Star-formation histories early type dwarfs

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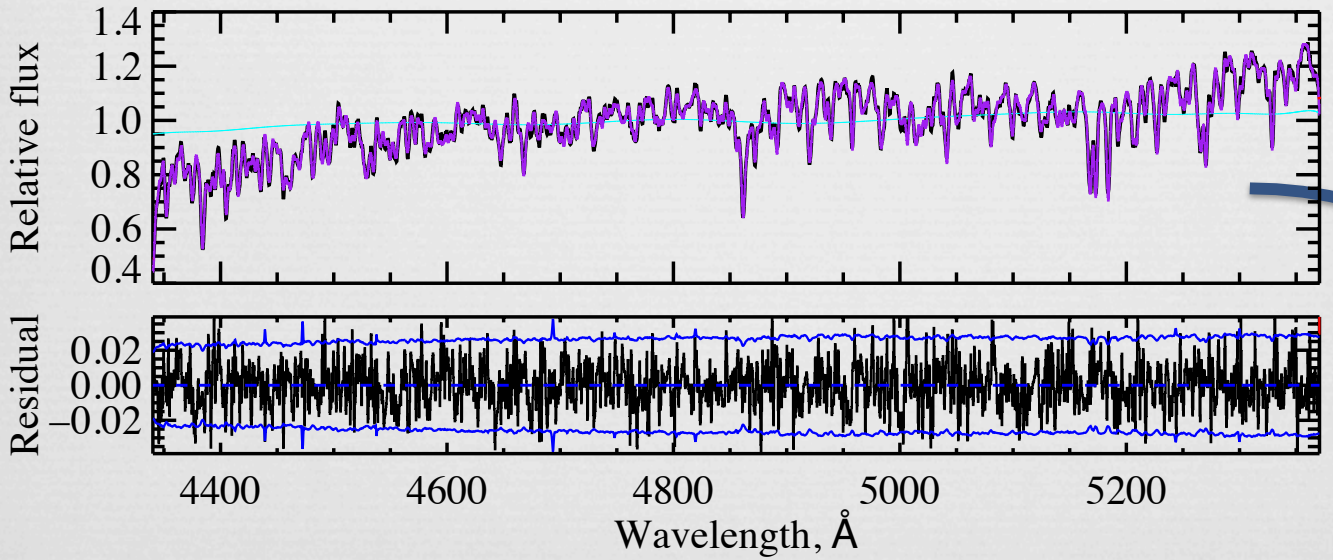
Questions

- How star formation is regulated in dwarf galaxies?
  - Cooling, collapse, feedback
  - DM distribution, mass, angular momentum
- Why do galaxies stop forming stars?
  - Internal/environmental processes
- Which are the progenitors of the quiescent dwarfs?

Tools

- High precision, spectroscopic analyses in the optical domain
- Full spectrum fitting (ULySS, *ulyss.univ-lyon1.fr*)



