Beyond Azimuthal Averaging: Deep Surface Photometry of Galaxy Disks

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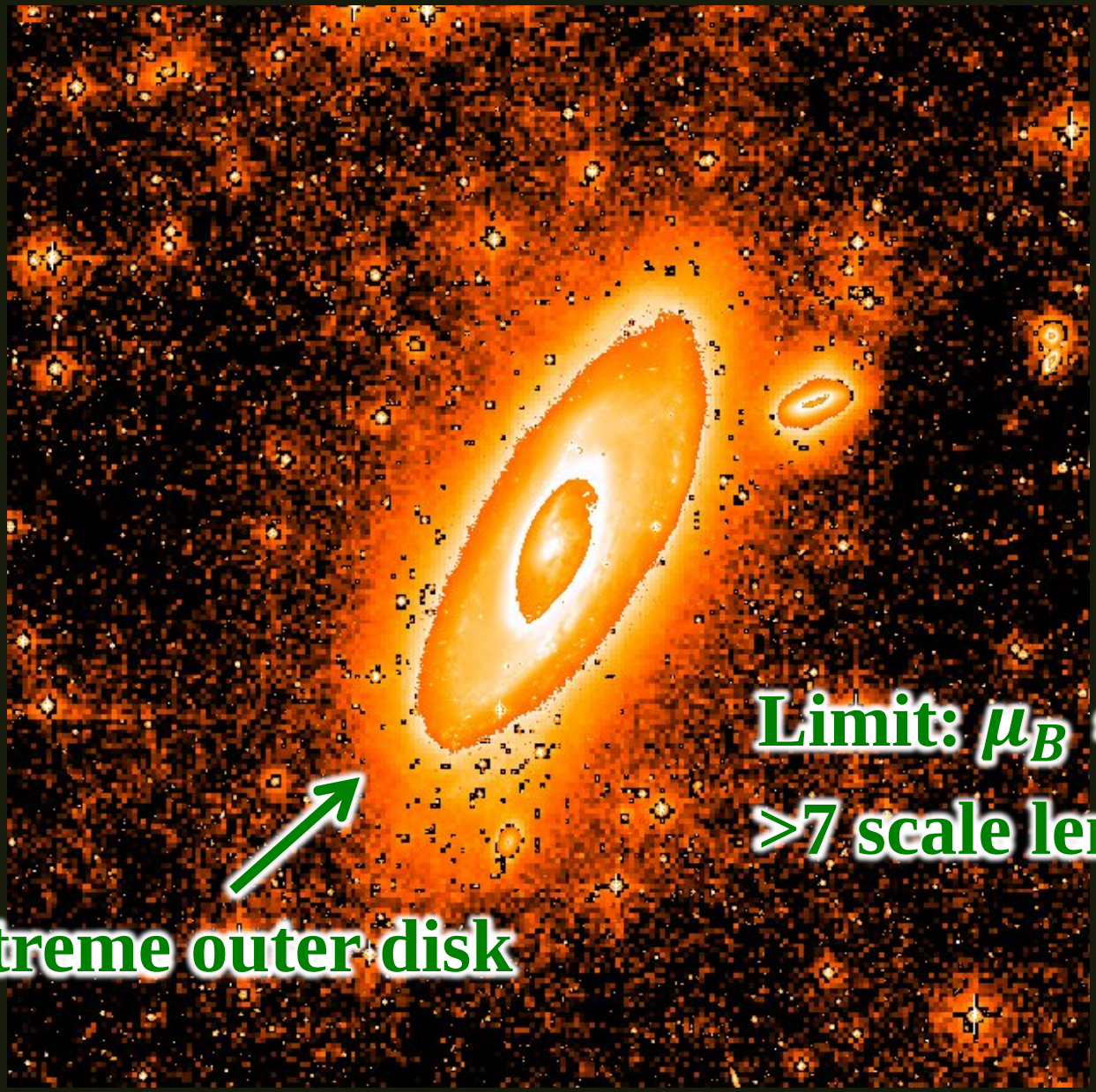
Why study famous nearby galaxies?

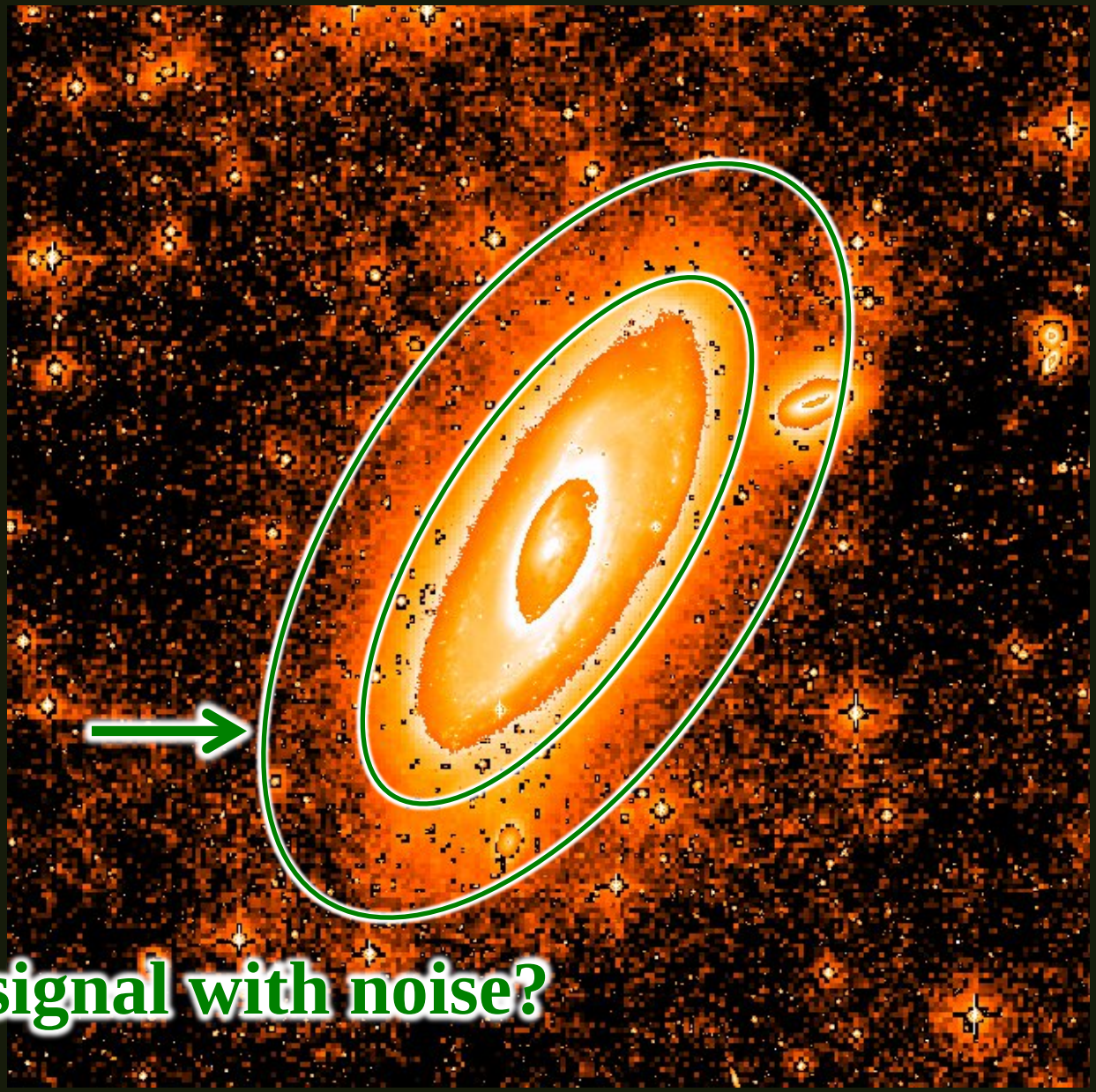
- Sweet spot: too far for star counts, too close for survey levels
- Examples of the end-state – the goal of galaxy formation scenarios
- Plenty of archival data and research available
  - Getting to know galaxies on a personal level

