

# The Stellar Populations of Virgo Cluster Galaxies

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# The Menagerie of Galaxy Formation Uncertainties

- Gas-poor giants (E, S0)
  - e.g., **details** of their hierarchical origin (gas fractions, etc.)
- Gas-poor dwarfs (dE, dS0)
  - e.g., are dwarfs formed **similar** to the gas-poor giants?
- Spiral galaxies (Sa-Sm)
  - e.g., do bulges form **before** or **in situ** with disks?
- Stellar population data **can** help galaxy formation models!

# Data & Model

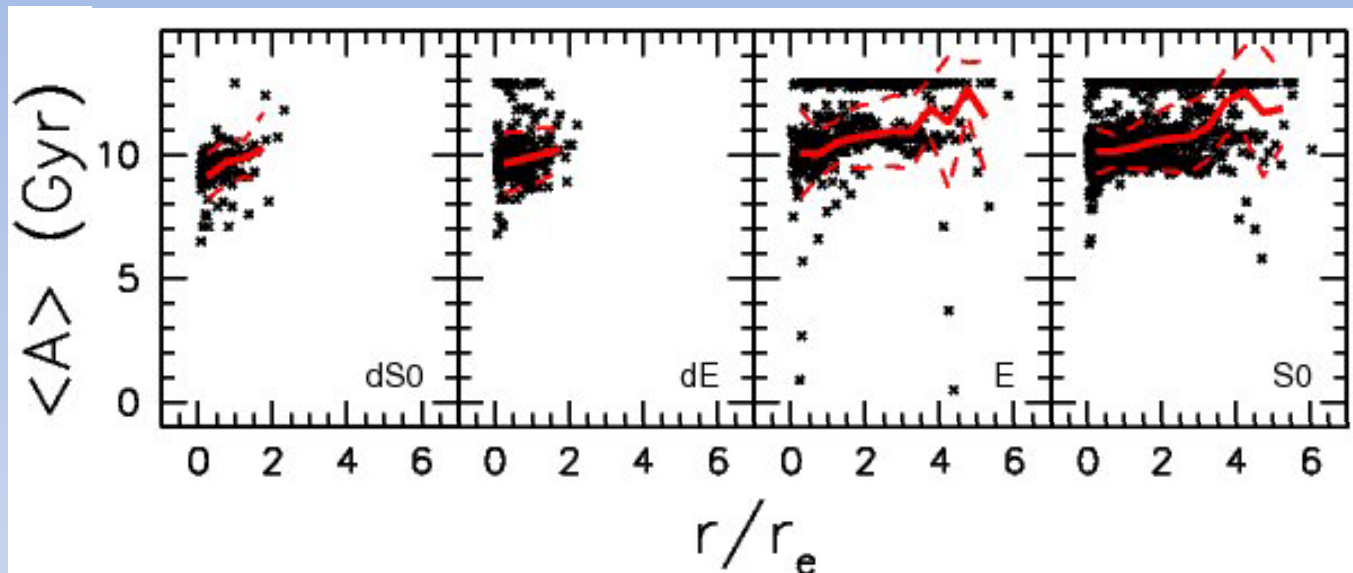
- SDSS + H-band light profiles for **285** VCC members (McDonald+, *submitted*) enable an **extensive** SP analysis

