



***An Mid-infrared View of the Highway  
for Galaxy Evolution in Compact Groups***

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*The 5<sup>th</sup> SSGW (Feb 1-3, 2016)*

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## Stephans Quintet deep space star galaxy cluster Square Wallclocks

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*Stephan's Quintet, Hickson Compact Group 92*

# Compact Groups of Galaxies: Densest Galaxy Systems



*Hickson Compact Group 79*

- ✧ High Galaxy number density  
 $10^{3.5} \text{ Mpc}^{-3} \gg 10^2 \text{ Mpc}^{-3}$  (clusters)
- ✧ Low Velocity dispersion  
200 km/s (CGs)  $\ll$  500~1000 km/s (clusters)
- ✧ High Fraction of ETGs  
> 60% ( $\approx$  clusters)
- ✧ Small size  
less than 150 kpc ( $\approx$  typical size of the BCGs)

***“Compact groups are a fascinating laboratory for studying galaxy interactions and evolution.”***

*(Sohn et al. 2015, JKAS)*

# Compact Groups of Galaxies

$\langle \mu \rangle \leq 26 \text{ mag arcsec}^2$   
(compactness)

Only photometric constraints!!!

$3\mu_\theta$

No bright ( $\Delta m < 3$ ) galaxy  
(isolation)

$\mu_\theta$  ( $\sim$  few arcmin)

$N (\Delta m \leq 3) \geq 4$   
(population)

Selection criteria  
suggested by  
Hickson (1982)

# Compact group catalogs

✧ *Hickson 1982 : 100 compact groups*

✧ *McConnachie et al. 2009 : 77,088 tentative compact groups (SDSS DR6)*



✧ *Sohn et al. 2015 : 332 compact groups with complete spectroscopic redshifts (SDSS DR12, FLWO/FAST, & literatures)*



✧ *Sohn et al. (in prep.) :  $\geq 2000$  compact groups selected with a FOF algorithm (SDSS DR12)*