Star-formation and metal enrichment histories

Koleva+2009

Tools

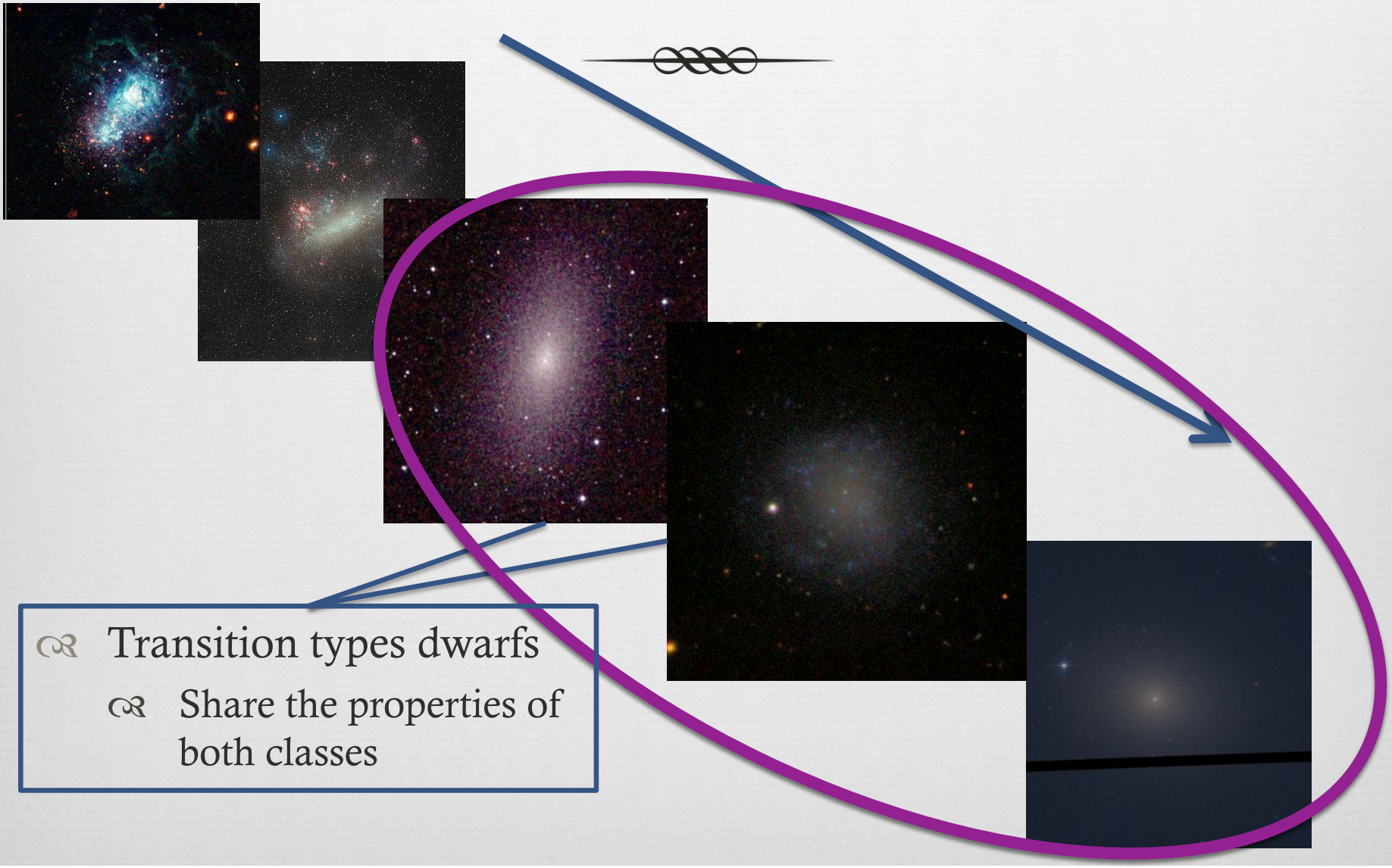
- High precision, spectroscopic analyses in the optical domain
- Full spectrum fitting
  - ULySS (ulyss.univ-lyon1.fr)
- Targets
  - Dwarfs with little star formation ($M_\star \sim 10^9 M_\odot$ in this talk)

