Narrowband Imaging with ODI

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Narrowband imaging is a niche for ODI!

- WIYN has longer focal length (f/6.3) than other wide-field imagers
- Slowly converging beam works better with narrowband interference filters

Cost of filters

- ODI project will (probably) pay for 1 narrowband filter (~$80-100K); others must be funded in other ways

- H-alpha line is strong and has many scientific uses

  -->Zero-velocity H-alpha filter

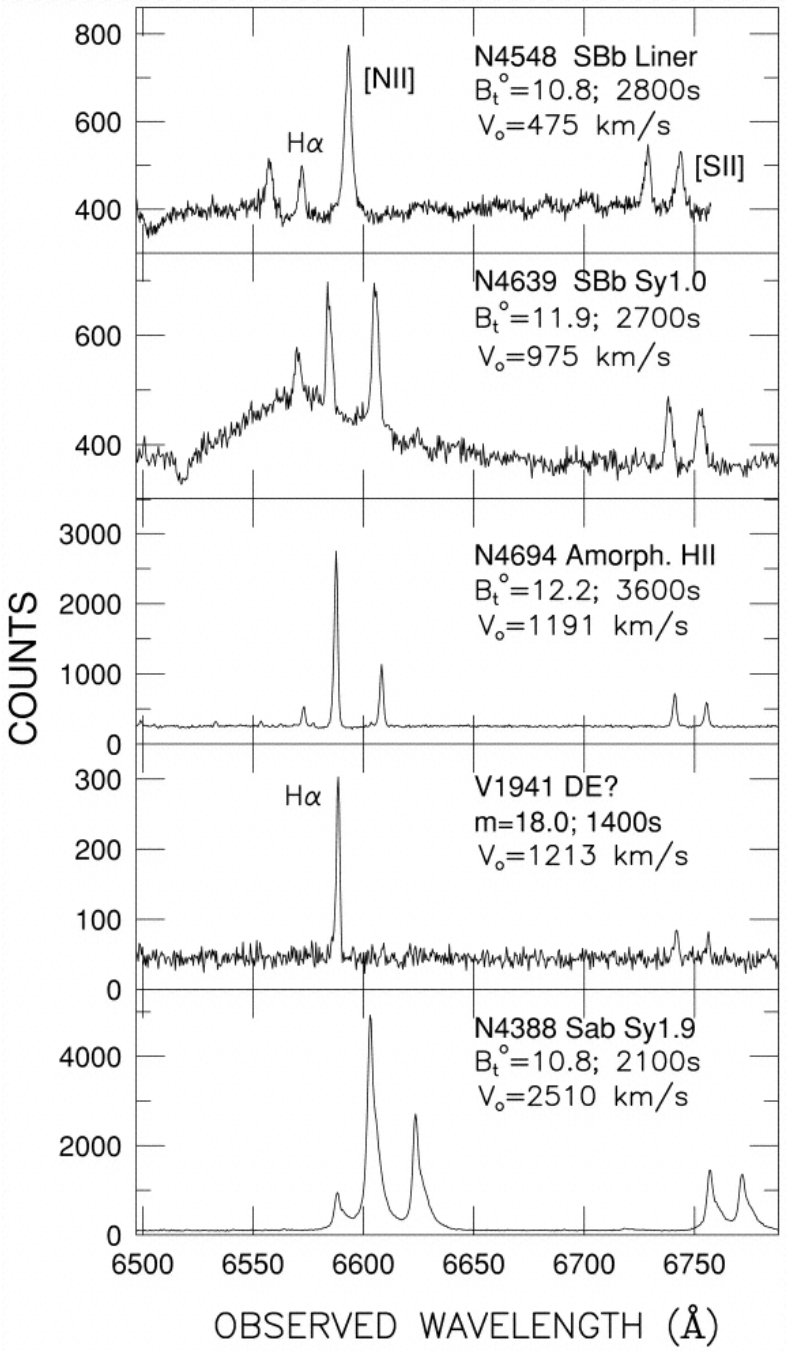
Width of H-alpha filter

Choices:

- Narrow: ~10-15A (Galactic)
- Medium: ~50-60A (Nearby Galaxies)
- Broad: ~100A (Clusters, high z)

The tradeoff:

- Narrower: less Poisson noise from unwanted continuum and background emission
- Broader: covers larger range of redshift/velocity/volume of universe; also covers satellite [NII] lines more uniformly



