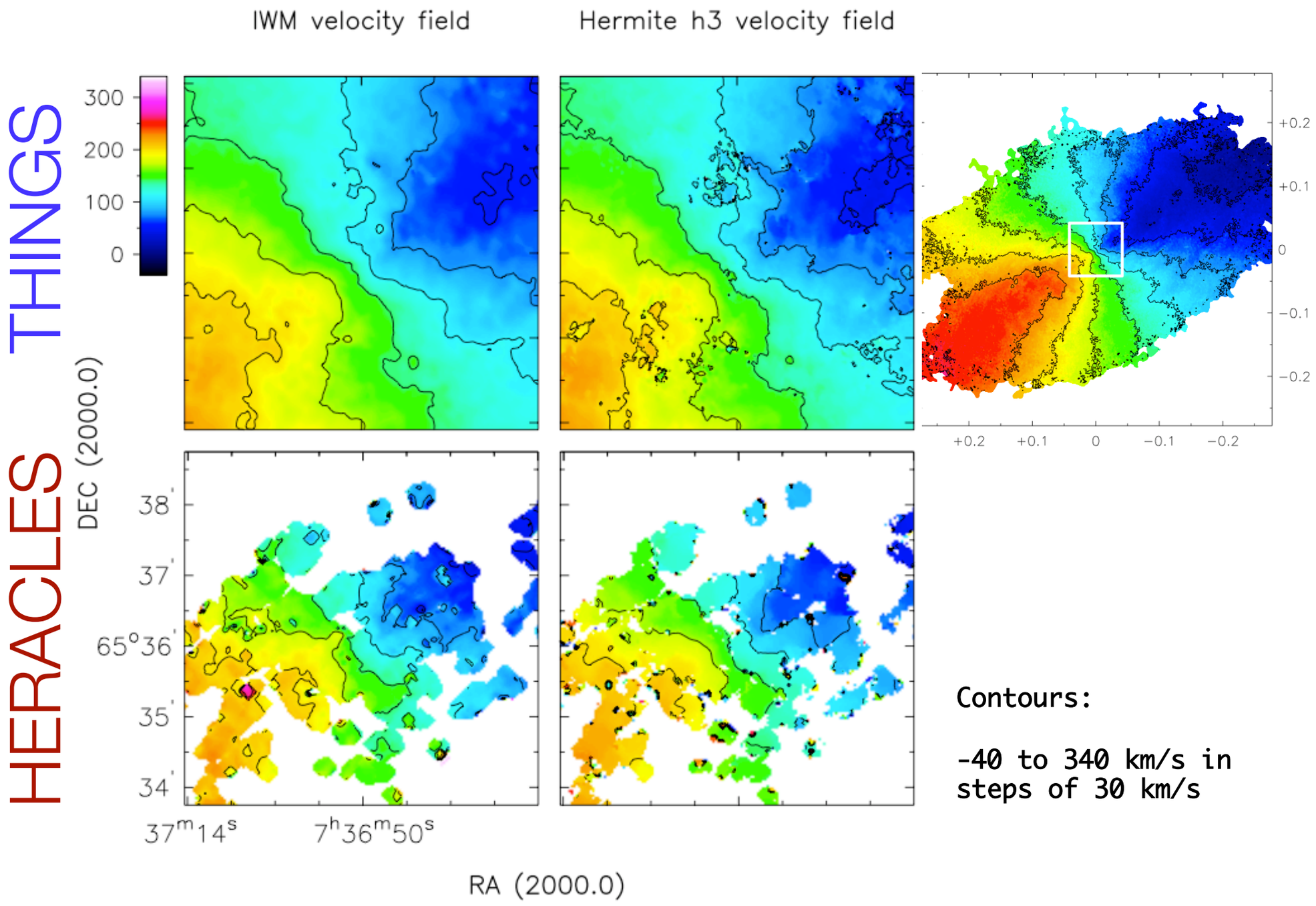
NGC2976 Rotation Curves



NGC2403


NGC2403
+65°50'
+40'
+30'
+20'
Declination (J2000)
7h39m
38m
37m
36m
35m
Right Ascension (J2000)

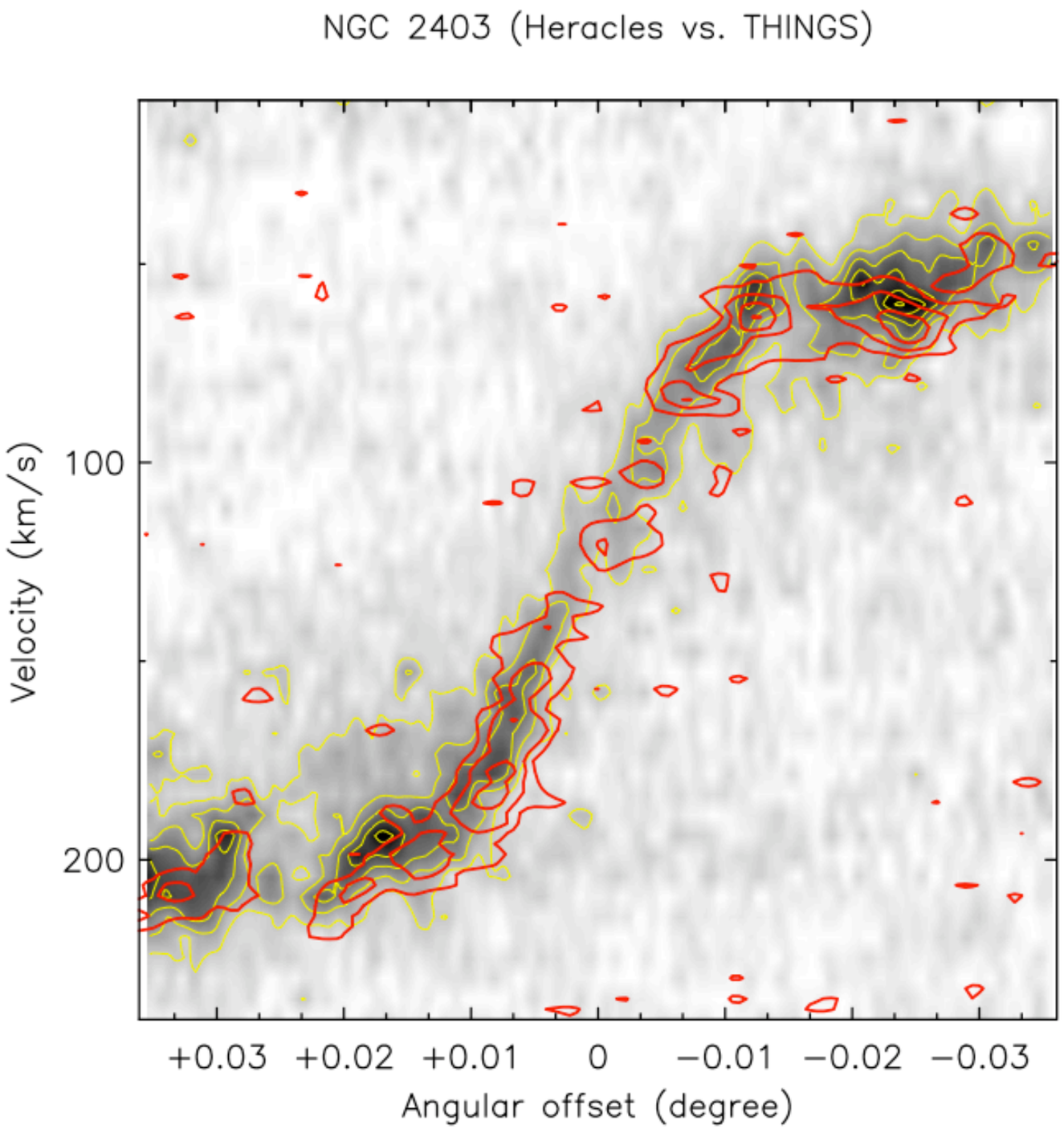
NGC2403 Velocity Fields



Contours:

-40 to 340 km/s in steps of 30 km/s

NGC2403 Position-Velocity

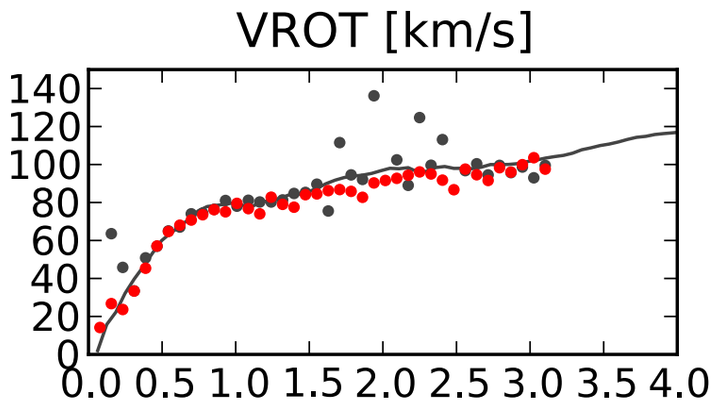


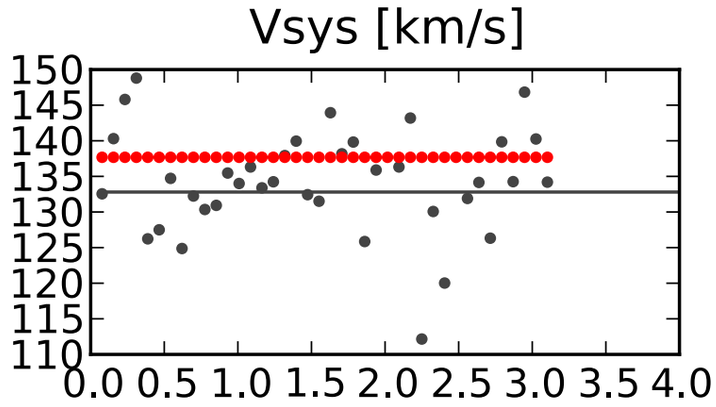
HERACLES

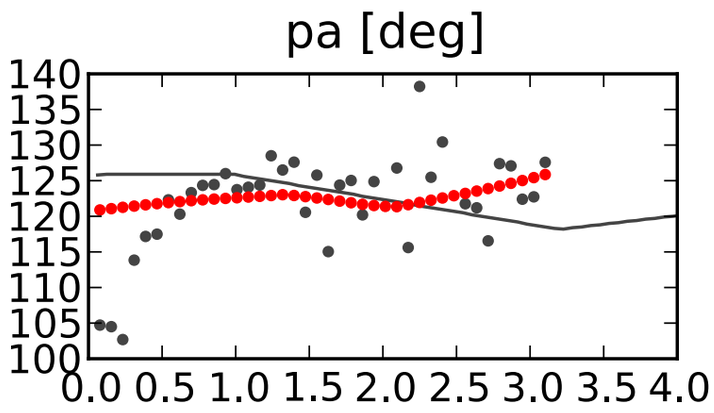
THINGS

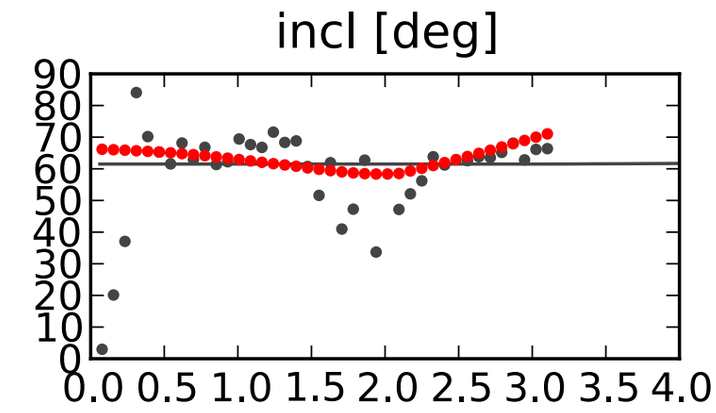
