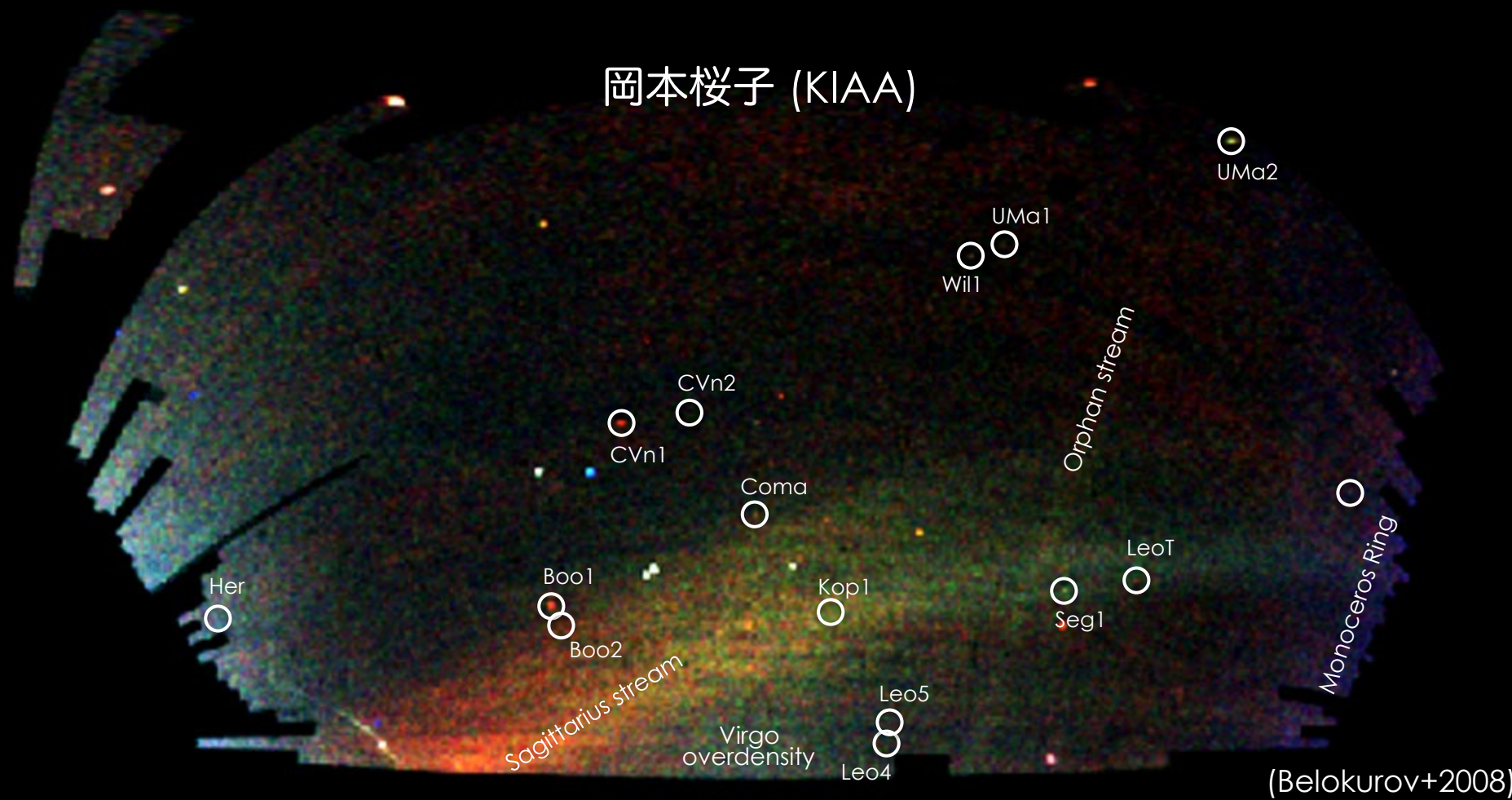


HSCサーベイによる銀河考古学

岡本桜子 (KIAA)



(Belokurov+2008)

Galactic Archaeology with HSC wide survey

Wide survey: 1,400 deg², griz ~ 26mag

- ✧ Search new Galactic faint satellites
- ✧ Search new stellar streams at the outer halo
- ✧ Search new distant faint galaxies in the Local Group
- ✧ Study the properties of known streams, dSphs and dlrrs
- ✧ Probe 3D structure of Galactic outer halo