Metamorphosis

- Star-forming dwarfs
  - Star formation
  - Gas/dust
  - Irregular shapes

- Quiescent dwarfs
  - No star formation
  - No gas/dust
  - Regular isophotes

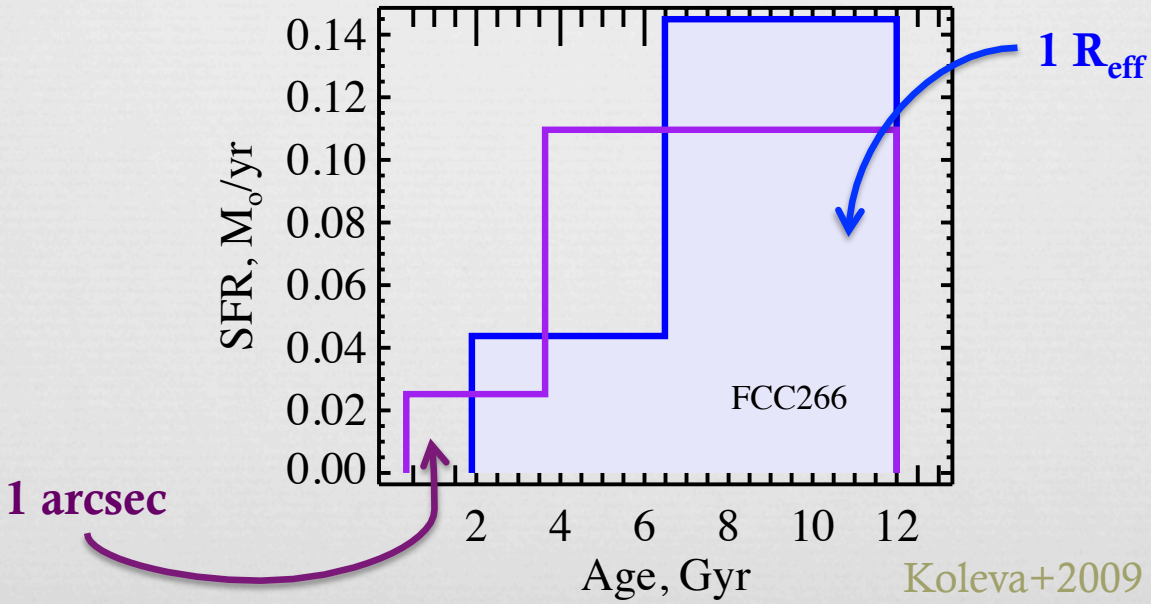
Metamorphosis



- Transition types dwarfs
  - Share the properties of both classes

Dwarf elliptical galaxies

- Sample (similar to NGC205)
  - Different environment
  - $M_\star \sim 10^9\ M_\odot$
  - Long-slit optical spectra
- Results – SFHs
  - 80% stars > 5 Gyr
  - Zoo of SFHs
  - SF area shrinks with time



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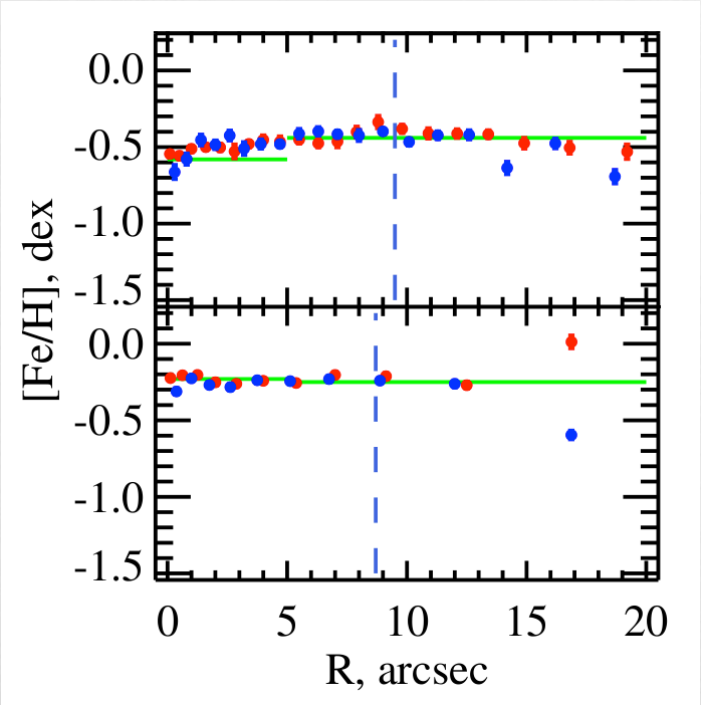
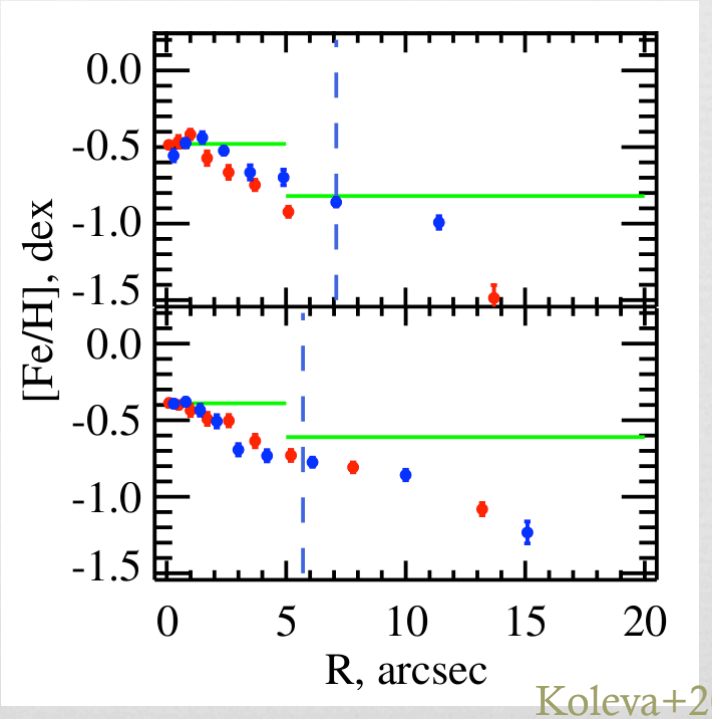
Dwarf elliptical galaxies