## Advantages of the McDonald+ database:

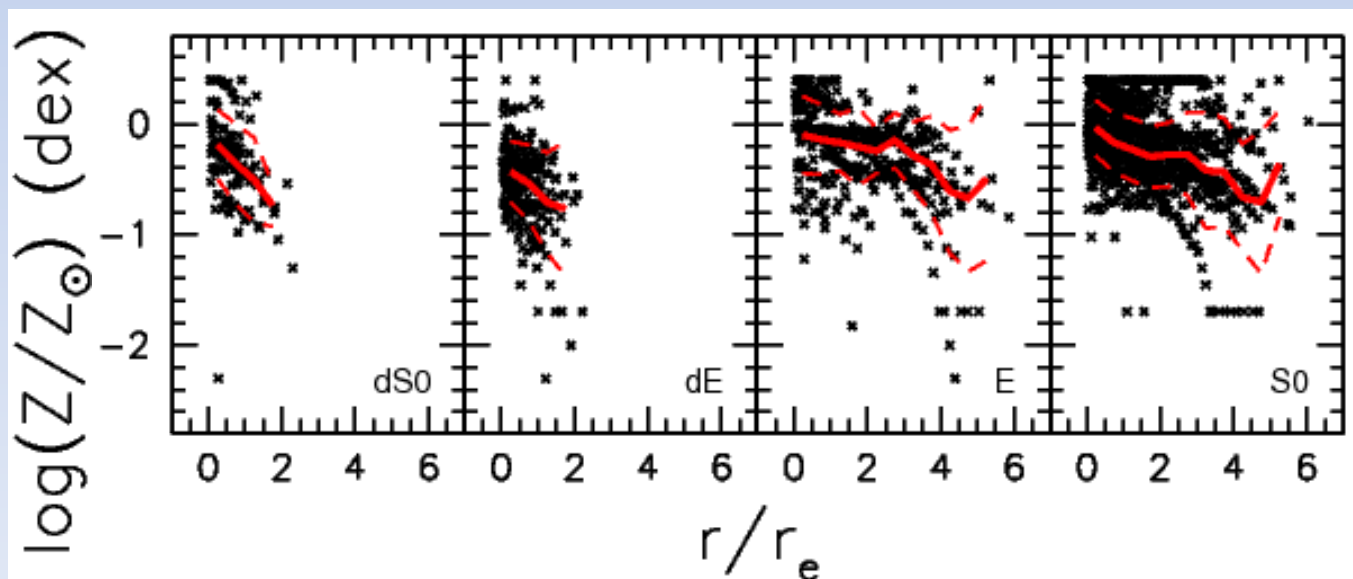
- sample covers **wide** ranges in galaxy structure & environment
  - it's **deep!**; H-band light profiles typically reach  $\sim$ **24** mag arcsec<sup>-2</sup>
  - structural information **available** from light profile decompositions
- Virgo galaxies' colour profiles fitted with models from Charlot & Bruzual (2010), assuming an **exponential** SFH

# Gas-Poor Galaxies

Age  
profiles



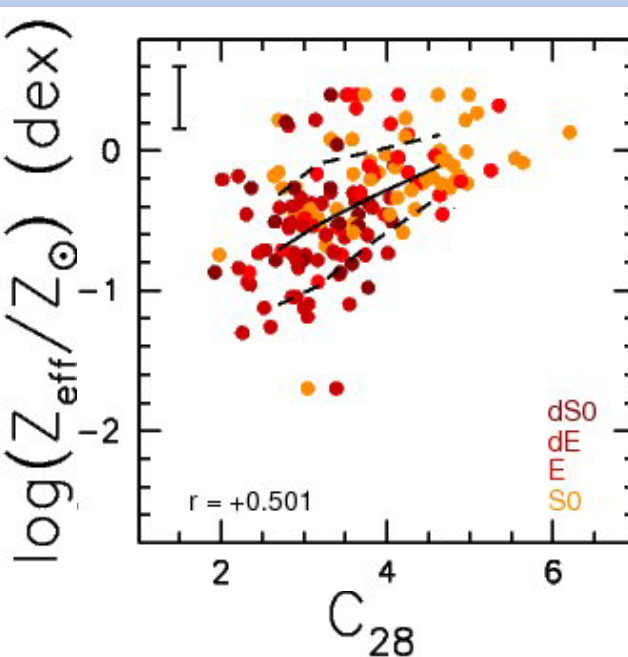
Metallicity  
profiles



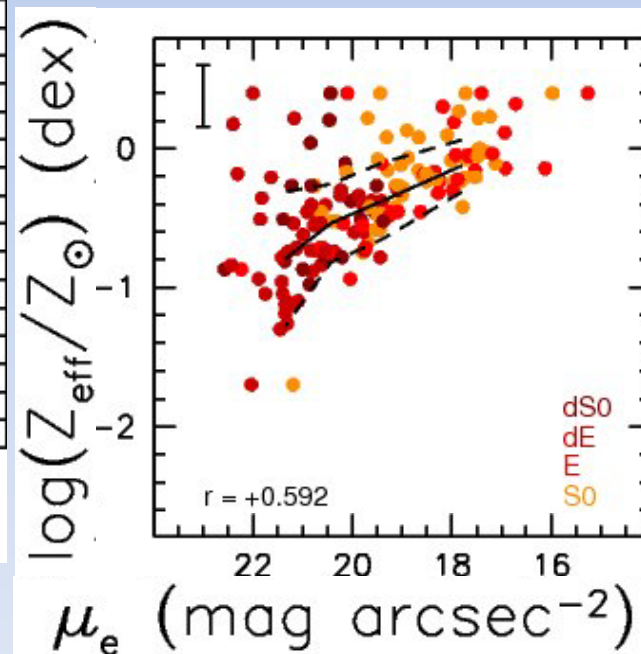
# Gas-Poor Galaxies: Chemical Evolution

Metallicities of Virgo gas-poor galaxies **increase** with ...