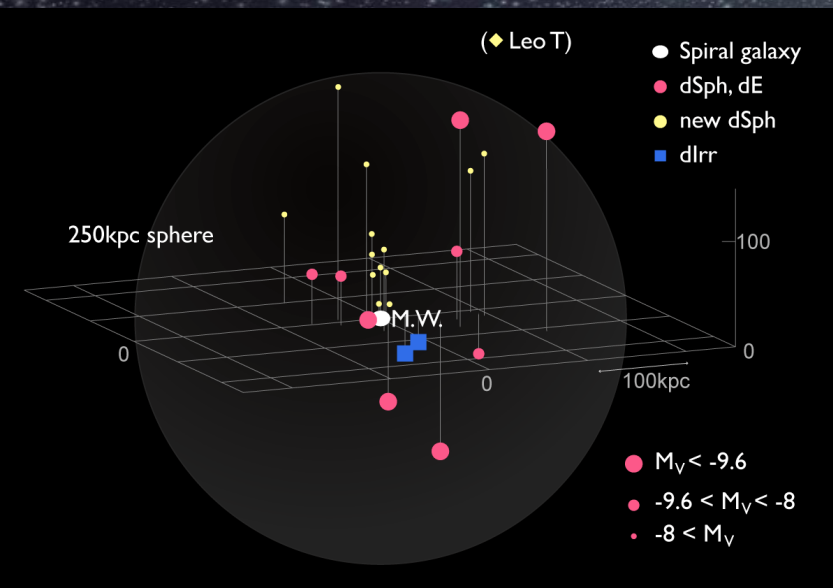
Complete sample of visible MW satellites

SFH of the faintest galaxy

Internal/External effects on SF in low-mass halo

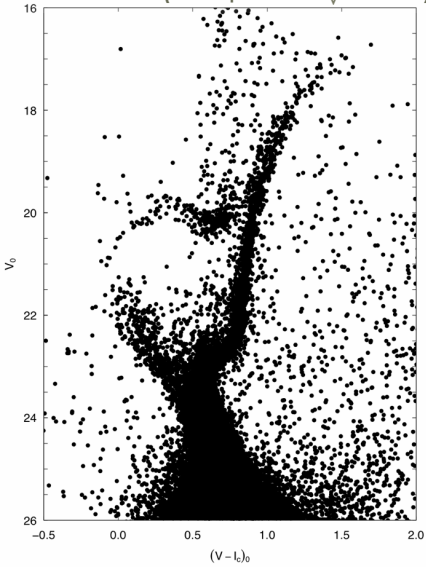
Distribution and Lumpiness of DM (sub)-halo

Verification of LCDM in the MW scale

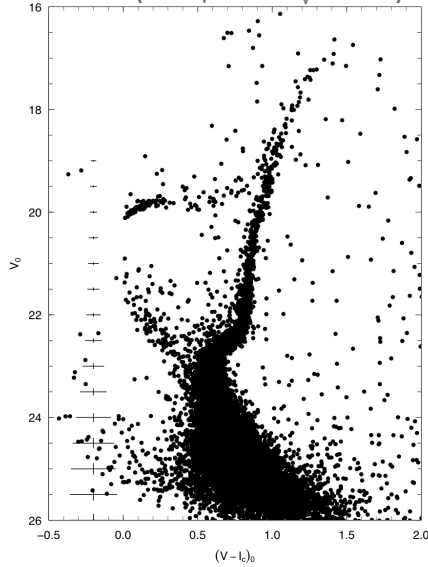


Stellar populations of UFDs

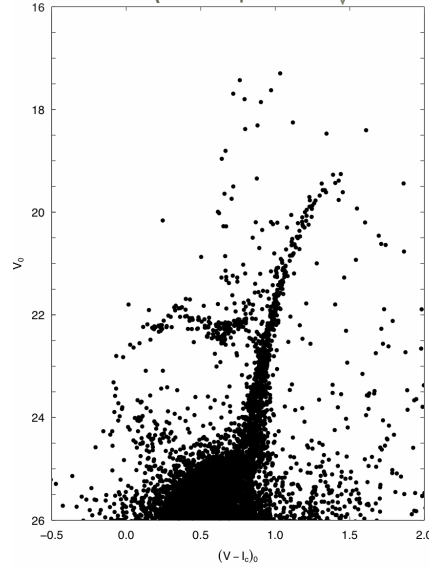
Draco (84kpc, $M_V=-8.7$)