- Results – radial gradients
  - Flat and positive age gradients
  - Flat and negative metallicity gradients





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Dwarf elliptical galaxies

- Discussions
  - Prolonged, heterogeneous star-formation histories

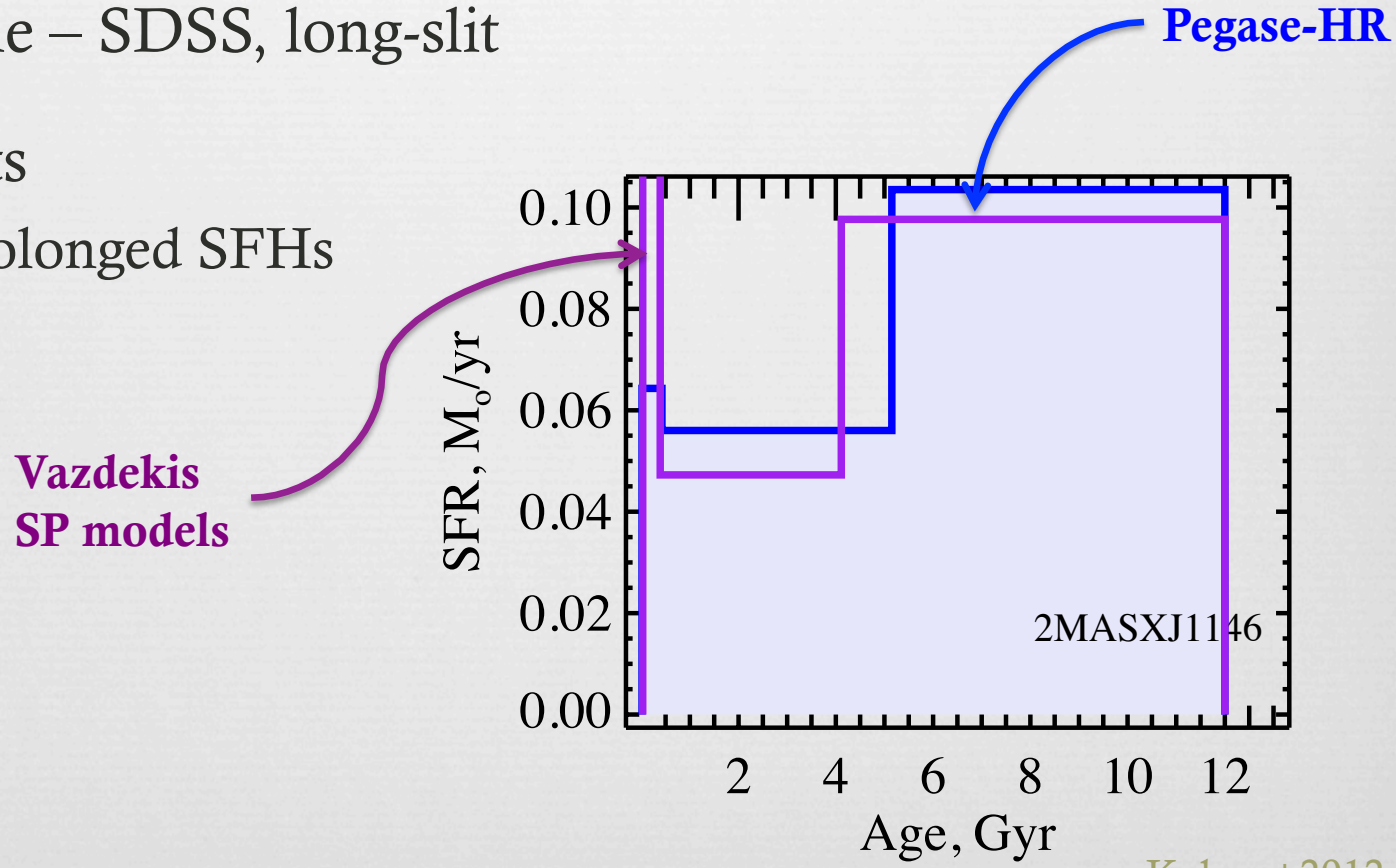
    ➔ galaxies will keep their gas (and SF) until it is removed by environment (simulations, e.g. Valcke+ 2008)
  - Flat metallicity gradients