Typical view of a galaxy

Deep view of a galaxy



On azimuthal averaging, briefly



Mixing signal with noise?

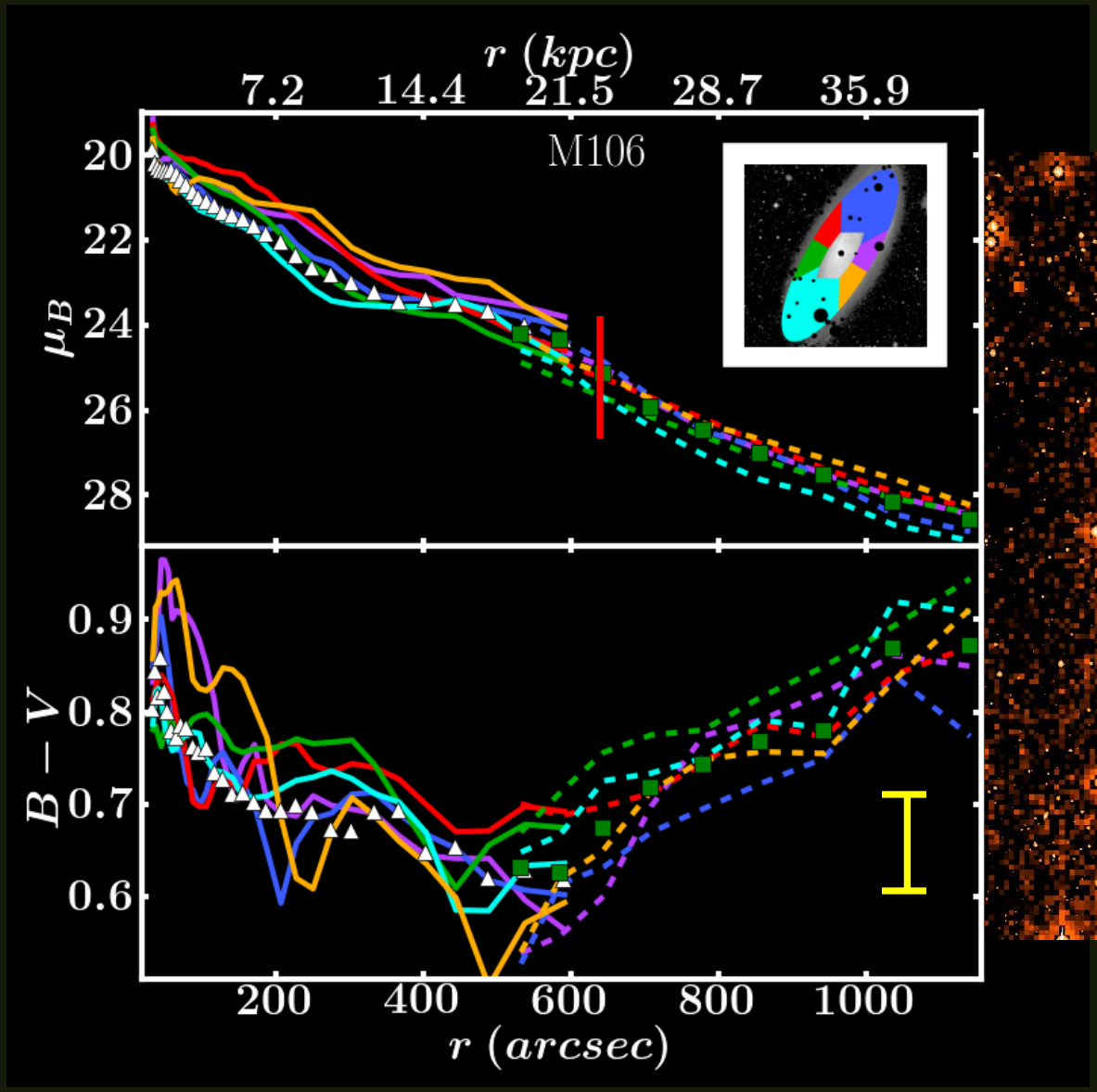
Questions

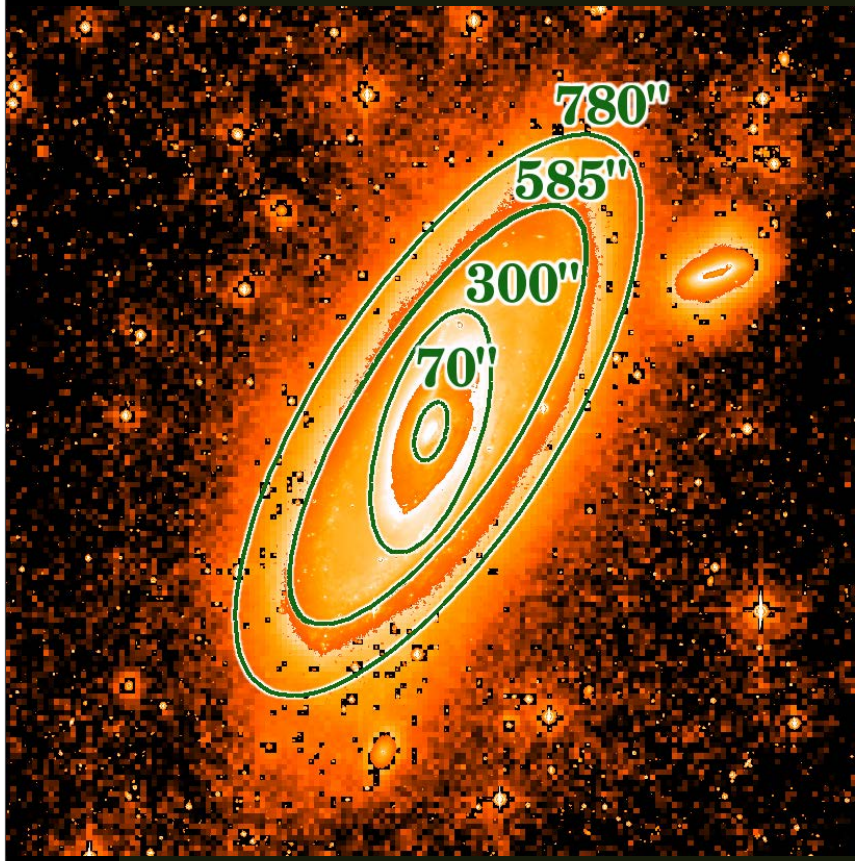
- What do outer disks look like?
  - Typically not well-mixed?
  - Accretion remnants? Tidal streams? Other distortions?
- What kinds of stars live in extreme outer disks?
  - Blue plumes typical (e.g. induced SF)?