contours start
from +3σ
in steps of
+3σ

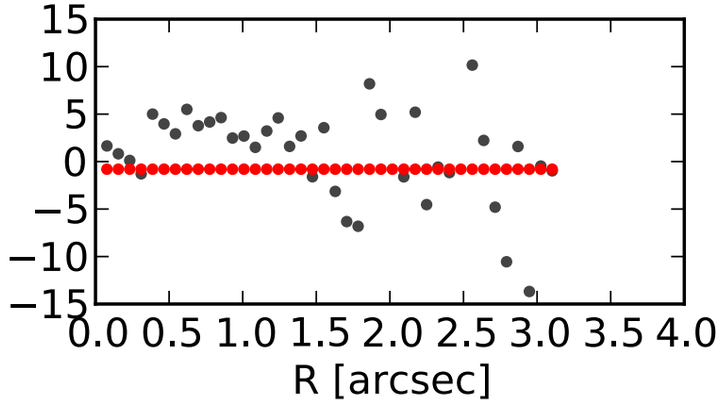
NGC2403 Tilted Ring Model

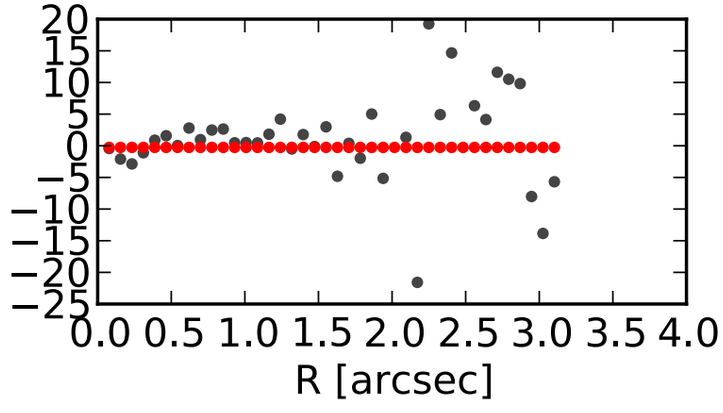




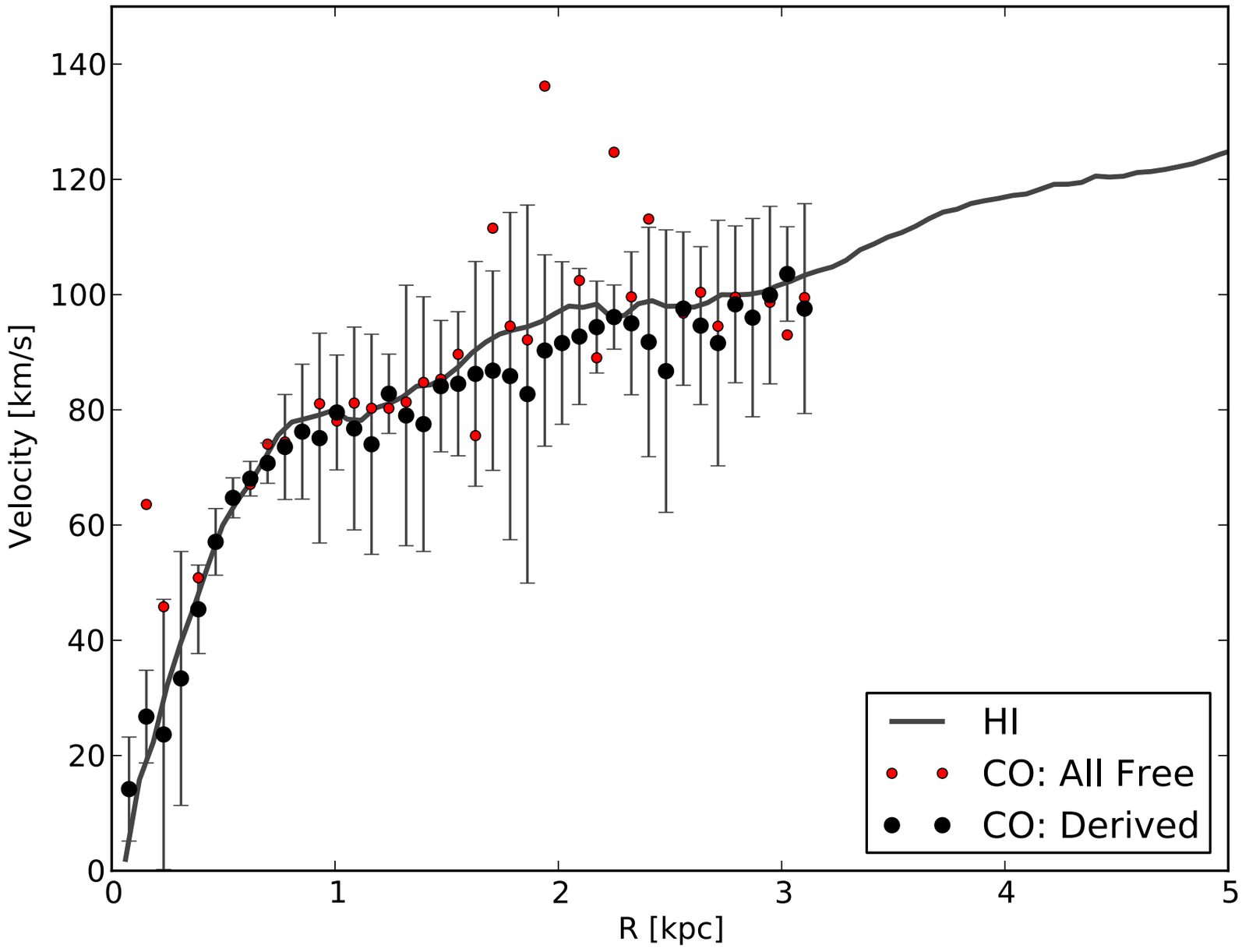




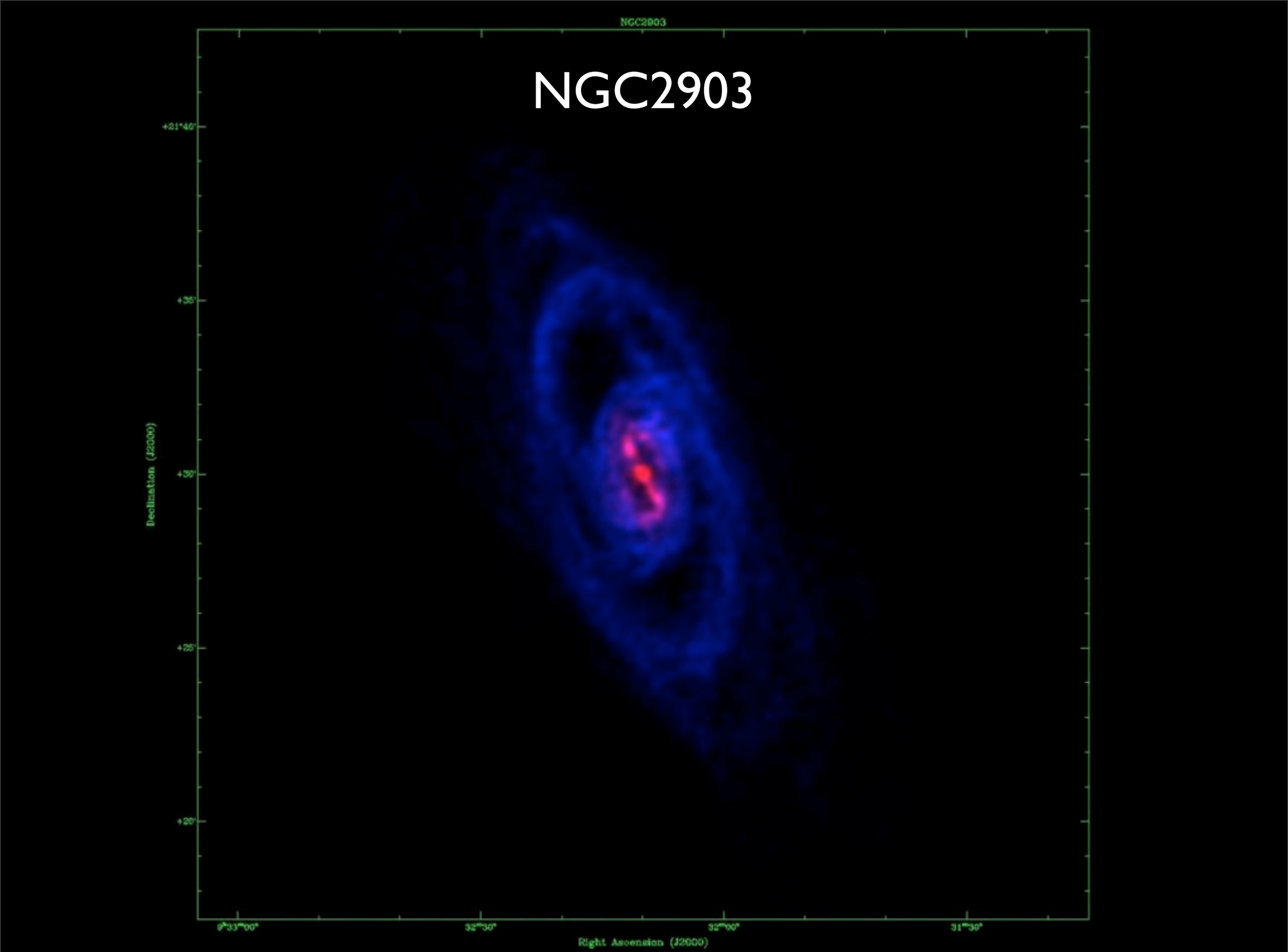