Spectra of Hα and [NII] region in Virgo galaxies

H-alpha filter width: Current plan is medium

- 6551-6617A (at 50% peak sensitivity)
- Width 66 A

H-alpha ODI Science

- Narrow:

  Milky Way PN, CVs, low mass XRBs, symbiotics
- Medium:

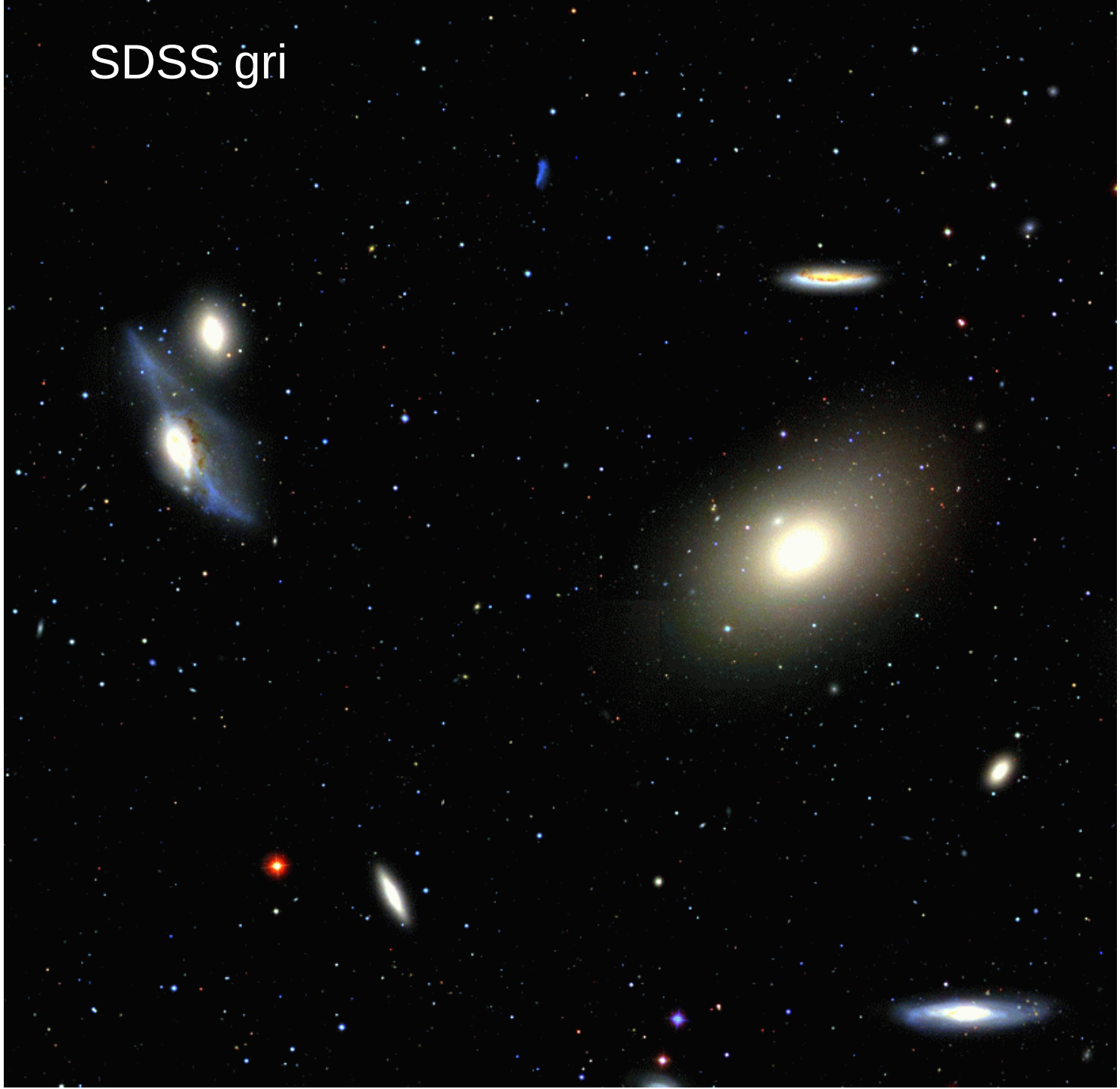