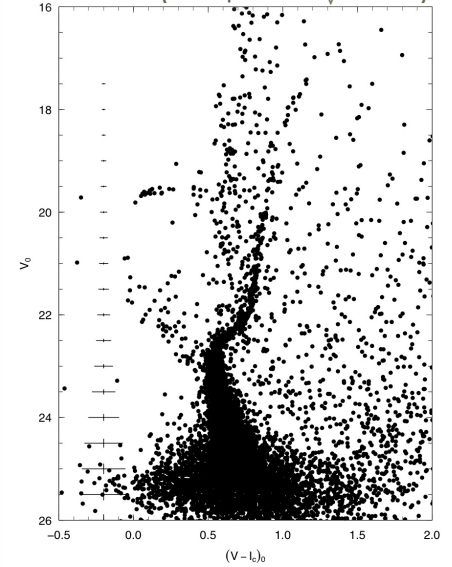
UMi (74kpc, $M_V=-8.5$)



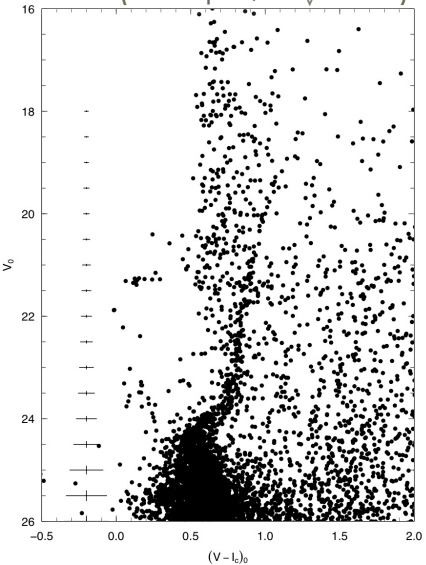
CVn I (223kpc, $M_V=-7.9$)



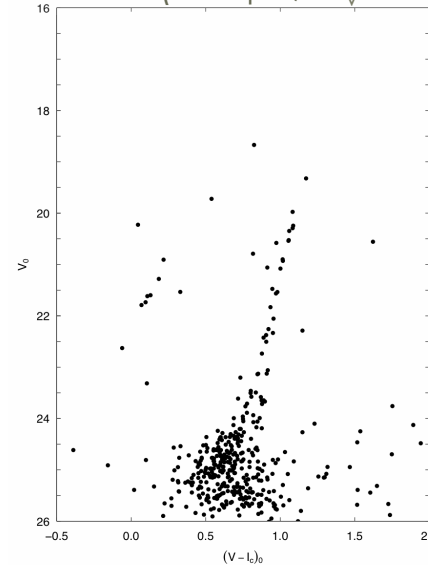
Boo I (64kpc, $M_V=-5.9$)



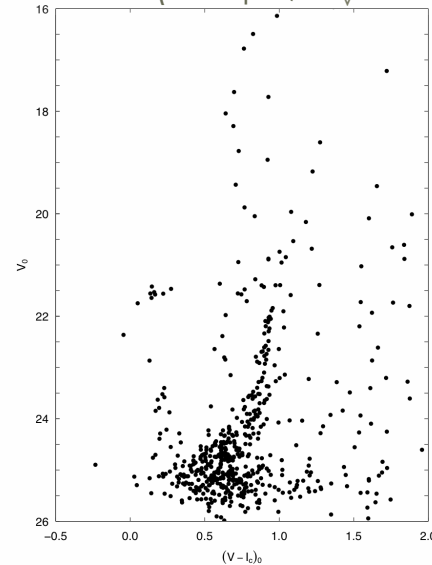
Her (141kpc, $M_V=-5.7$)



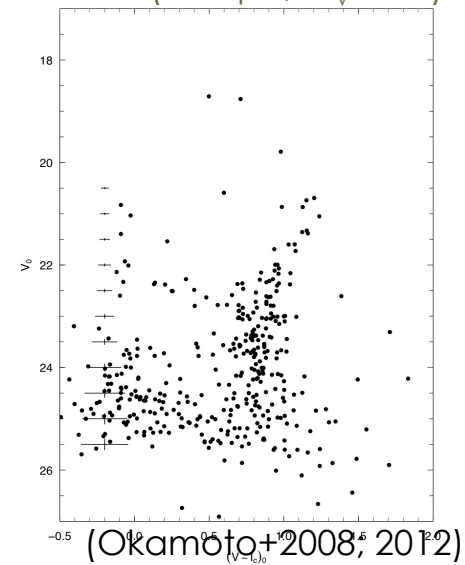
CVn II (159kpc, $M_V=-5.3$)



Leo IV (157kpc, $M_V=-5.0$)