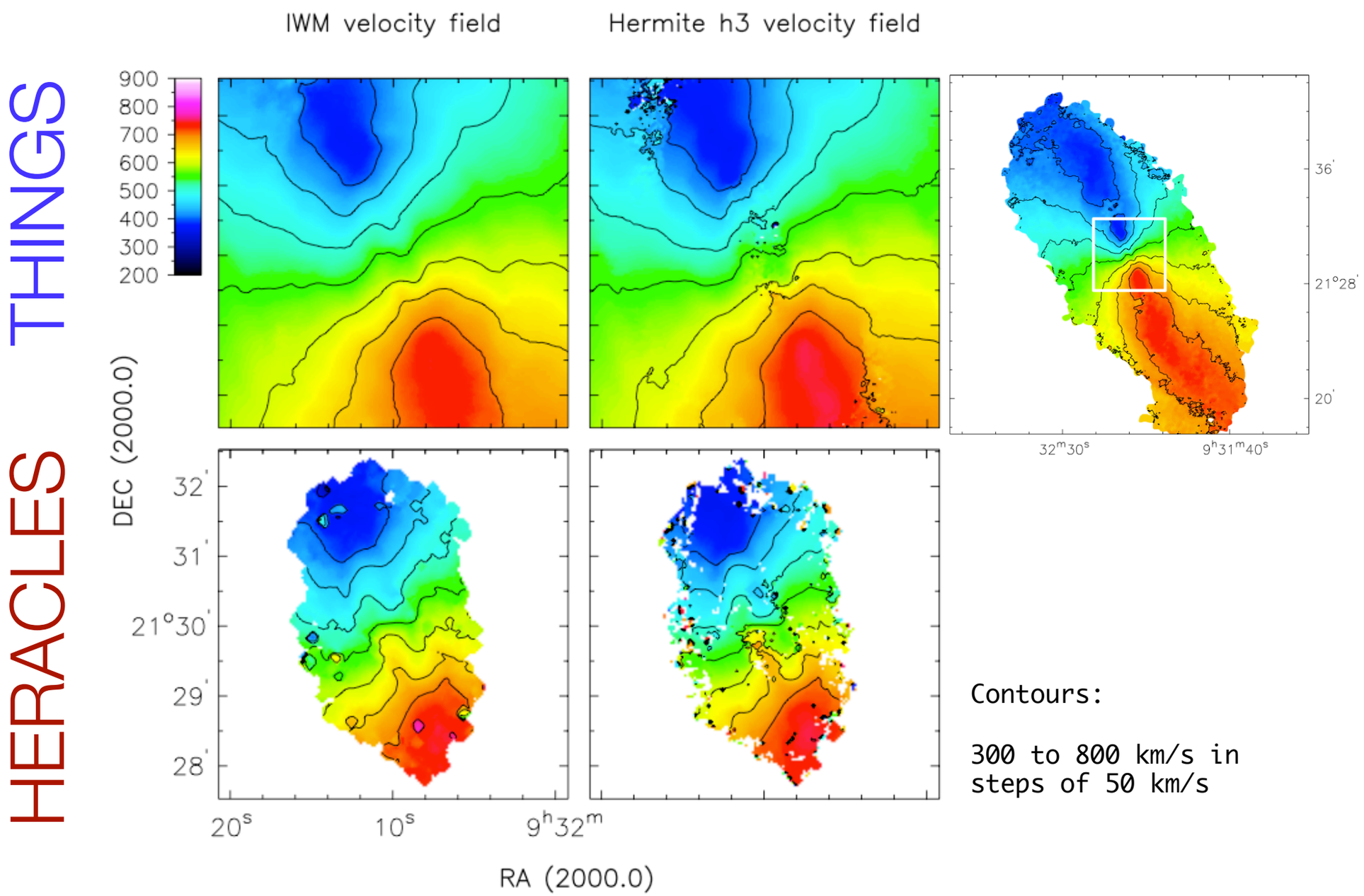
NGC2403 Rotation Curves



NGC2903


NGC2903
+21°46'
+36'
+36'
+26'
+26'
Declination (J2000)
9h33m00s
32m30s
32m00s
31m30s
Right Ascension (J2000)

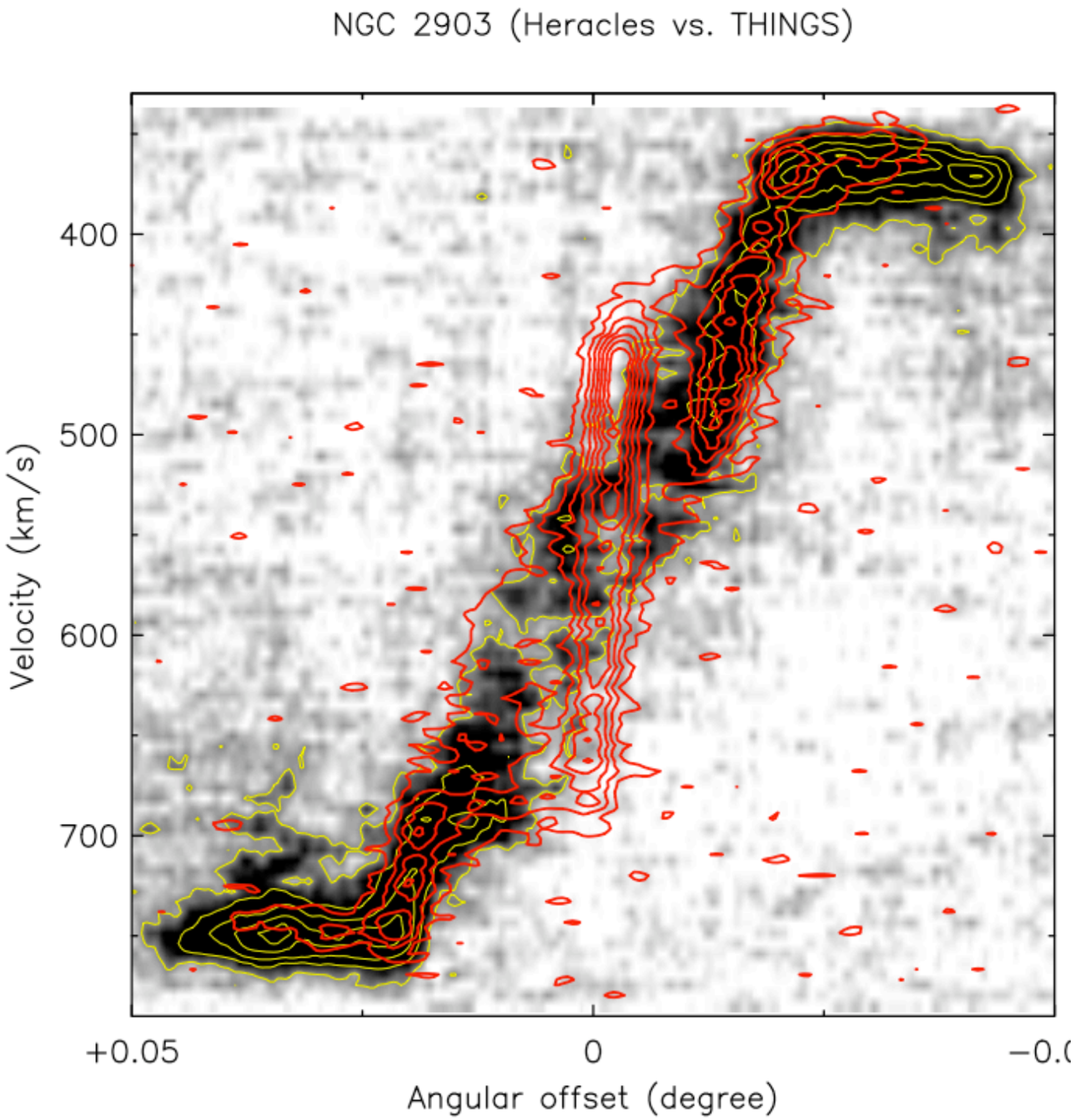
NGC2903 Velocity Fields



Contours:

300 to 800 km/s in steps of 50 km/s

NGC2903 Position Velocity

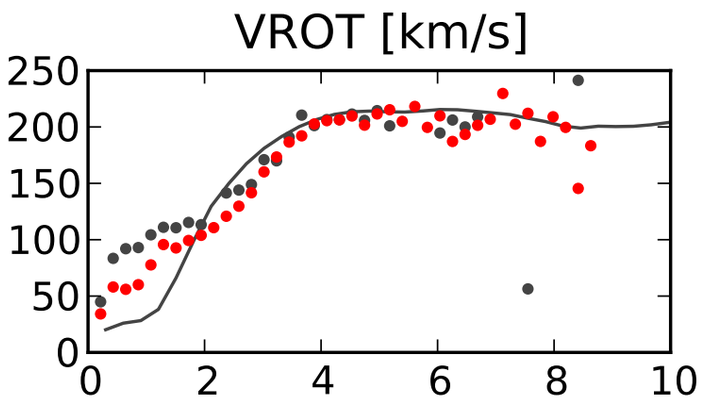


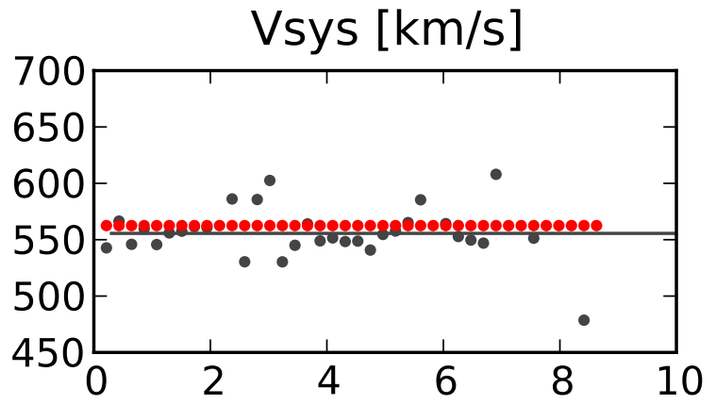
HERACLES

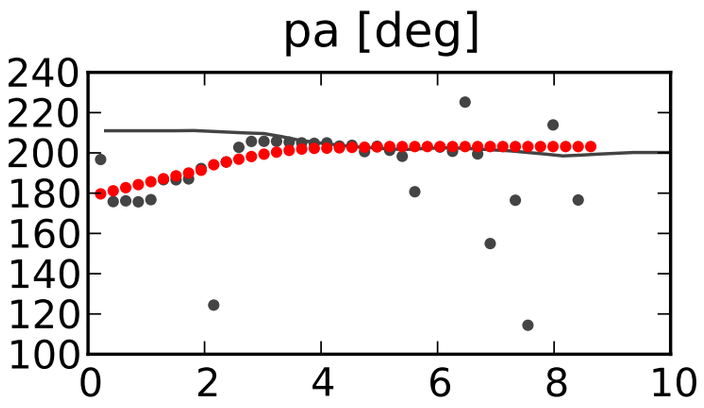
THINGS

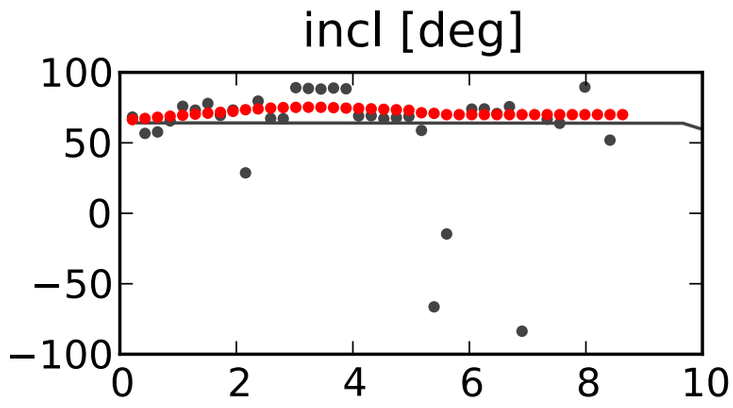
contours start
from +3σ
in steps of