  Finding Nearby Emission-Line Galaxies

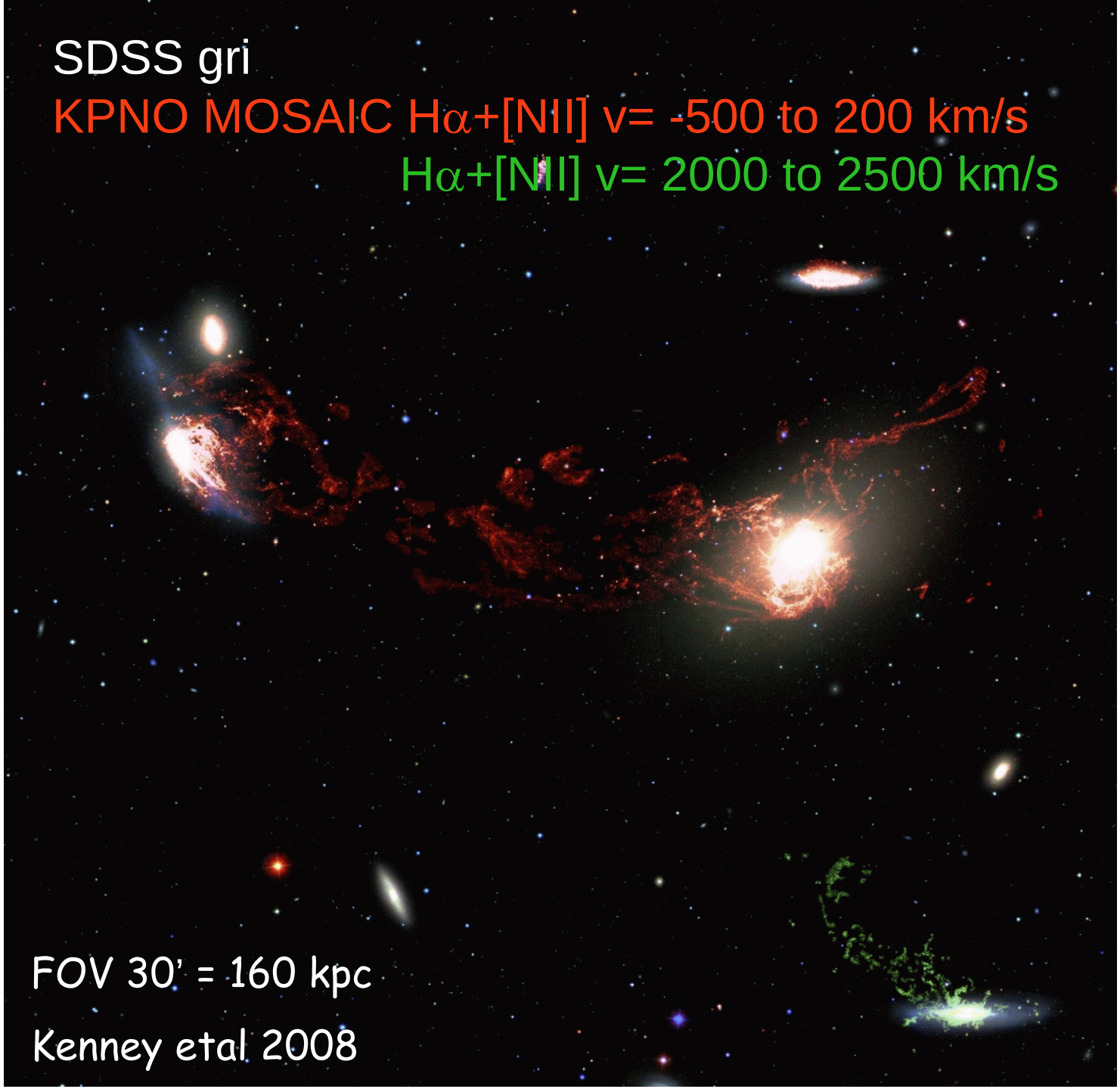
  Outer ISM in nearby galaxies
- Broad:

  Star formation in nearby clusters

  Revealing the ICM in nearby clusters (Virgo)

  High-z Lya (v=0 Ha ~ z=4.4 Lya) (Zheng talk)