  - U-shaped age gradient more typical?
  - Effect of interactions on populations?

The Data

- Taken with Burrell Schmidt Telescope
- Exposure times (total, per galaxy):
  - ~10 hours in B
  - ~10 hours in V
- Limiting surface brightness (local):
  - $\mu_{B,lim} \approx 30$
- Color limit (B - V):
  - ± 0.1 at $\mu_B \approx 28$

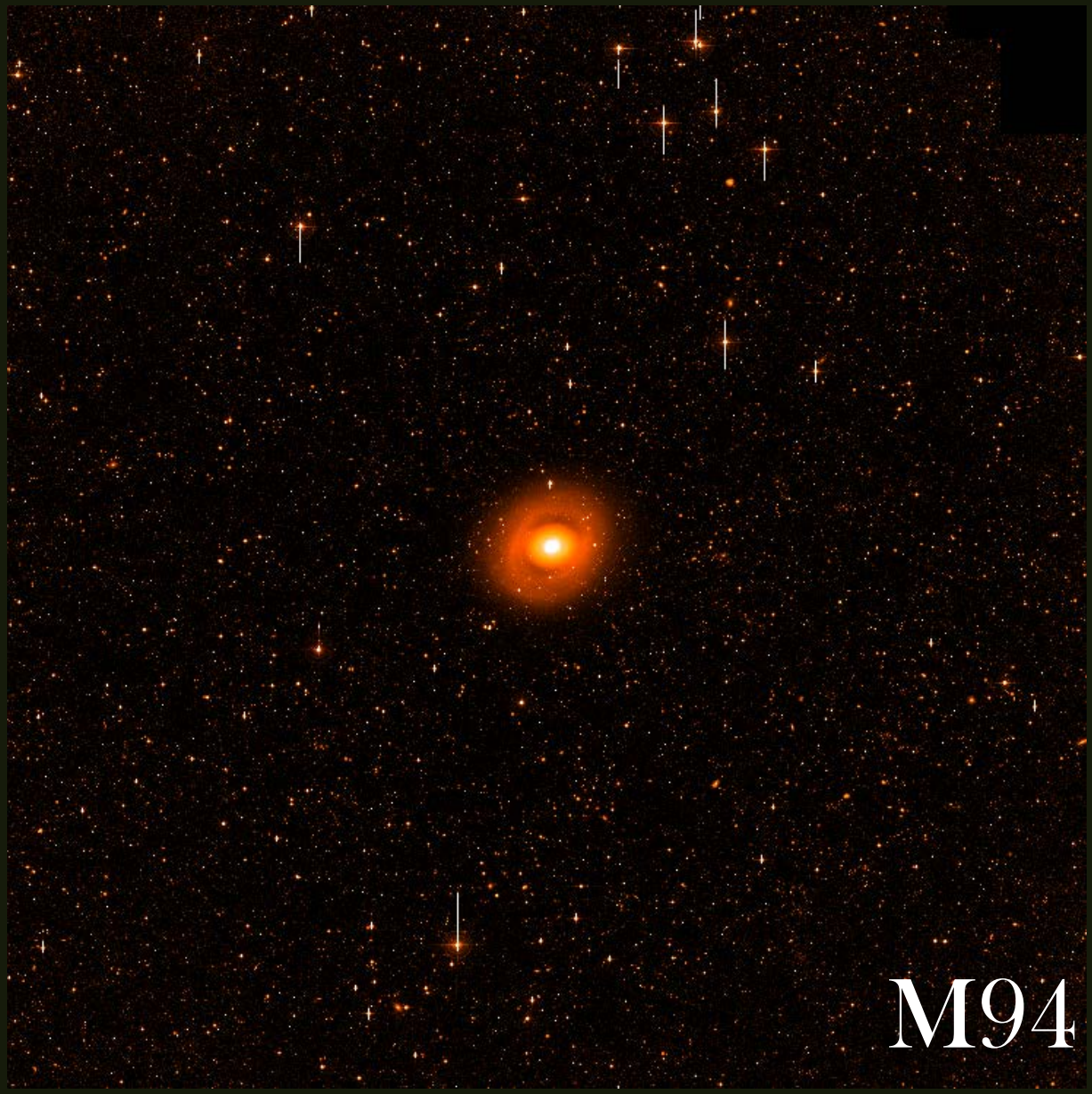
Effect of ongoing interactions?