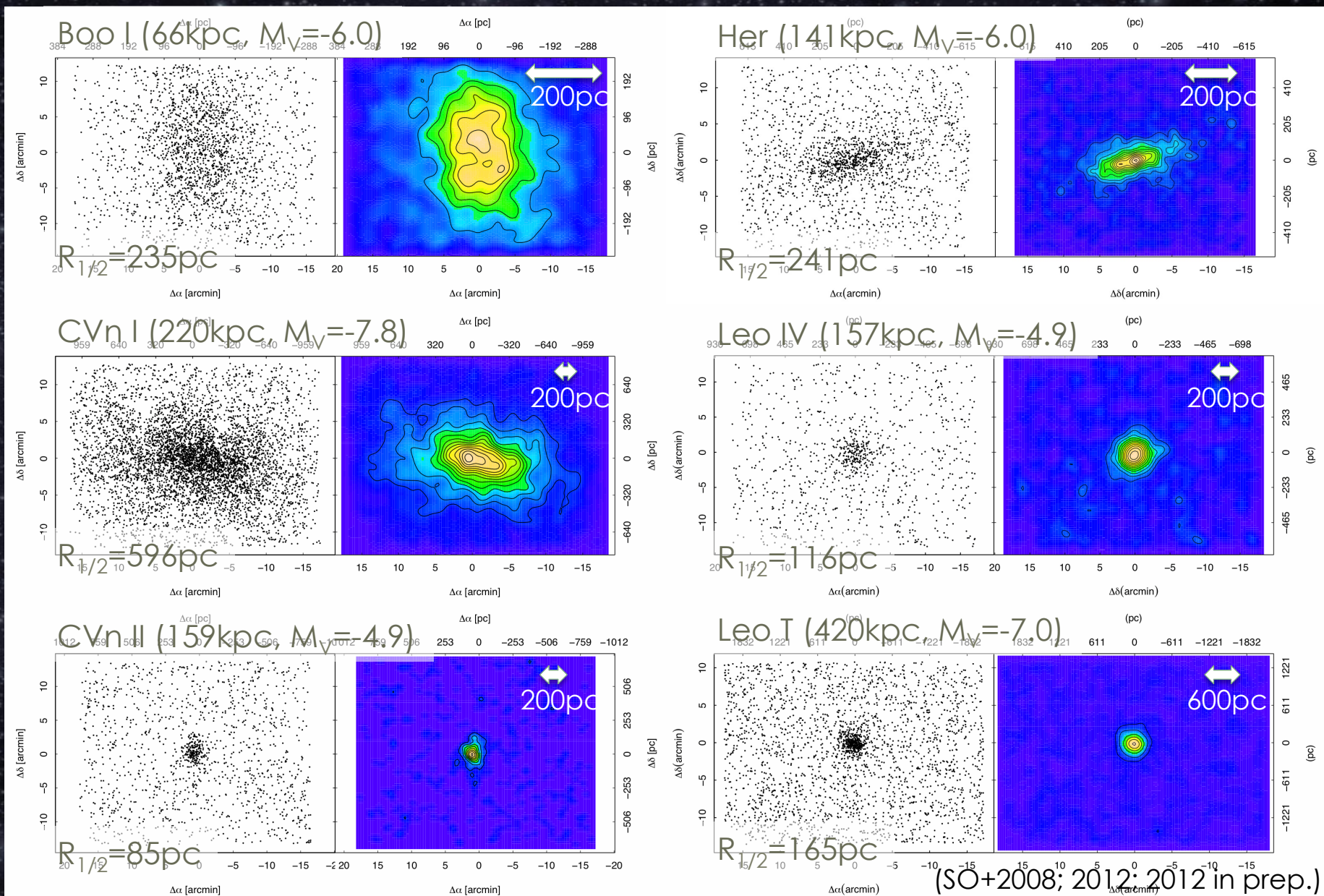


Leo T (420kpc, $M_V=-7.7$)