SDSS gri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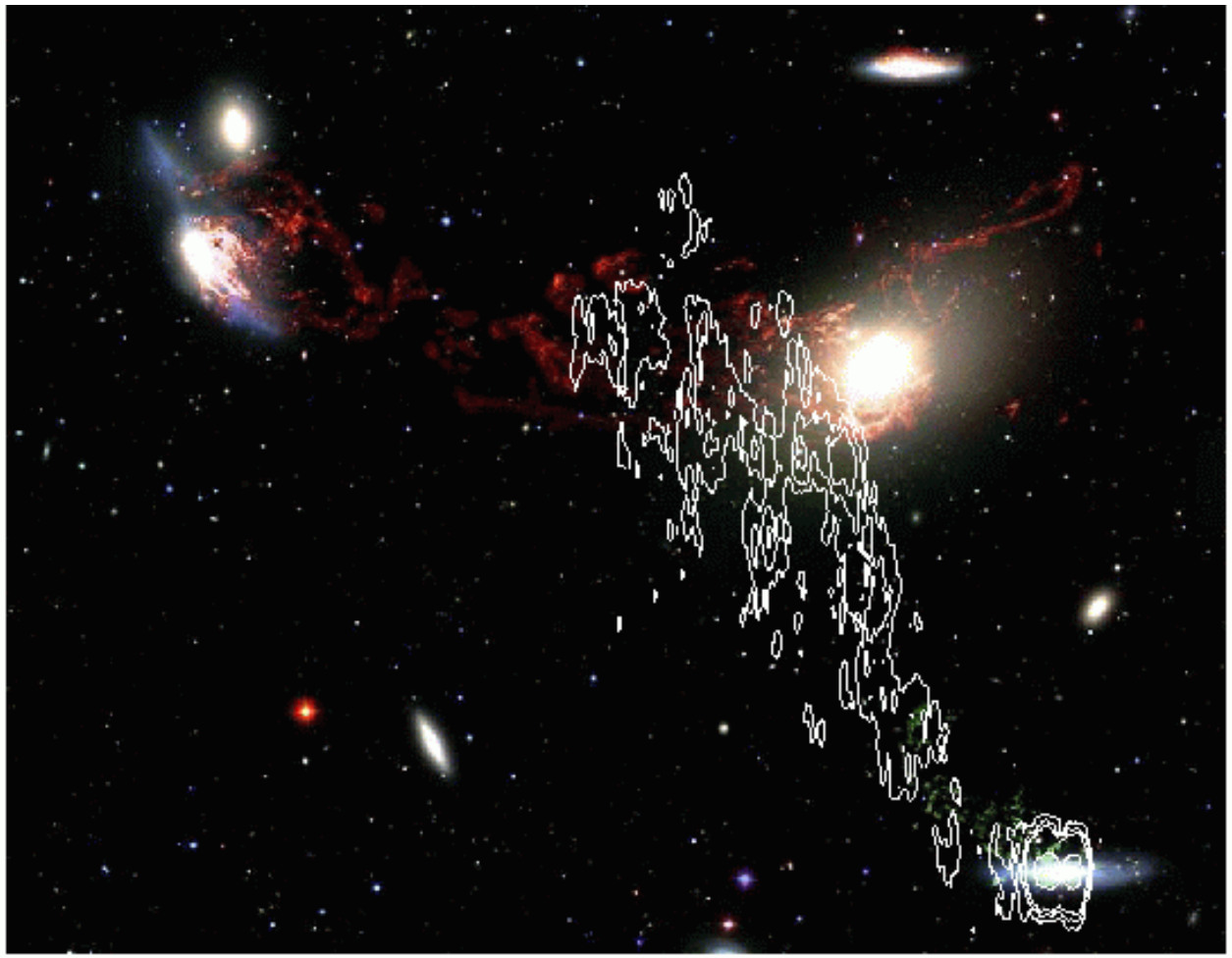
KPNO MOSAIC Hα+[NII] v= -500 to 200 km/s
Hα+[NII] v= 2000 to 2500 km/s
FOV 30' = 160 kpc
Kenney etal 2008



cluster gas with velocity range of 2500 km/s at same position!