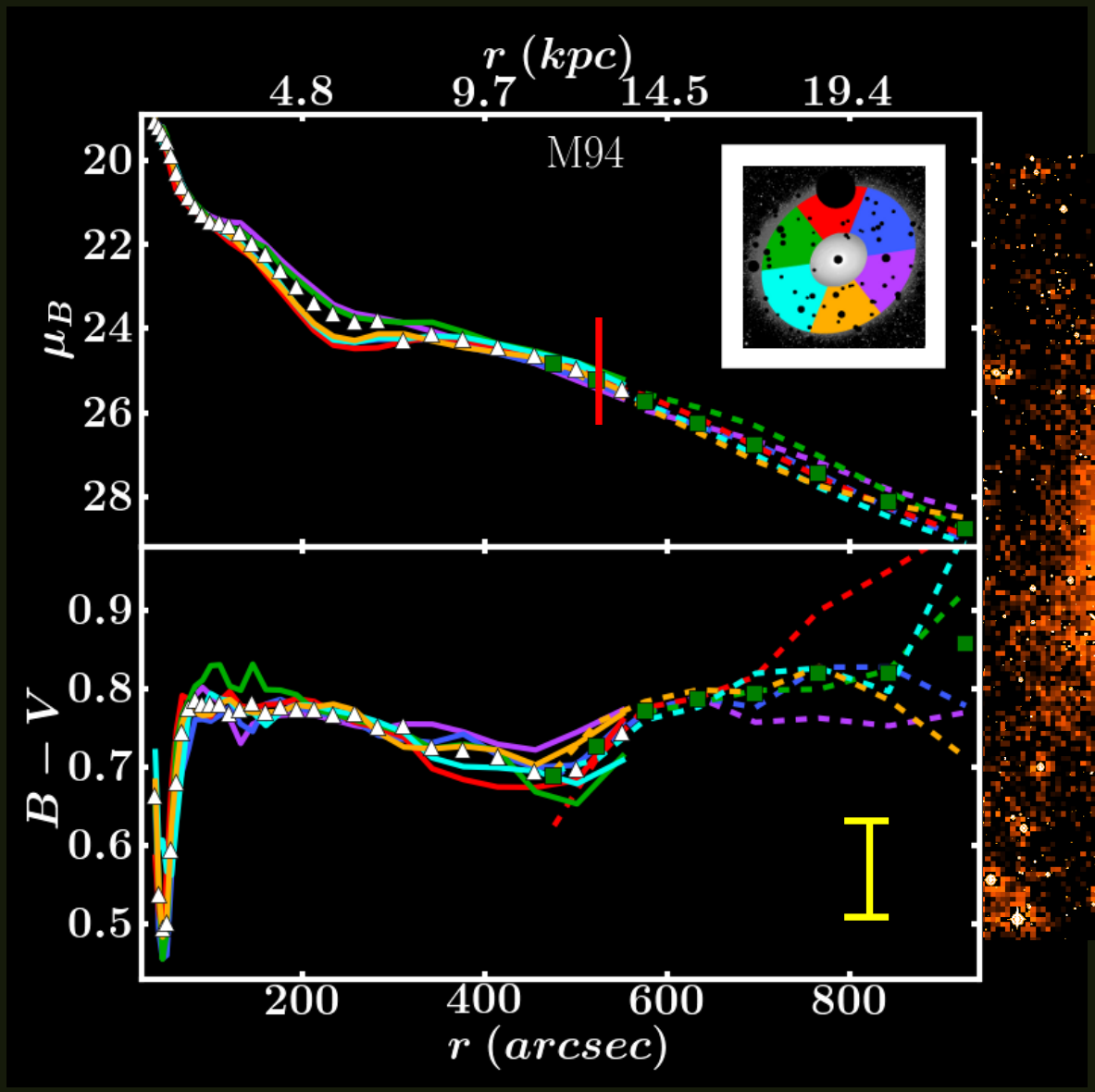


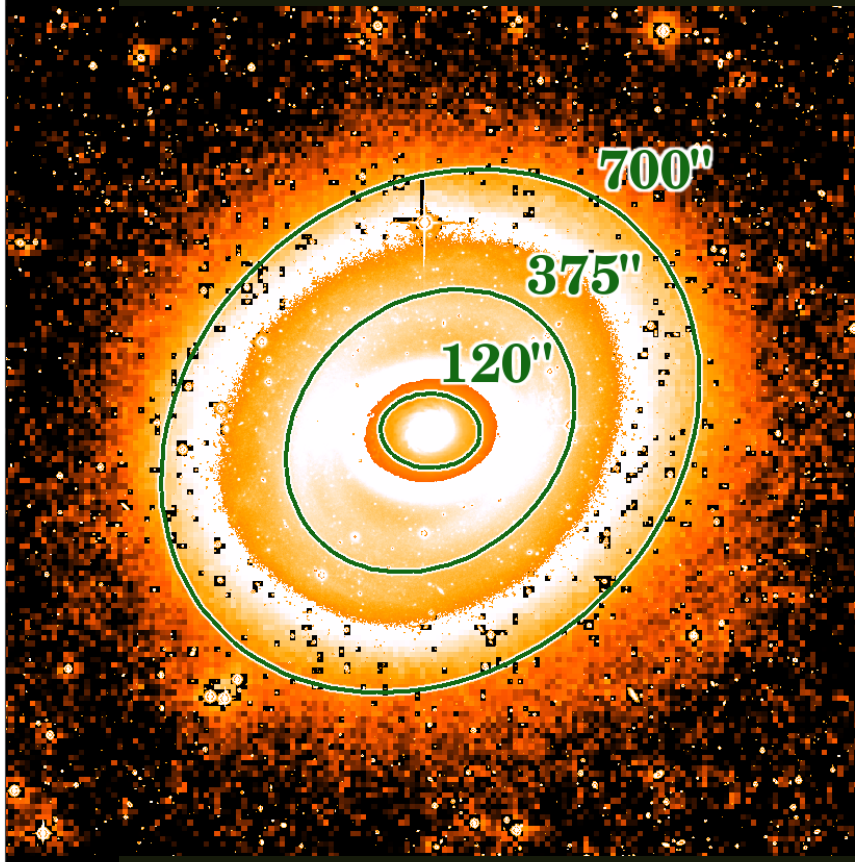
M106/N 4258

A different environment