## Quiz

✧ *Member galaxies in compact groups evolve (                      ).*

✧ *Graduate students are getting old (                      ).*

① *rapidly*

② *rapidly x 2*

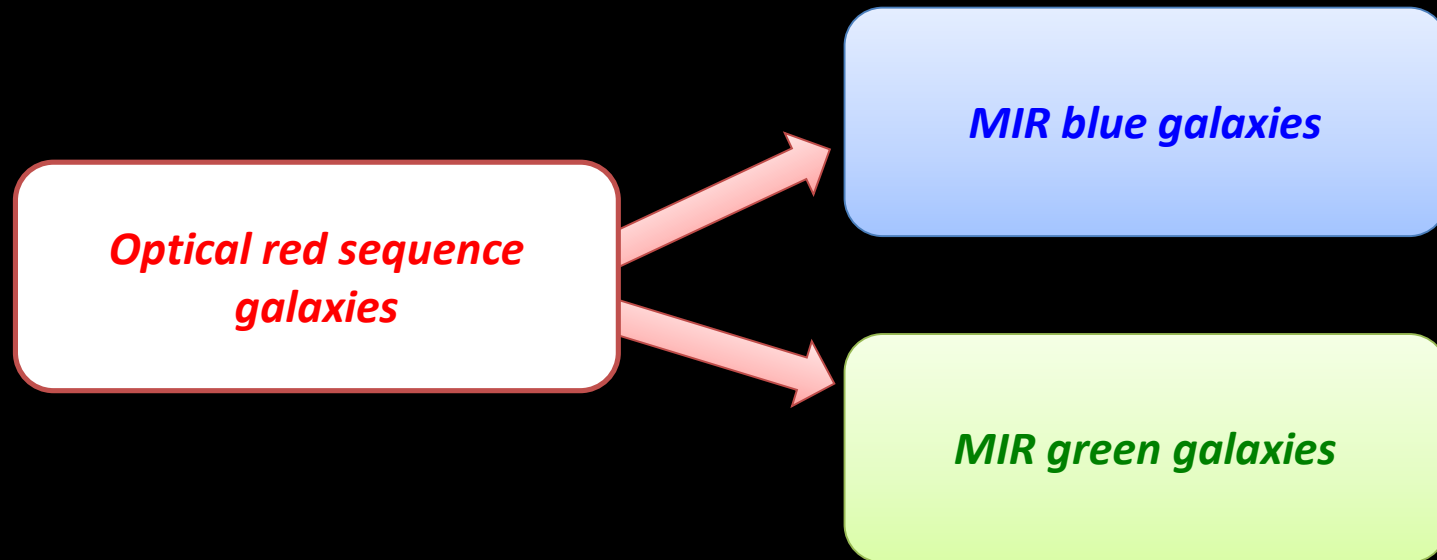
③ *rapidly x 5*

④ *rapidly x 10*

⑤ *rapidly x 10<sup>10.5</sup>*

# MIR Properties of Compact Group Galaxies

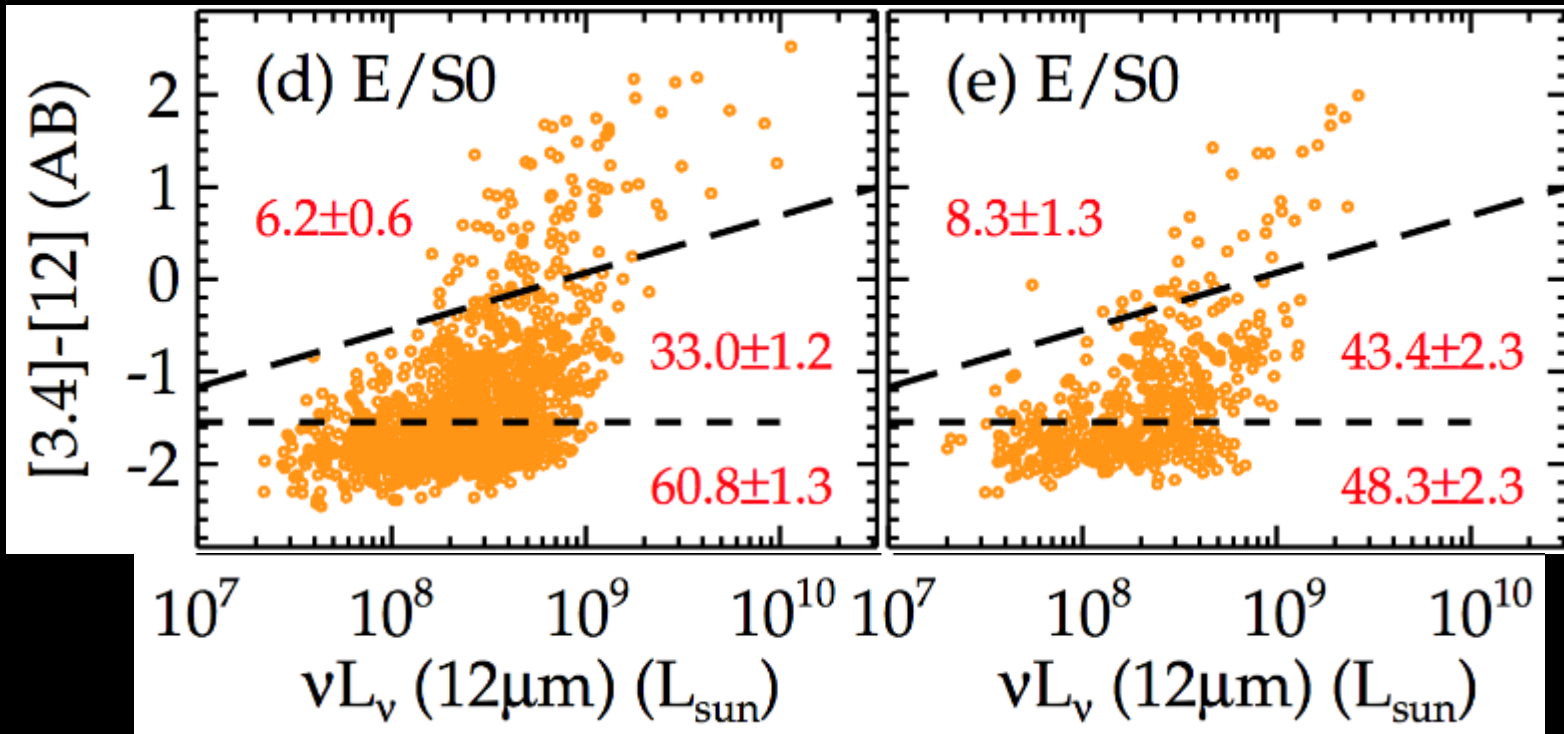
- ✧ *Compact groups are dominated by red sequence galaxies (Bitsakis et al. 2010, 2011; Walker et al. 2013; Sohn et al. 2013; Coenda et al. 2015).*
- ✧ *MIR colors are powerful tools to peer into the late-stage of galaxy evolution (G.-H. Lee et al. 2015).*



## A Result

**Compact Groups**

**Clusters**



✧ *Galaxy transition in compact groups occurs much faster than in clusters.*