High velocity (2000-2500 km/s) HI (Oosterloo & van Gorkom 2005) and Hα tail from NGC 4388 (contours, green)

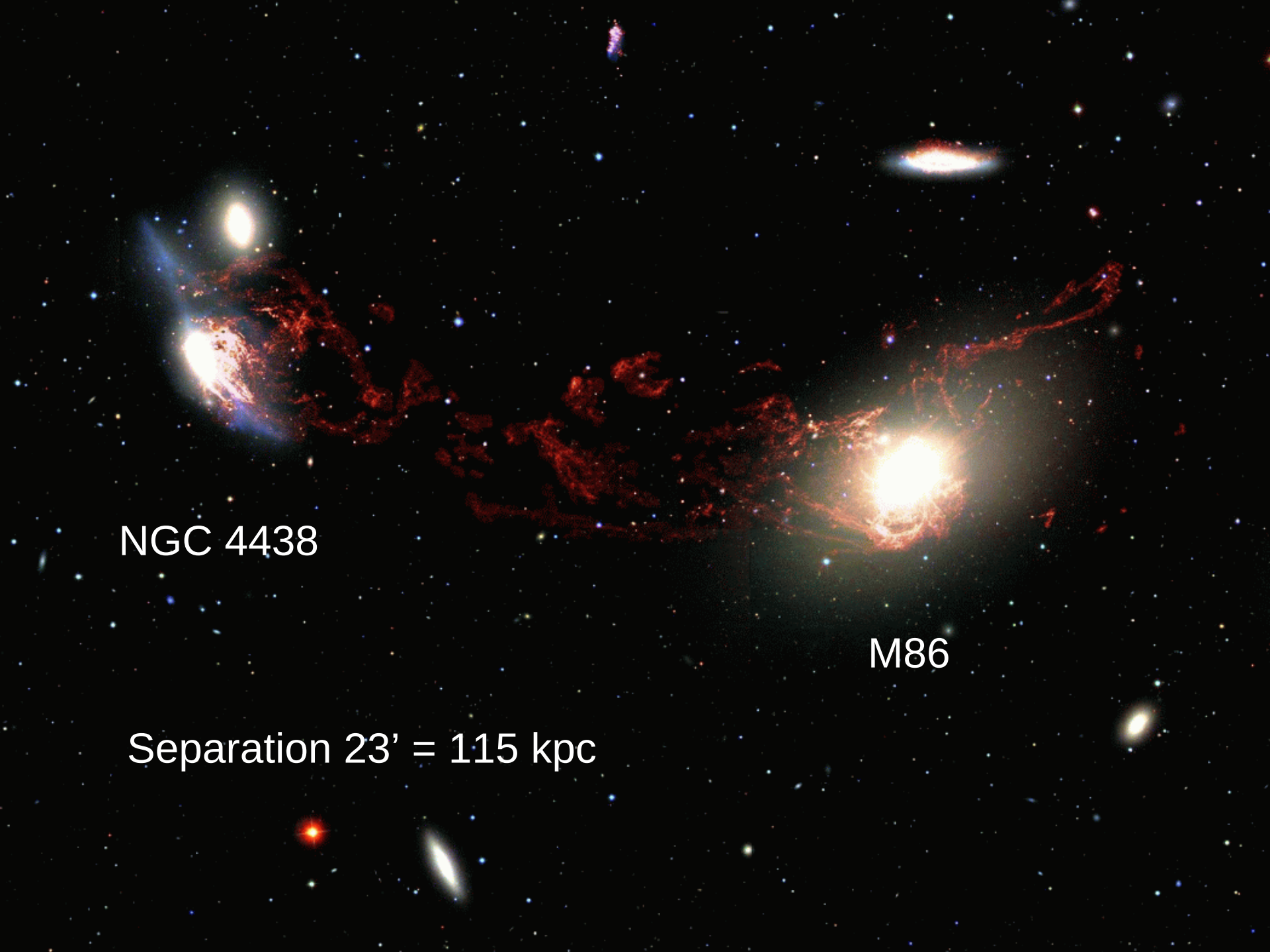
Low velocity (-600 to +100 km/s) Hα between M86 and NGC 4438 (red)

Yale ODI Survey will do H-alpha only in “poor seeing” (>1.0”)

- Not take time away from “core broadband survey” (which requires good seeing)
- A good use of “poor seeing” time, since it still uses niche of instrument
- H-alpha projects needing good seeing would be “add-on” projects

ODI H-alpha projects: Questions to discuss

- What filter width needed/acceptable?
- Is good seeing needed?


NGC 4438
M86
Separation 23’ = 115 kpc