## Formation of Bar and Spirals in Virgo dwarf galaxies

SungWon Kwak (KASI) Woong-Tae Kim (SNU) Soo-Chang Rey (CNU) Thomas R. Quinn (UW-Seattle)

# Motivation

8

v/sin(i) (km/s)



• <u>Hidden Disk Features</u> (Lisker et al. 2006)



 $M_{1} = -20.5$ 

 $M_{i} = -19.4$ 

<M.>=-18.49±0.02

 These dEs with disk featrues are a distinct type and probably originated from infalling late-type galaxies.

**Q1**: Intrinsic stability of infalling progenitor against bar formation in isolation? (Kwak et al. 2017, ApJ)

**Q2**: How would cluster tidal force alter? (Kwak et al. 2018, to be submitted.)

# **Initial Condition**



 VCC856, which is considered as an infalling progenitor, is chosen for our standard model.

- Rotation curve, velocity dispersion, stellar disk mass, dark matter fraction, disk scale length/height
- Additionally 14 more models based on observational error ranges.

## **Evolution in Isolation**

#### Face-on View

Bar Length



### **Buckling Instability**



## **Evolution in Virgo Cluster**



**Orbits of Infalling Galaxies** 



Density Distribution of Galactic Dark Halo (1500 kpc wide)

# **Tidal Effects**





#### on the Innermost Orbit

**Result**: The tidal effects on our realistic dwarf galaxy by cluster is insignificant in terms of disk stability (Kwak et al. 2018, to be submitted).

### **Ongoing**:

- 1) Effects of merger and high-speed multiple encounter
- 2) Formation of infalling progenitor