+3σ

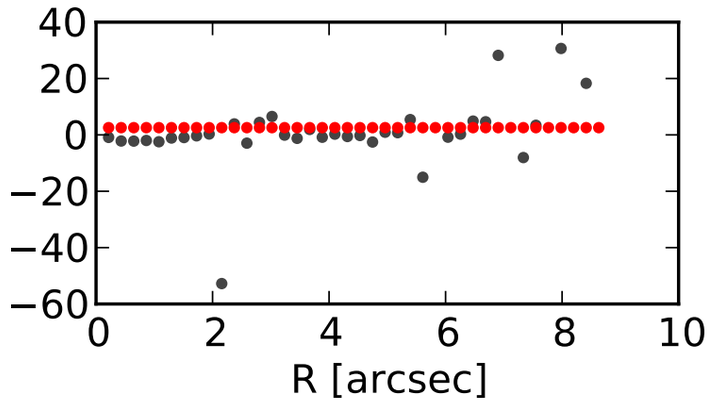
NGC2903 Tilted Ring Model

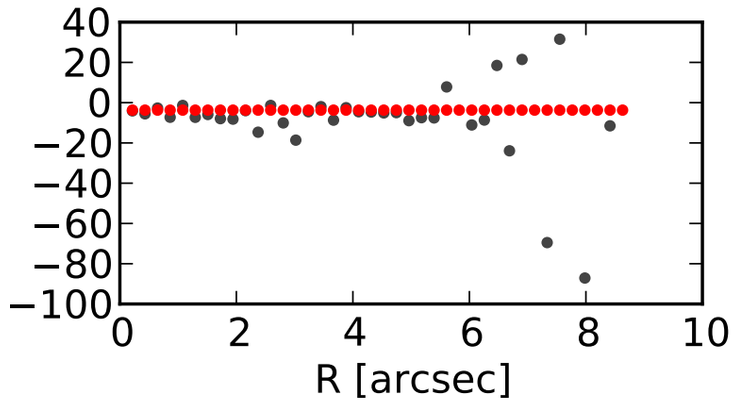




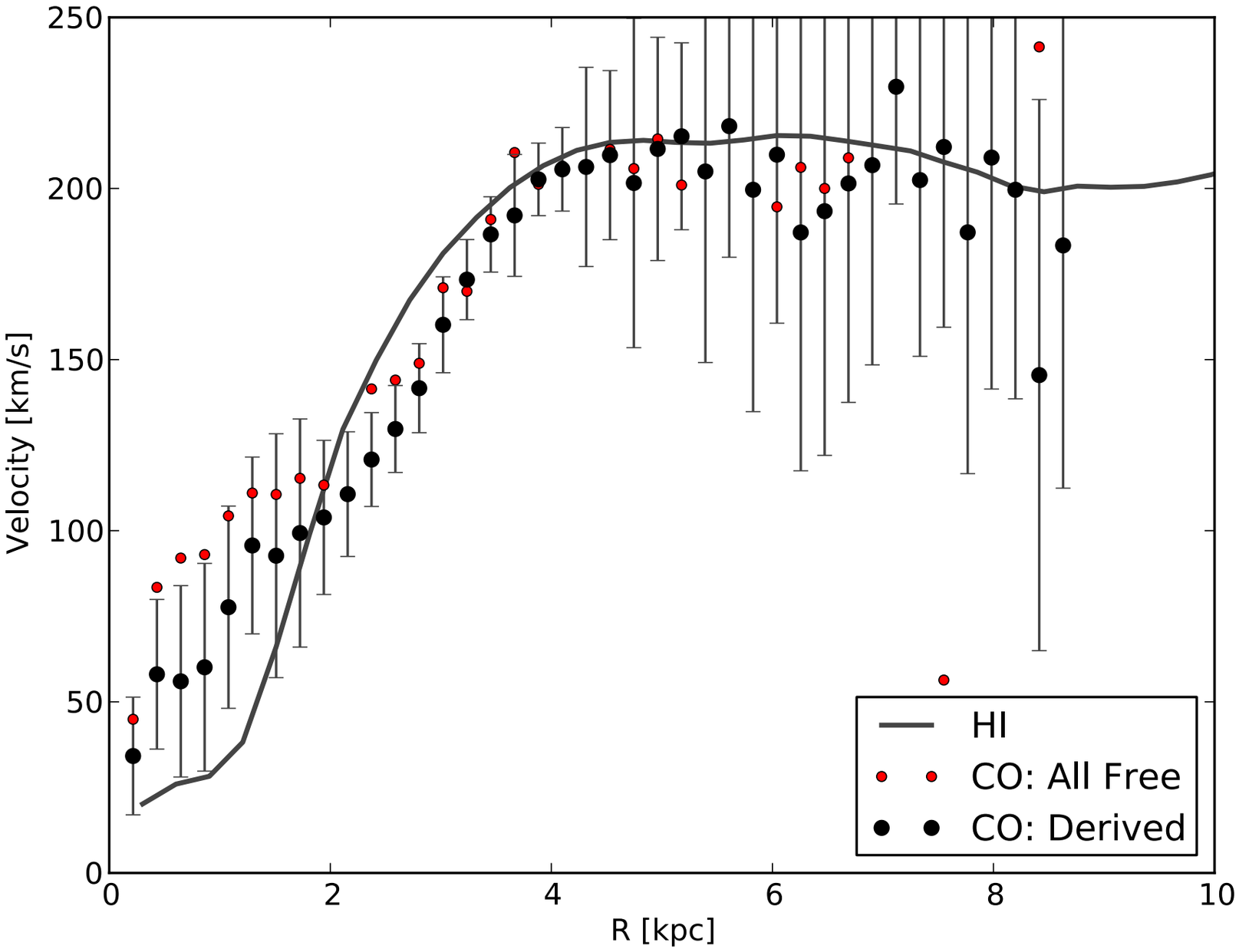






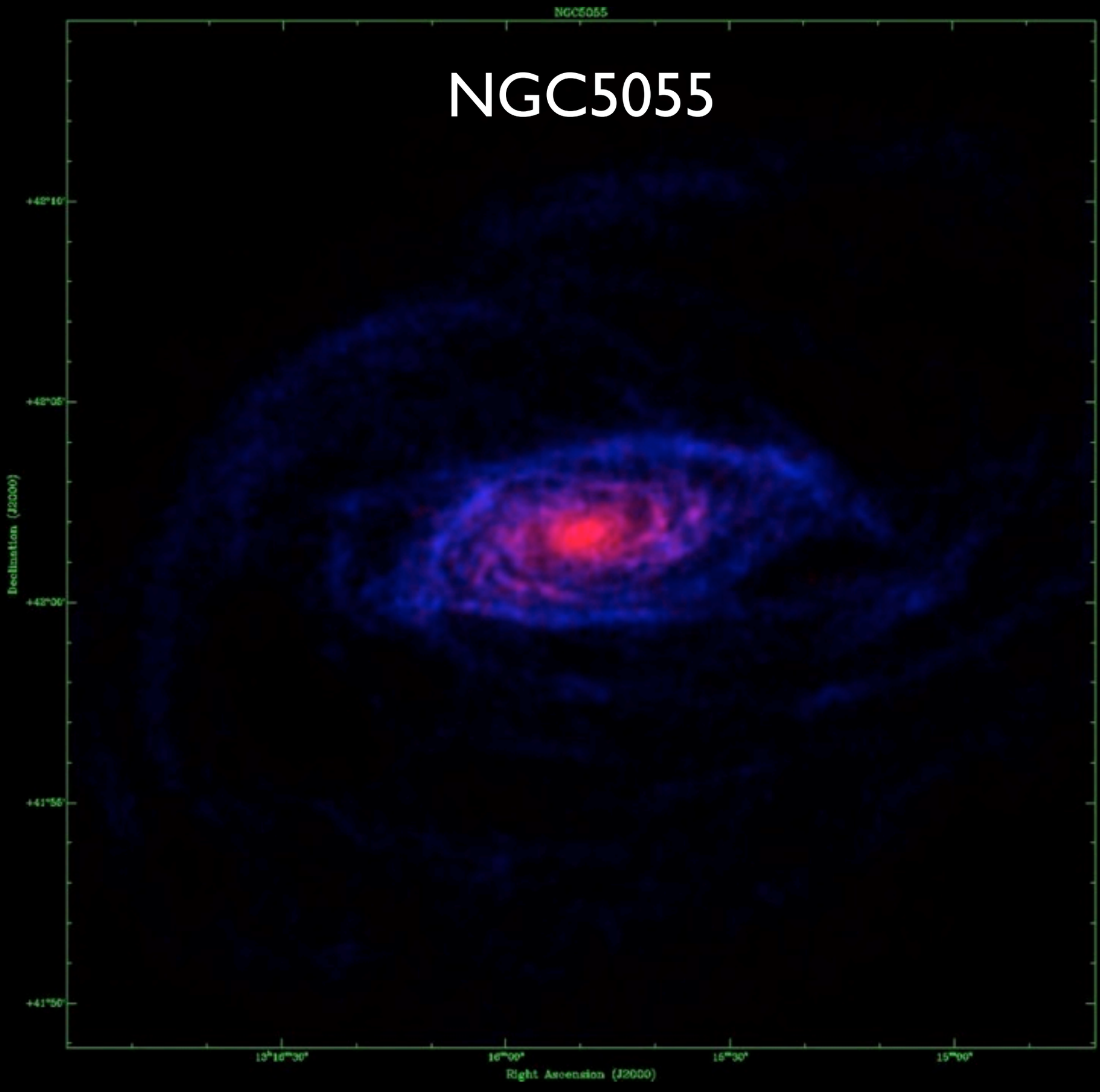


NGC2903 Rotation Curves



Dynamics of inner few kpcs dominated by bar