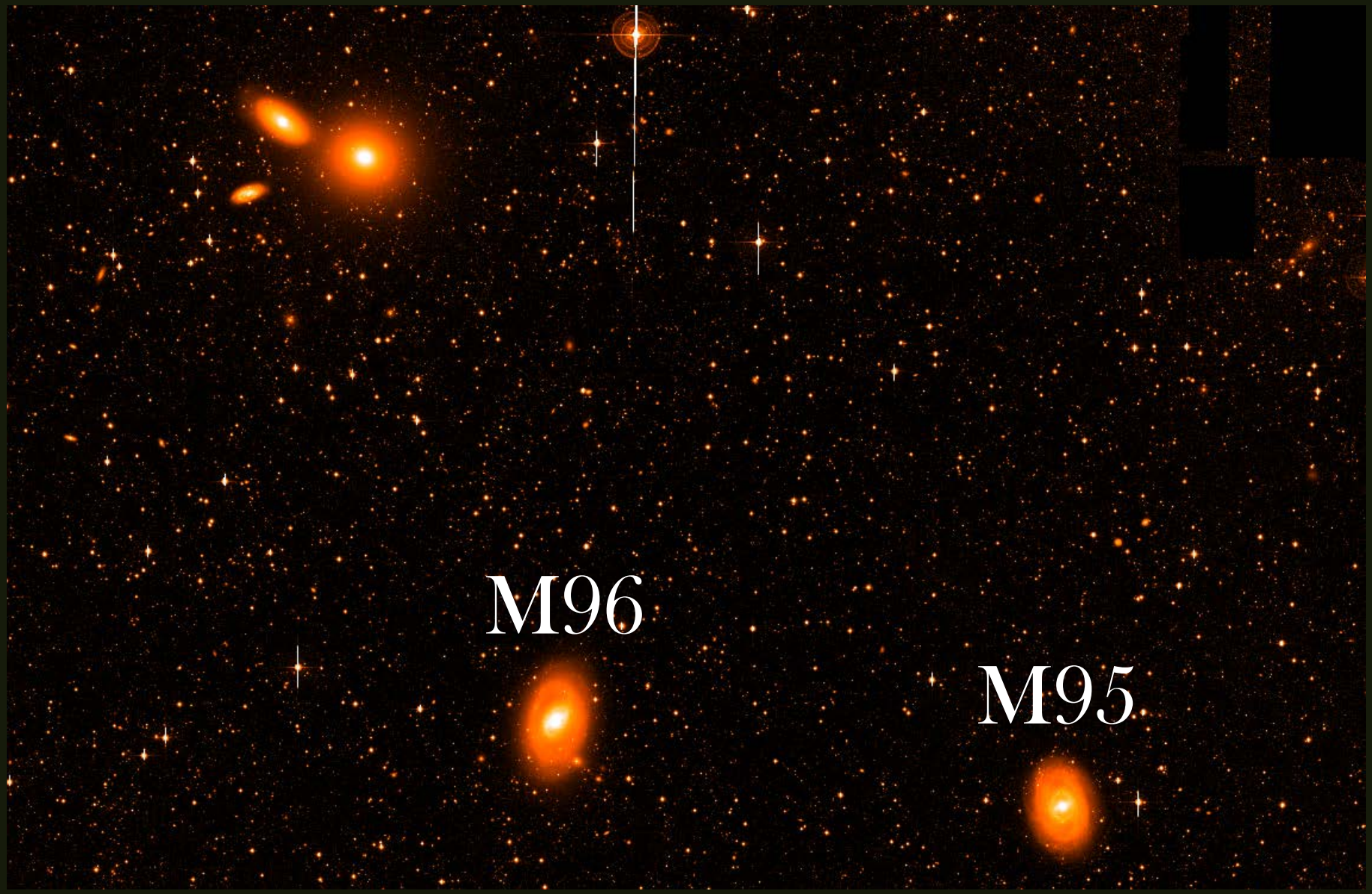
A smooth and exponential outer disk



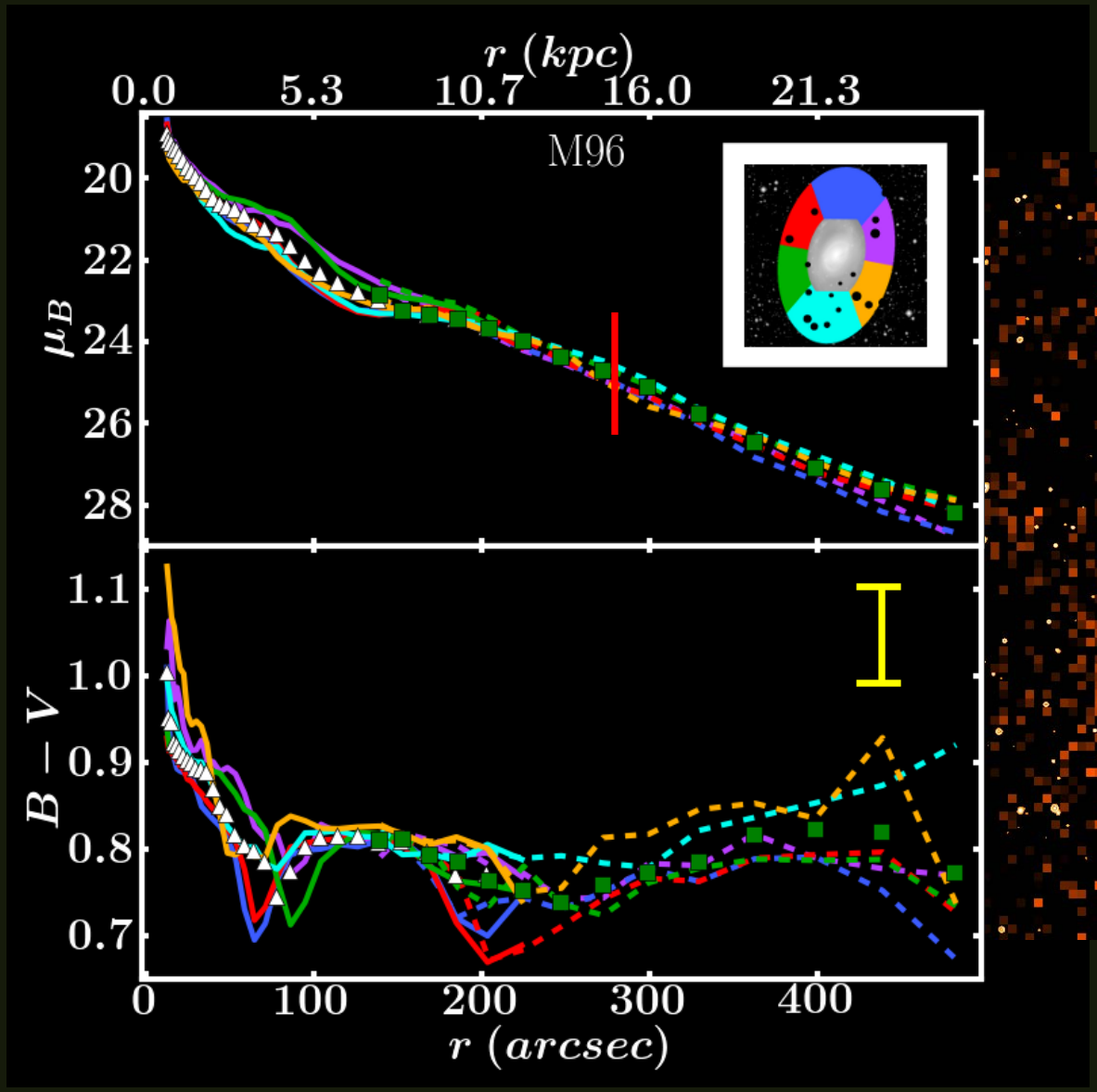