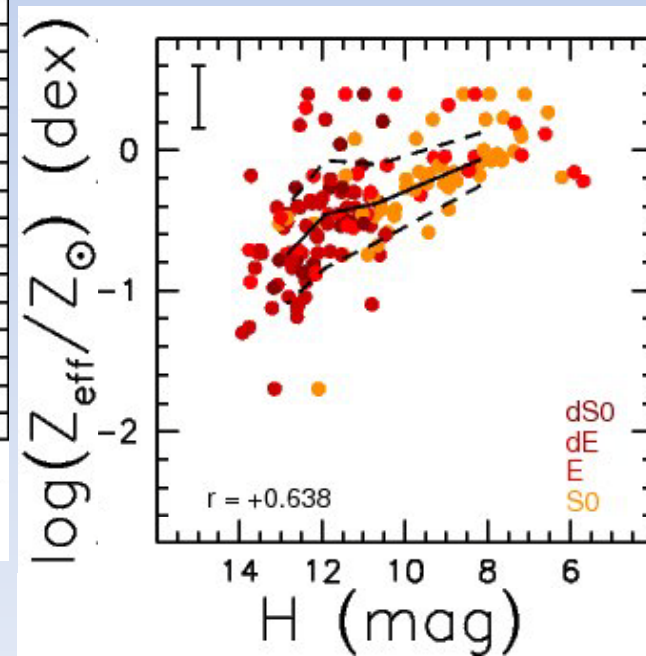
... **concentration,**



... **surface brightness,**

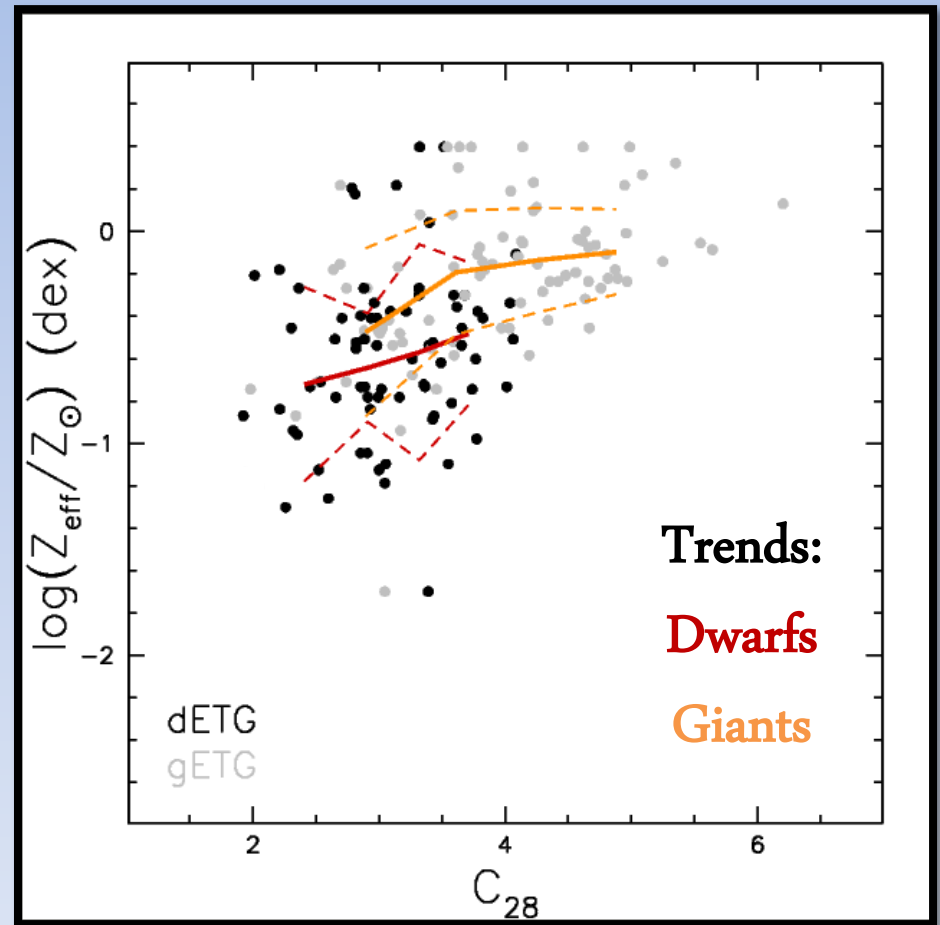


... and **luminosity.**



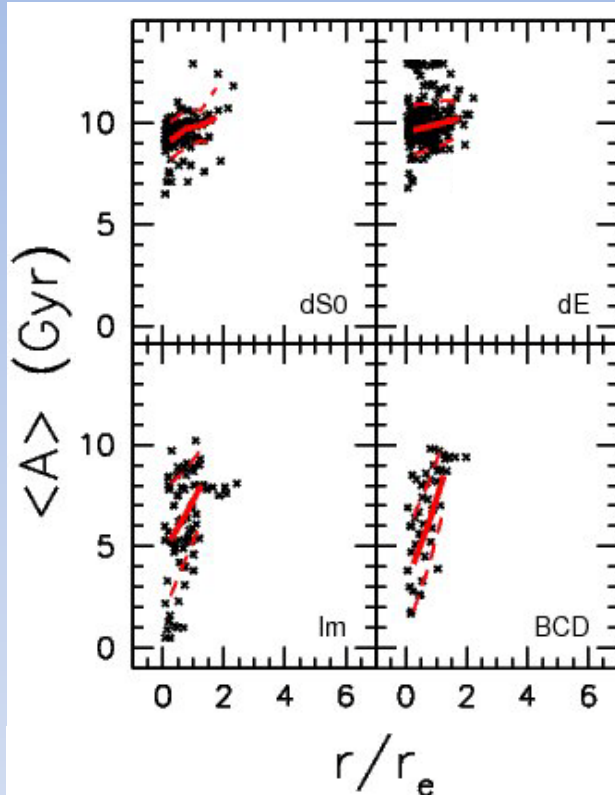
# The Dwarf-Giant Dichotomy

- Virgo dE/dS0's **do not** exhibit statistically significant metallicity-structure trends like those of Virgo E/S0's
  - ➡ the formation of Virgo gas-poor dwarfs may **differ** from that for the gas-poor giants