    ➔ rotating galaxies (dIrr) with continuous SF (see the talk of J. Schroyen)
  - Negative metallicity gradients

    ➔ galaxies with episodic SF (cf. BCDs), shrinking with time

Transition type galaxies

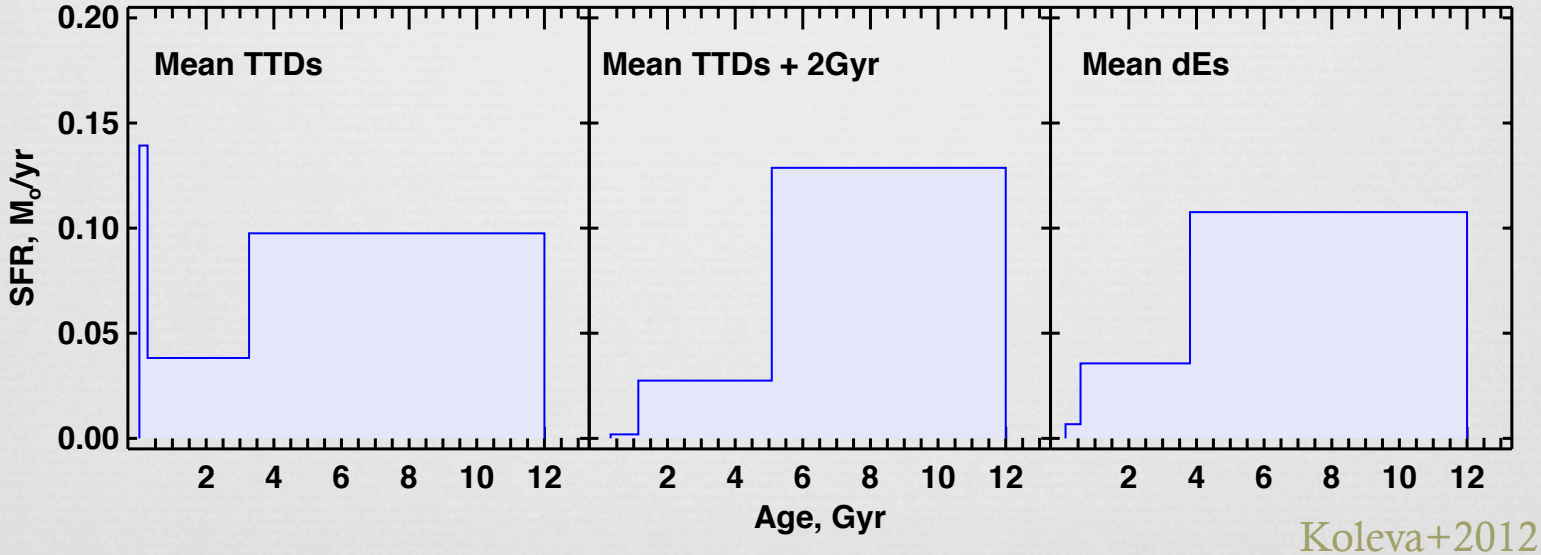
- Sample – SDSS, long-slit
- Results
  - Prolonged SFHs