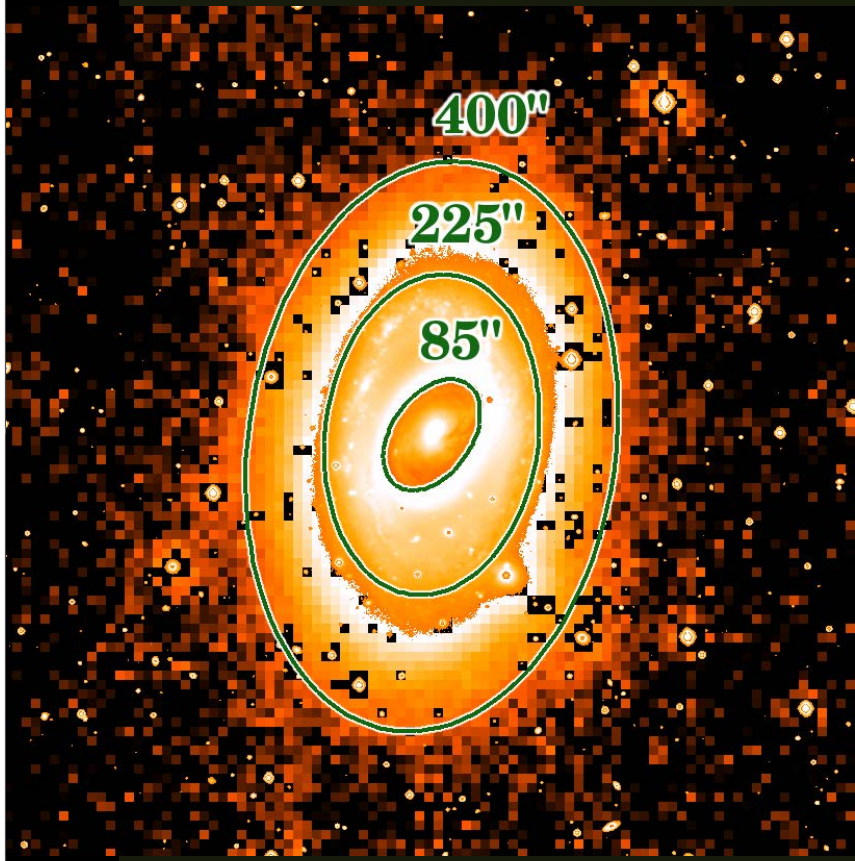
M94/N 4736

A loose group environment



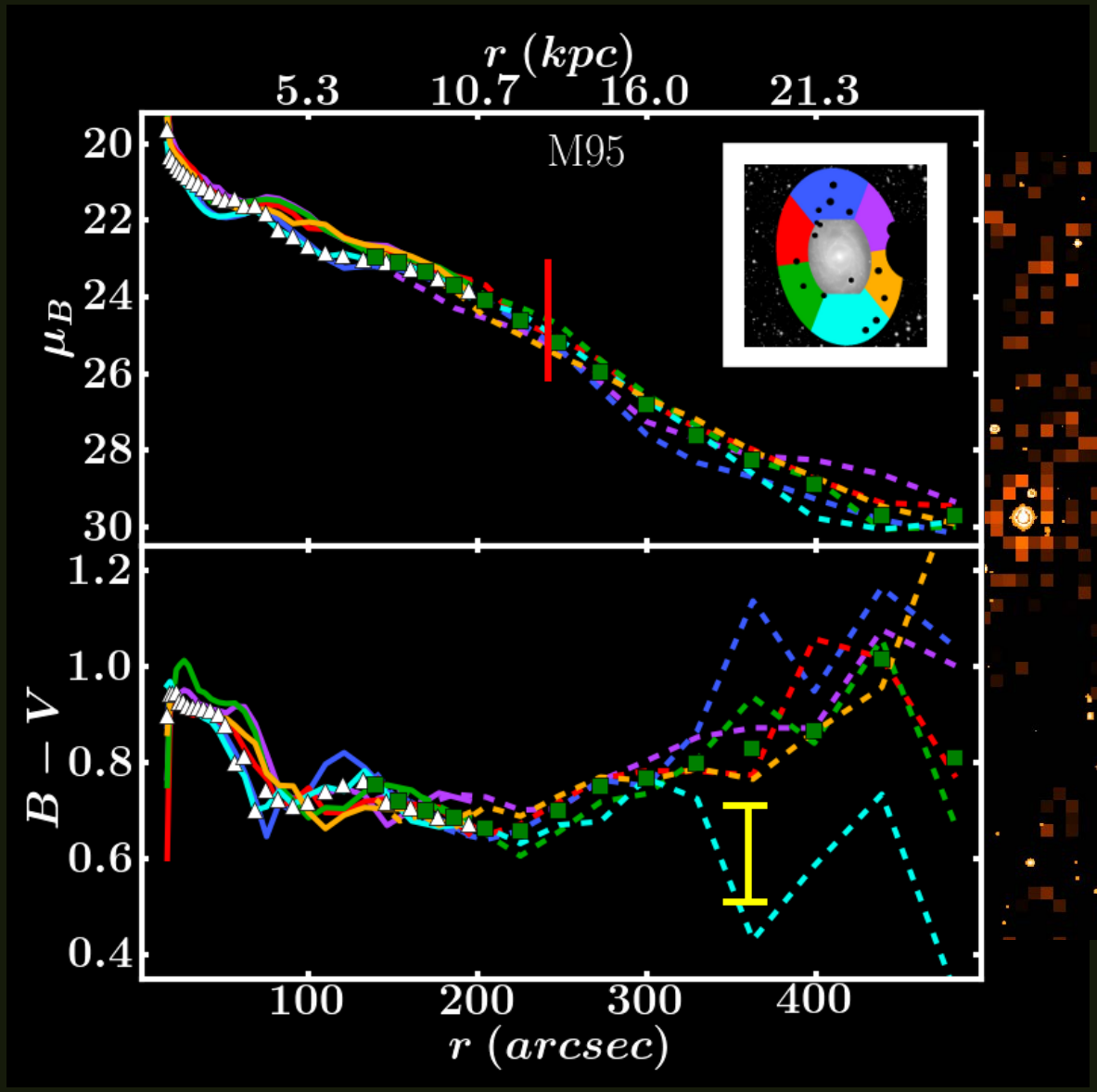
Another smooth exponential!