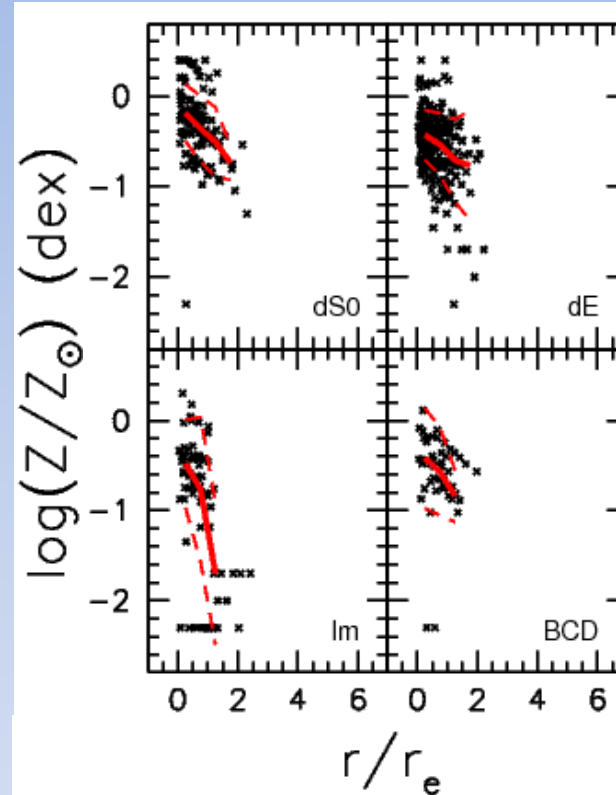


# Evolution of Cluster Dwarfs

Age  
profiles

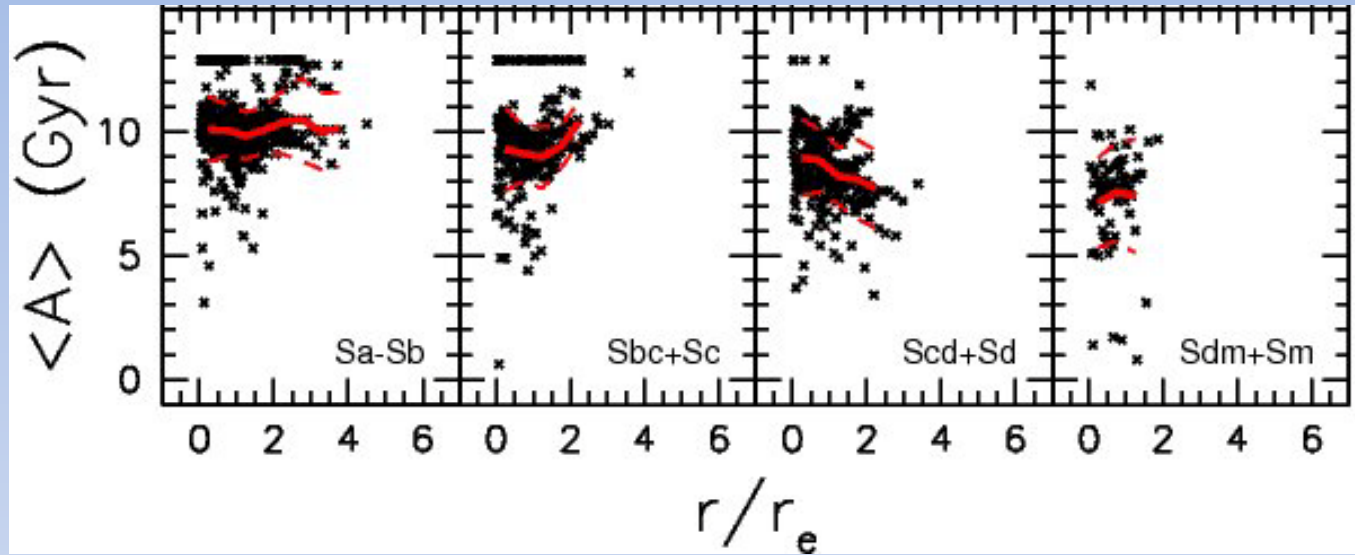


Metallicity  
profiles

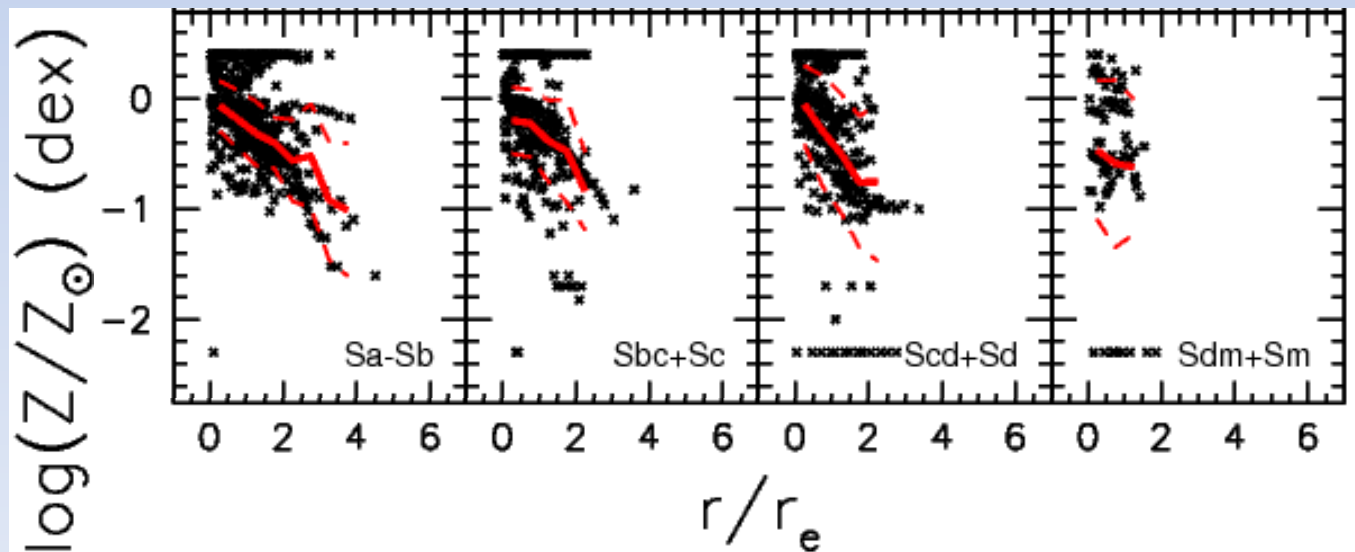


- Sense of age and metallicity gradients in all Virgo dwarfs is **equivalent**
  - **Recent star formation** in Im+BCD's may explain quantitative discrepancy, but, introduces **other** problems for transformation scenario (e.g., **metallicities**)

# Gas-Rich Galaxies



Age  
profiles

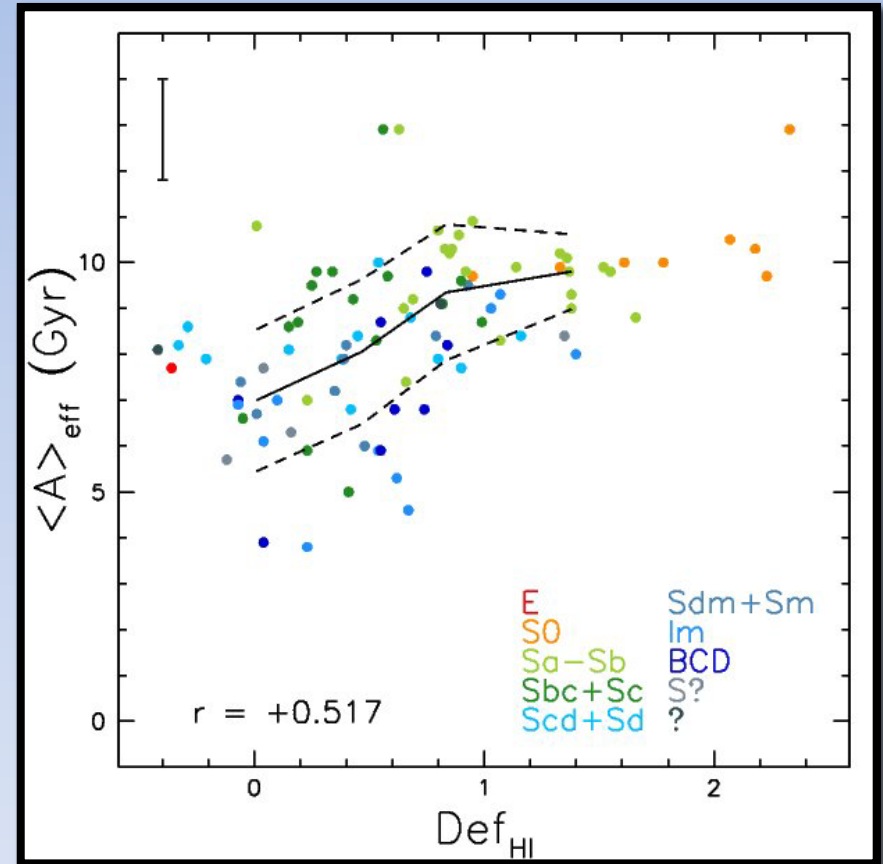


Metallicity  
profiles



# Environmental Effects

- Ages of Virgo gas-rich galaxies **increase** with  $\text{Def}_{\text{HI}}$ 
  - ➡ gas removal processes are likely significant to the evolution of cluster disks
- Other SP diagnostics for Virgo gas-rich galaxies show **no**  $\text{Def}_{\text{HI}}$  trend
  - ➡ due to **gas fallback** or **triggered star formation?**



# Conclusions

- We have studied the formation & evolution of **all** galaxy types in a nearby cluster with **deep** SP information, **for the first time**
- Results (Roediger+ 2011):
  - 1) Gas-poor giants' SPs favour a **gas-rich** merging origin of their stars
  - 2) Gas-poor dwarfs' origins may be **distinct** from gas-poor giants
  - 3) Virgo disks evolve due to **gas stripping**, but in a complex fashion
- Future work:
  - Comparison with **models**
  - **Complete** SED coverage of Virgo galaxies (UV, optical, IR, radio)
  - Pixel-to-pixel stellar population **maps** via tessellations