Koleva+2012

Results: TTD vs. dE

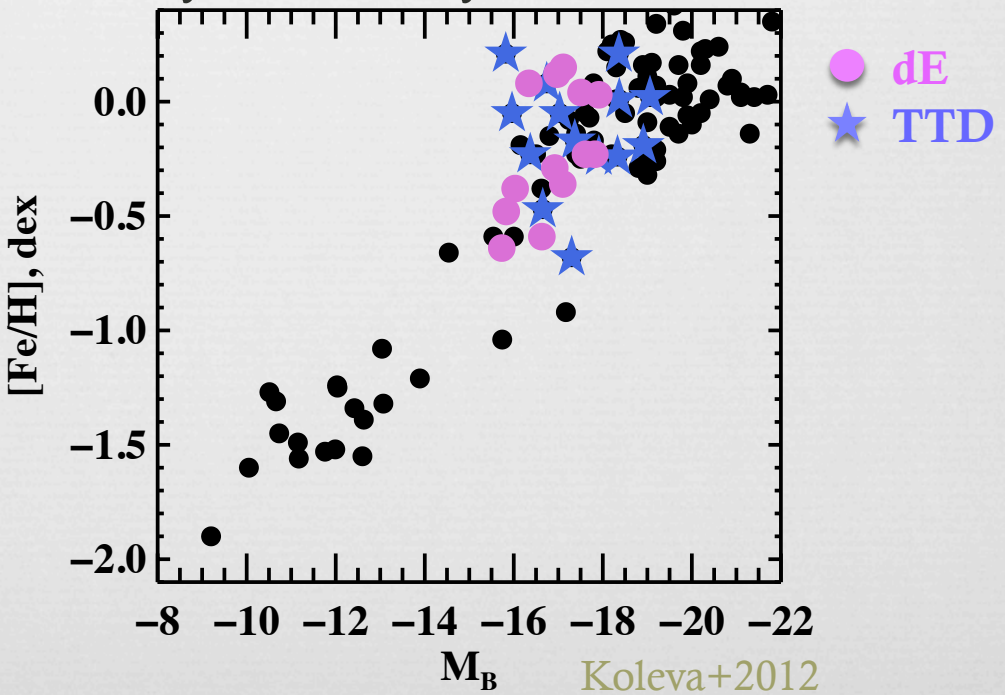
- Passive evolution of a TTD leads to a galaxy equivalent to a dE
  - Identical star-formation histories



Koleva+2012

Results: TTD vs. dE

- Passive evolution of a TTD leads to a galaxy equivalent to a dE
  - On the same metallicity-luminosity relation