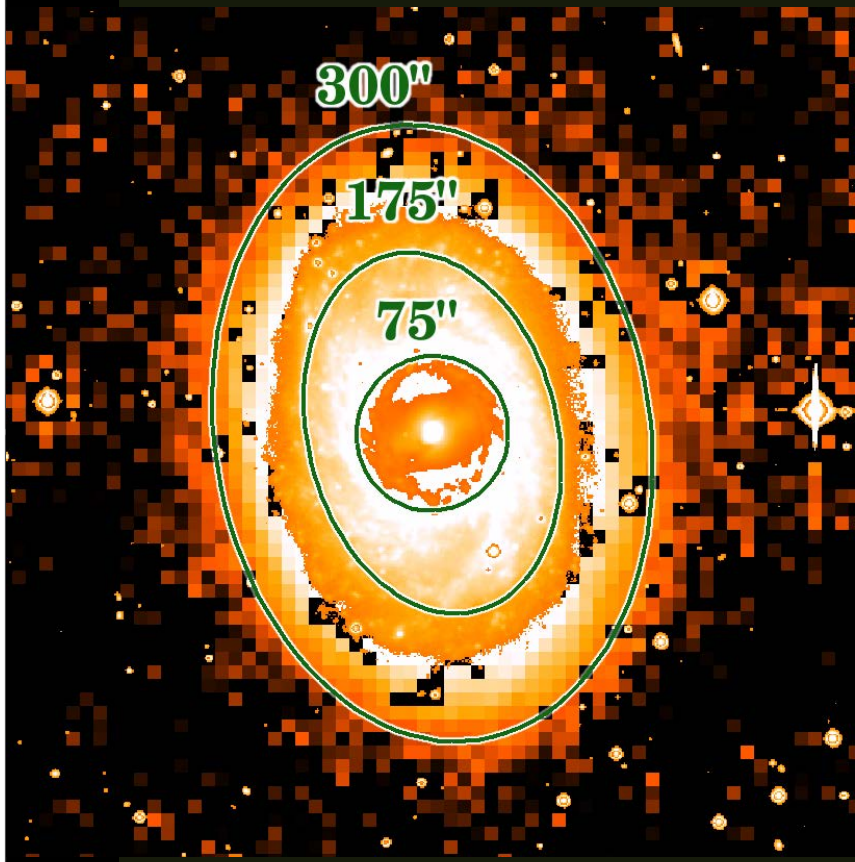




M96/N 3368

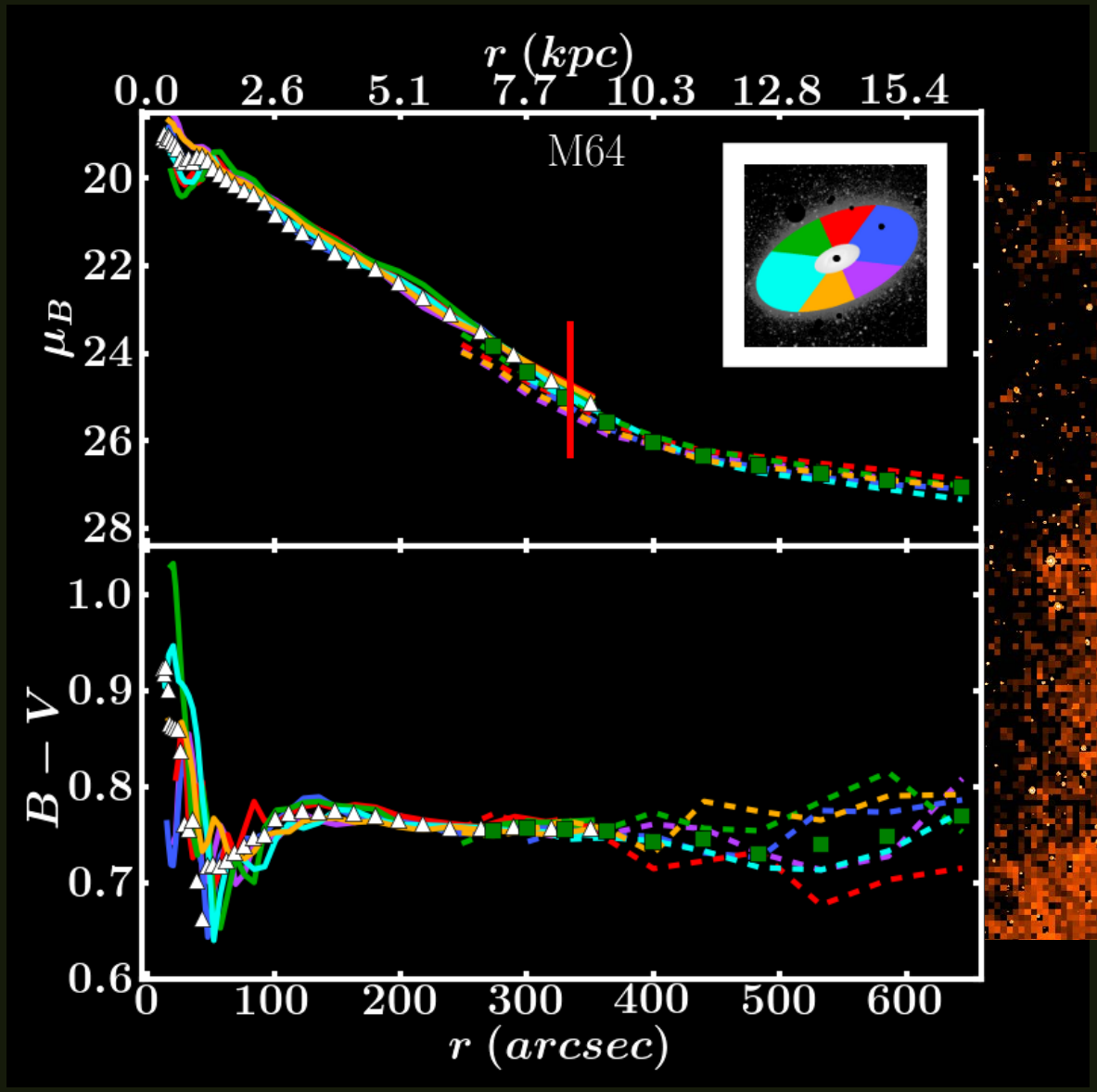
Disk break, but still smooth isophotes

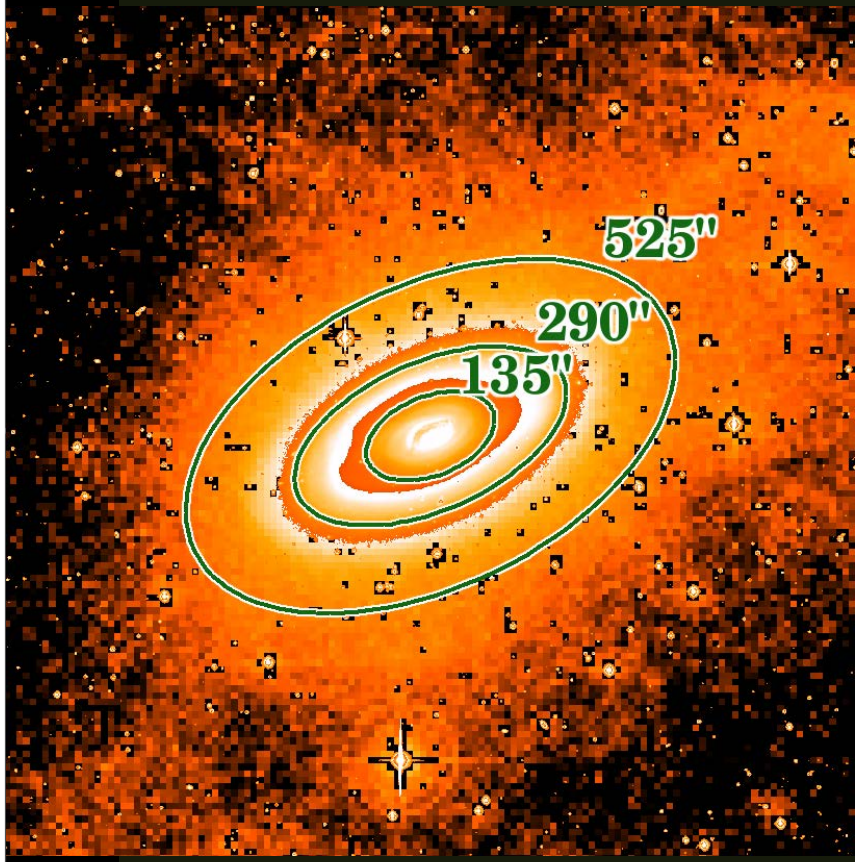




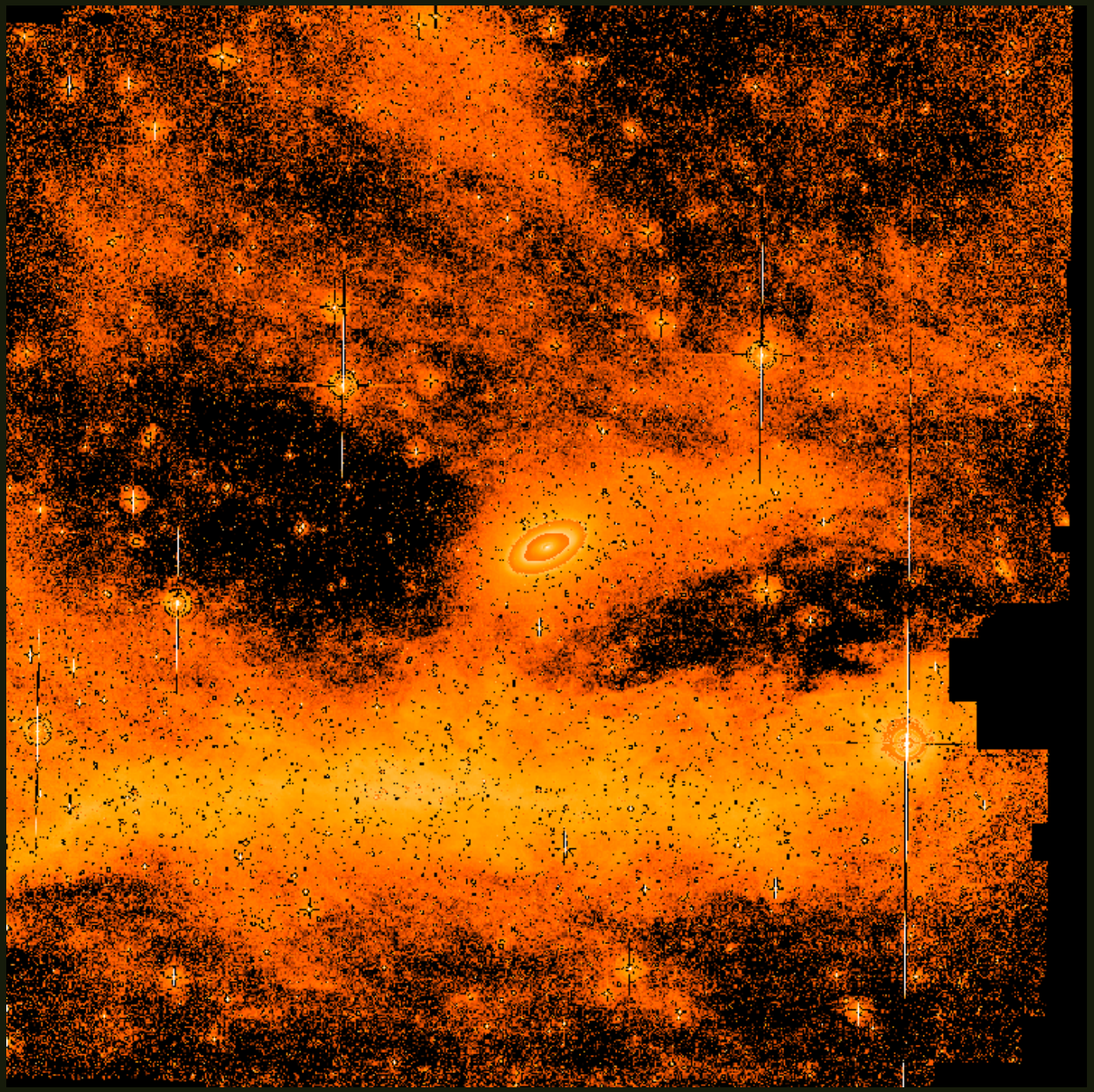
M95/N 3351

Here's a Type III break, but...





M64/N 4826



Summary

- Be careful when azimuthally averaging in outer disks
- Still, smooth outer isophotes may be common, unless there's a clear companion present
- Outer disk stars are red and therefore probably old
- Interactions don't always induce SF
  - Satellite mass important?
  - Gas in satellite important?

Thanks for listening!