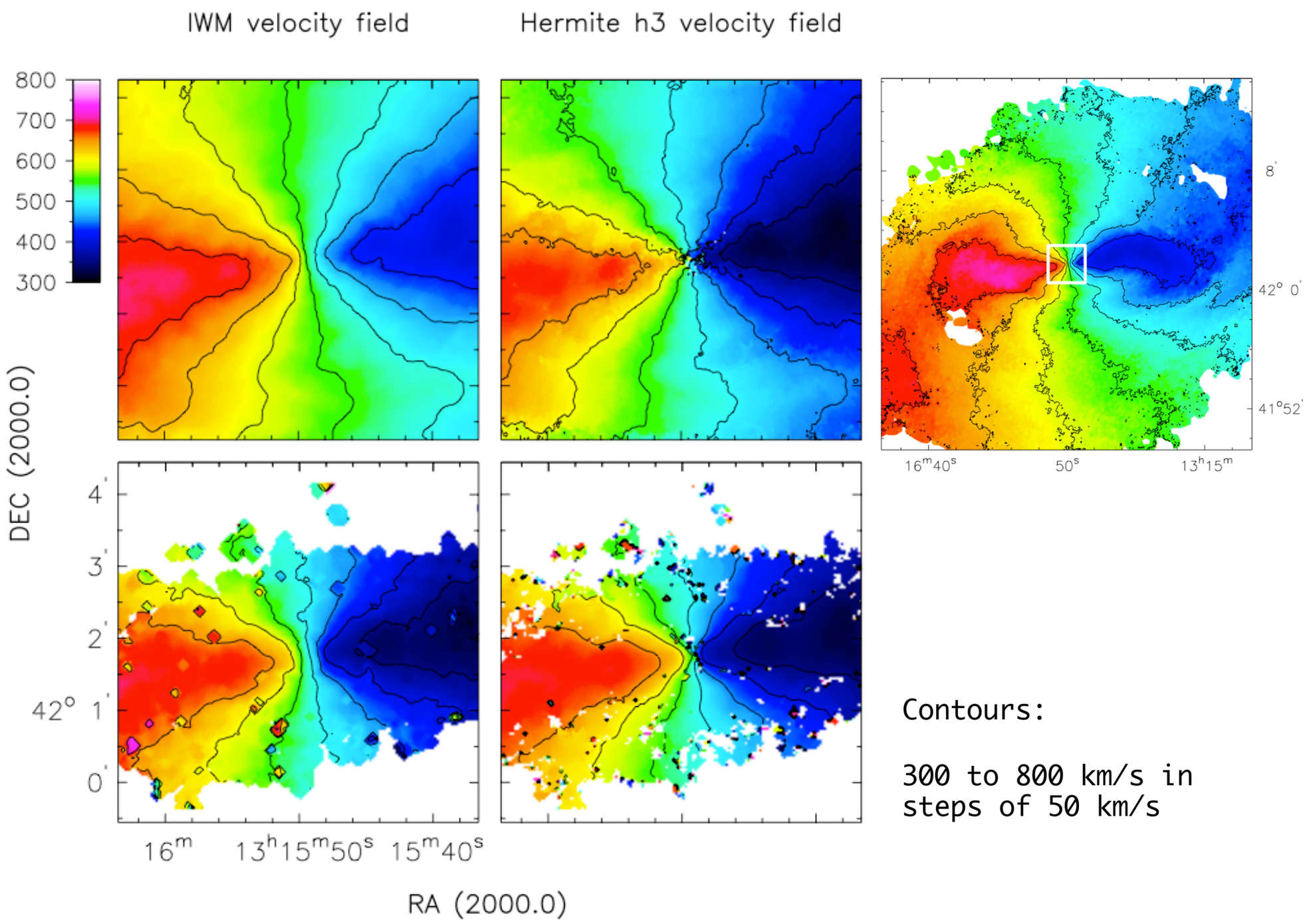
NGC5055


NGC5055
+42°10'
+42°05'
+42°00'
+41°55'
+41°50'
Declination (J2000)
15h16m30s
16m00s
15m30s
15m00s
Right Ascension (J2000)

NGC5055 Velocity Fields

THINGS

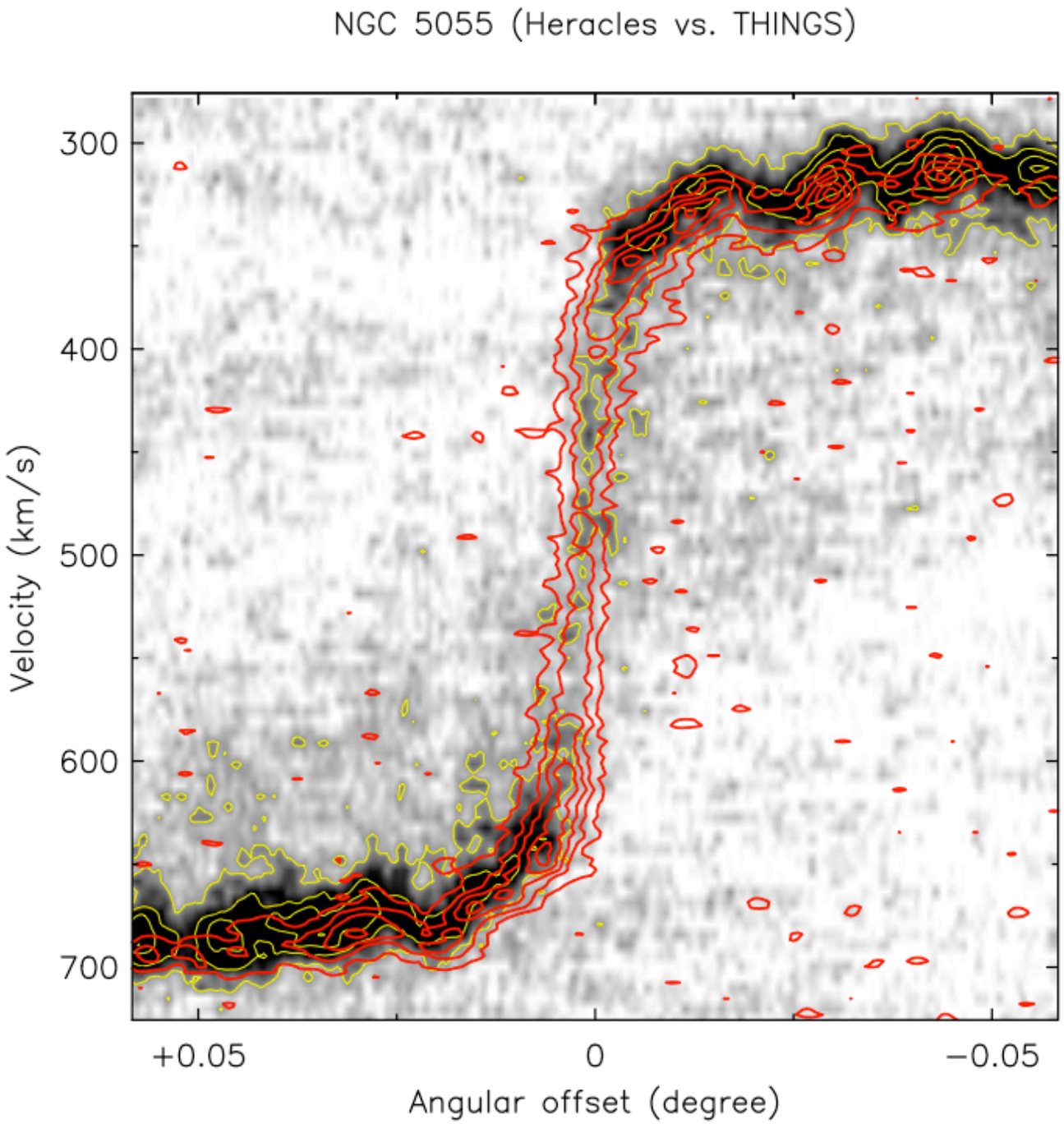
HERACLES



Contours:

300 to 800 km/s in steps of 50 km/s

NGC5055 Position Velocity

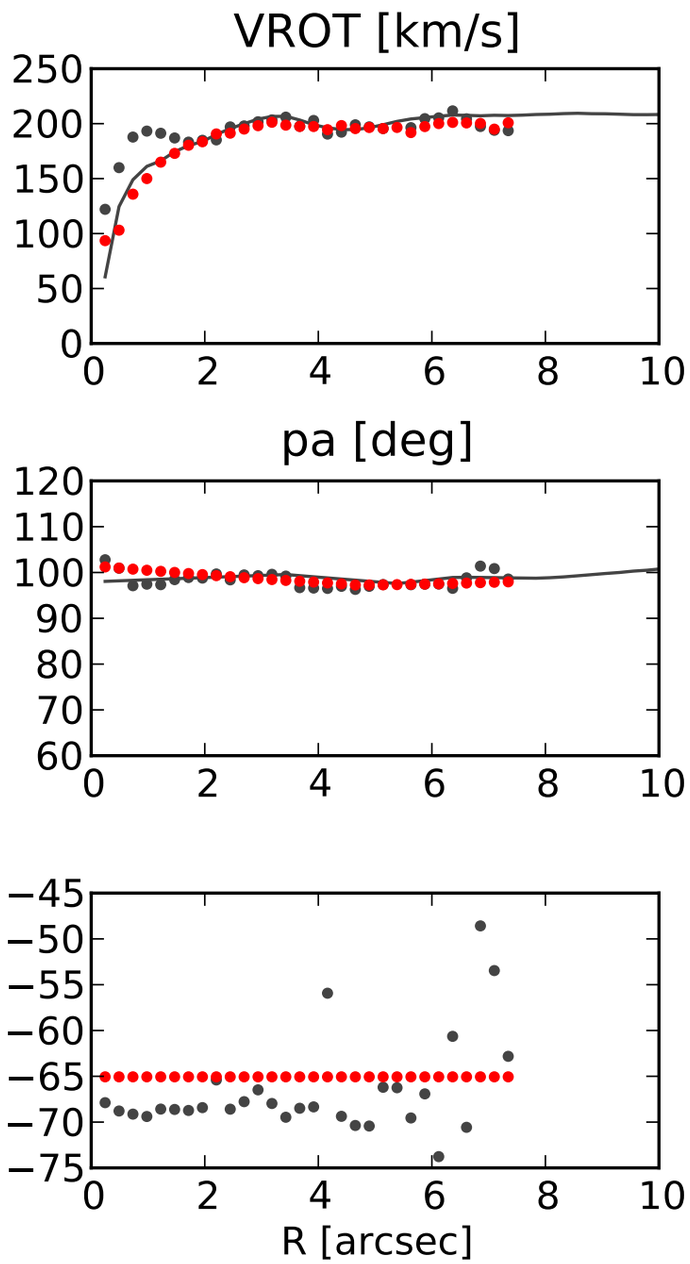


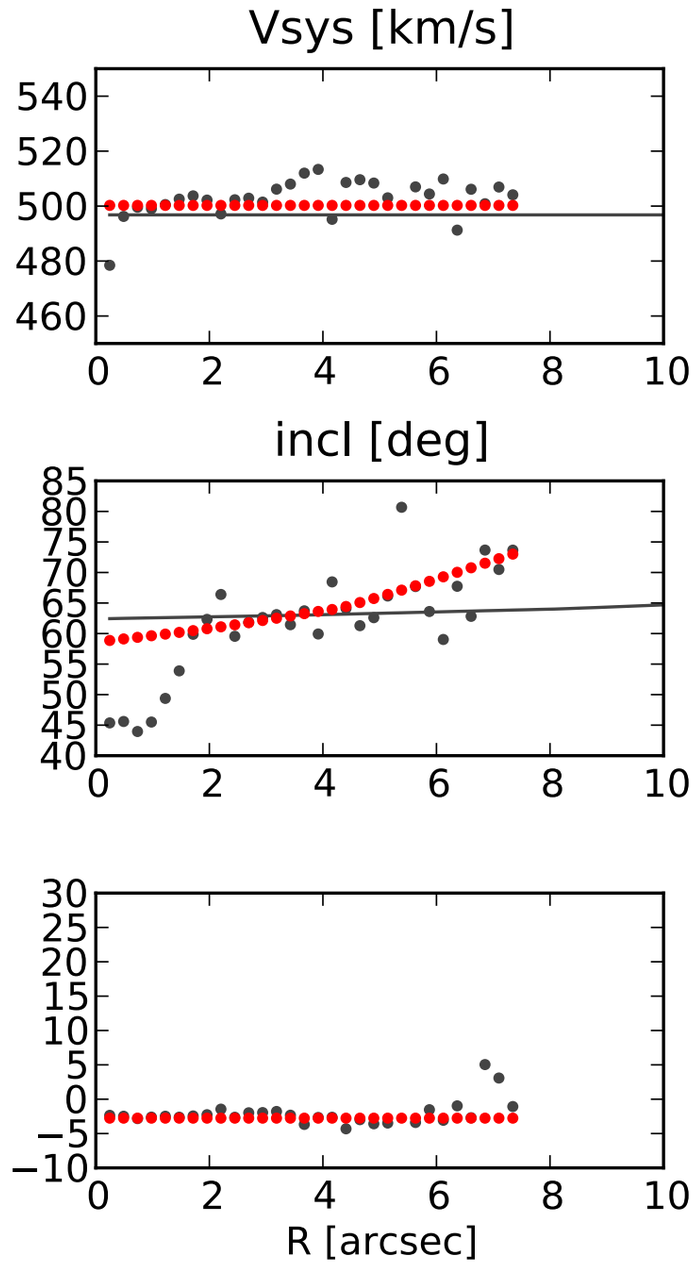
HERACLES

THINGS

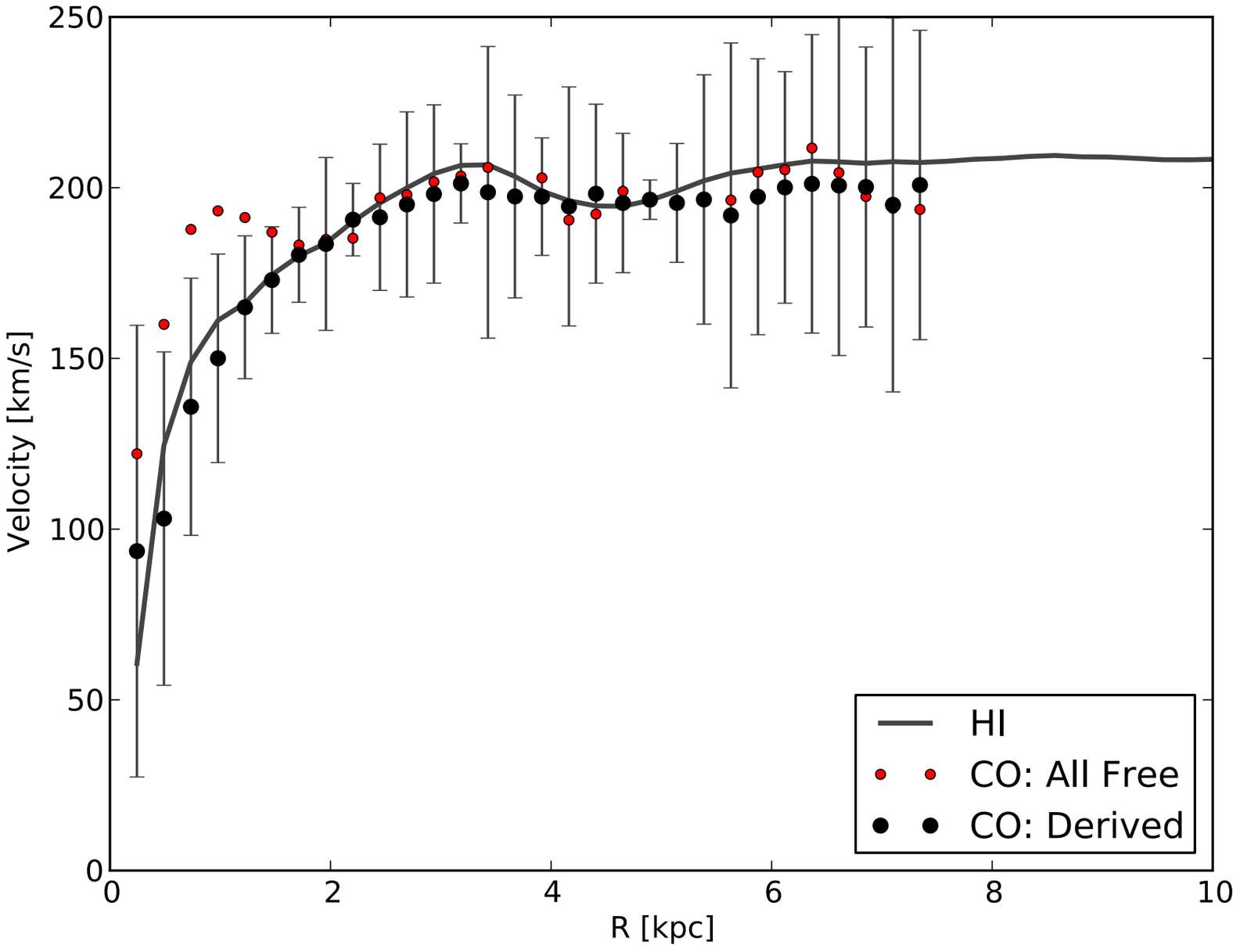
contours start
from +3σ
in steps of
+3σ

NGC5055 Tilted Ring Model





NGC5055 Rotation Curves



Good Agreement between HI and CO dynamics

Going Forward...

- Complete preliminary analysis of HERACLES galaxies
- Compare dynamics as obtained from different velocity fields per galaxy
- Verify, where possible, interchangeability between HI and CO, and account for differences
- Mass modeling

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Thank You!