Koleva+2012

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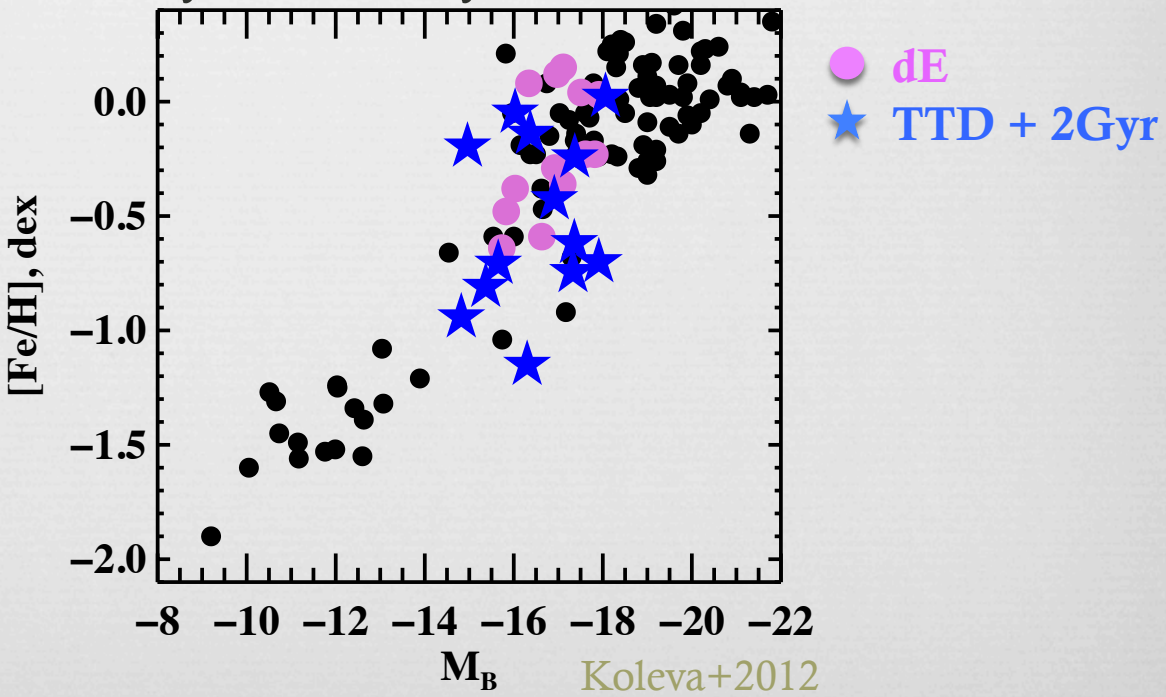

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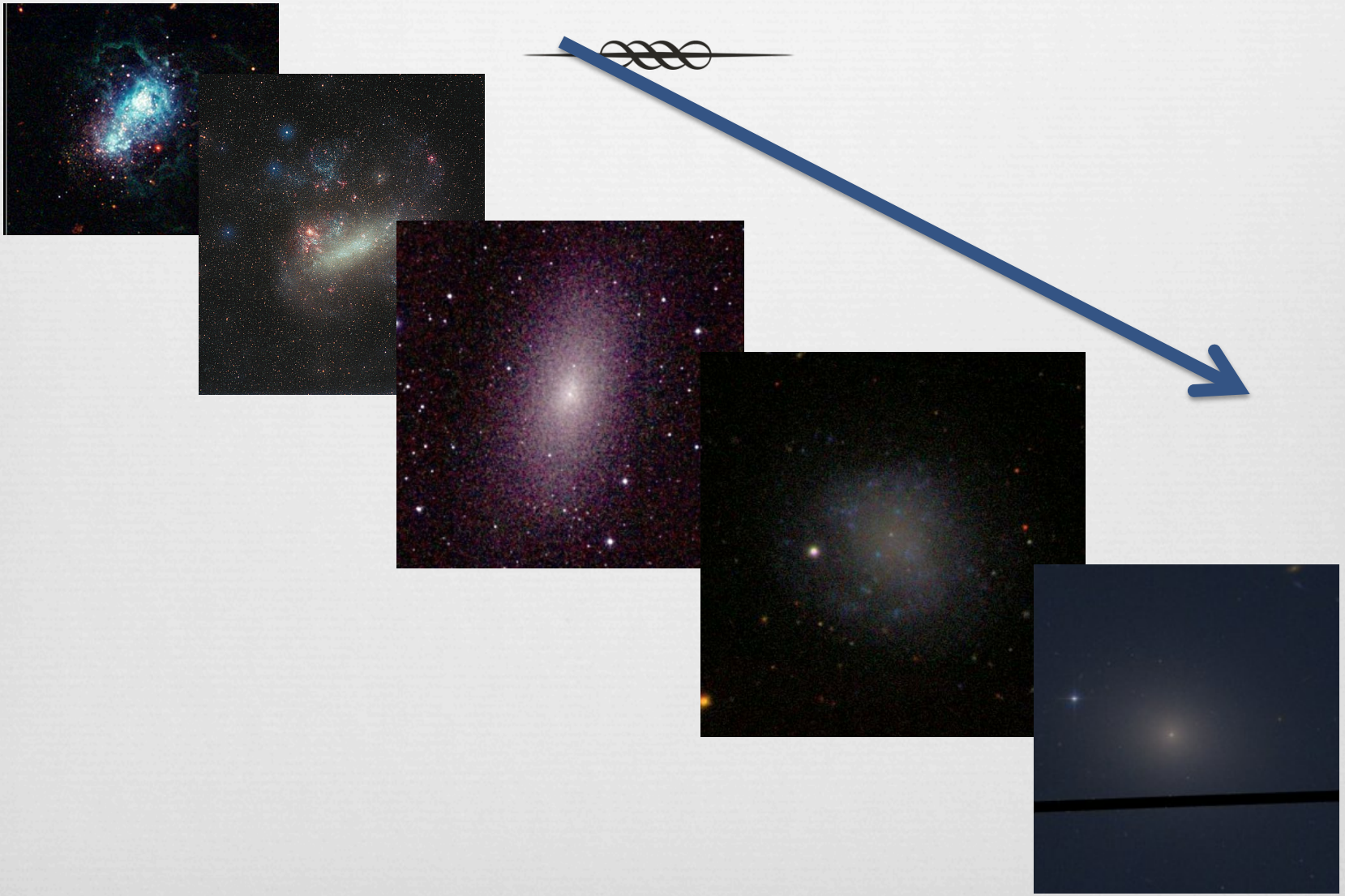
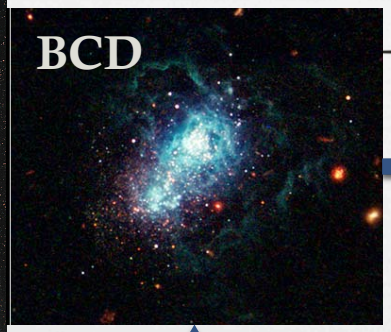
Possible interpretation



Possible interpretation



Enters in a cluster

Tangential orbit

30 %

Radial orbit

70 %

False dEs

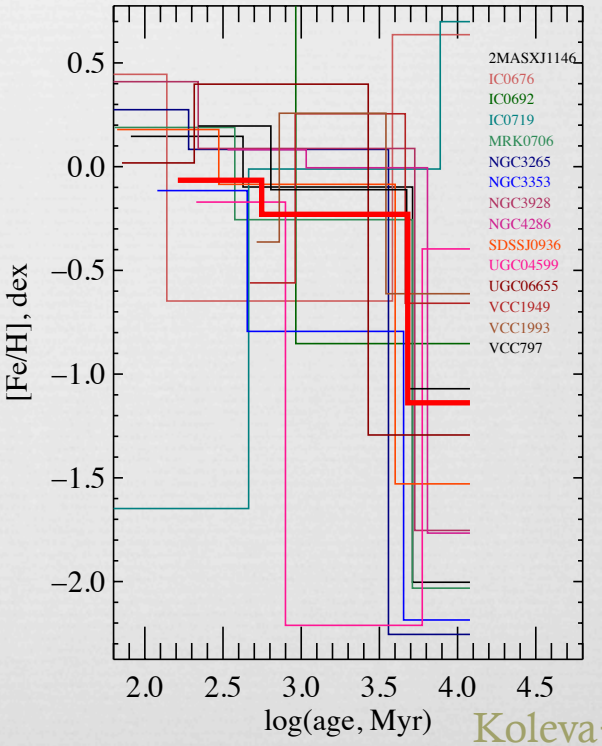
- **Transition dwarfs are not necessarily transiting**

Conclusions

- ***TTDs and dEs are similar***
  - ***Stellar populations alike between TTDs and dEs (Koleva + 2012)***
  - Also for less massive TTDs (Grebel + 2003, Weisz + 2011)
- TTDs should be found only in the outskirts
  - Yes (Conselice + 2003, Bouchard + 2009, Drinkwater + 2001)
- ~30% dwarf galaxies have gas. Hence, most of the galaxies should be on radial orbits
  - Yes (Fornax, De Rijcke et al 2010),
- TTDs and BCDs are similar in sparsely populated environments
  - Similar metallicities between BCDs and TTDs (Sanchez-Almeida + 2009)
  - Episodic SFH, steep metallicity gradients..
  - Need more data to be tested!

Results: TTD vs. dE

- Passive evolution of a TTD leads to a galaxy equivalent to a dE
  - Metallicity enrichment histories



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