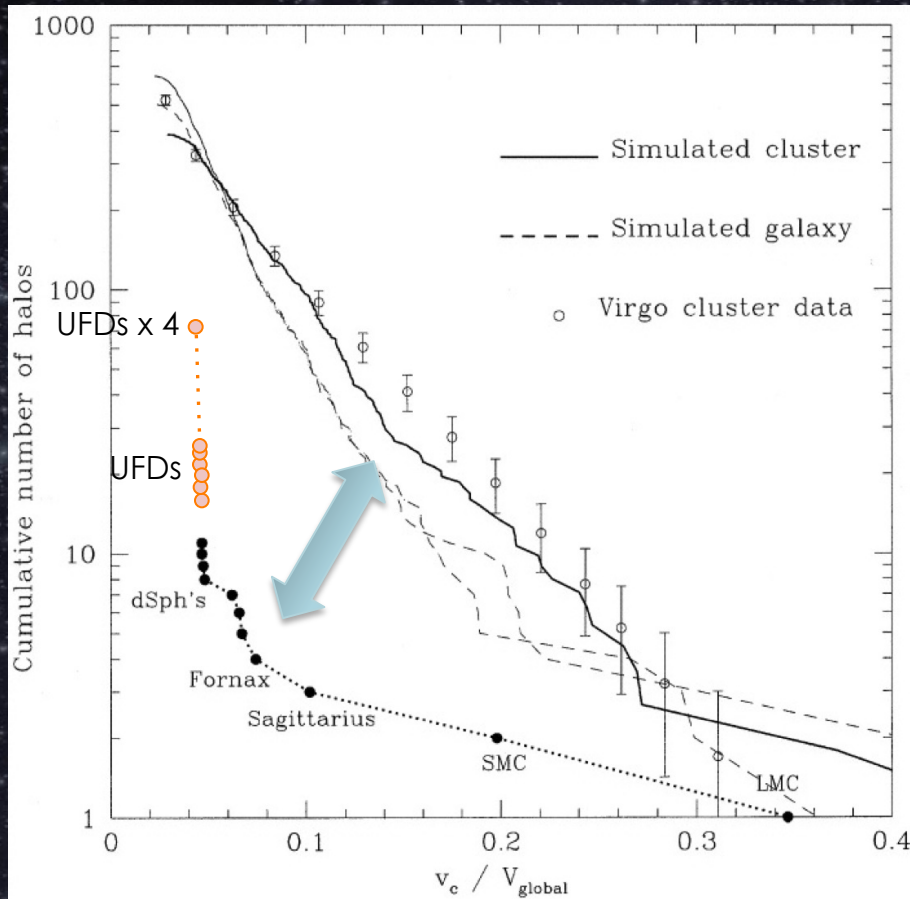


(Okamoto+2008, 2012)

Spatial distributions of UFDs



Missing satellite problem

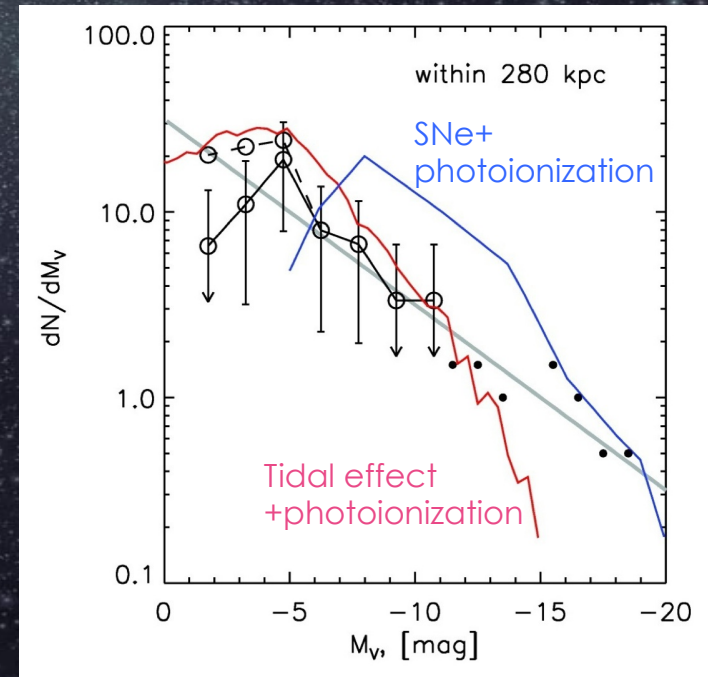


(Moore+1999)

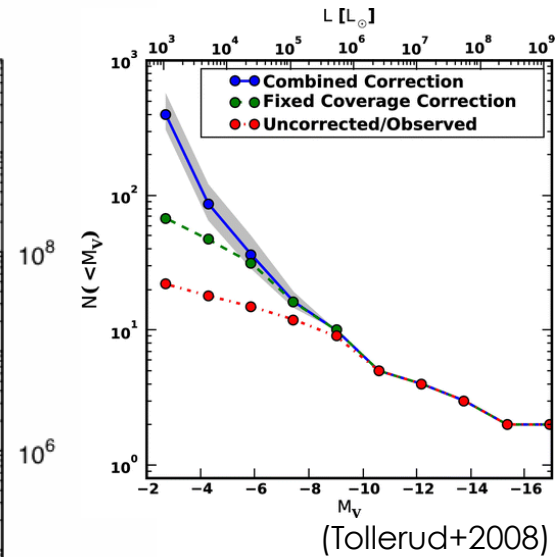
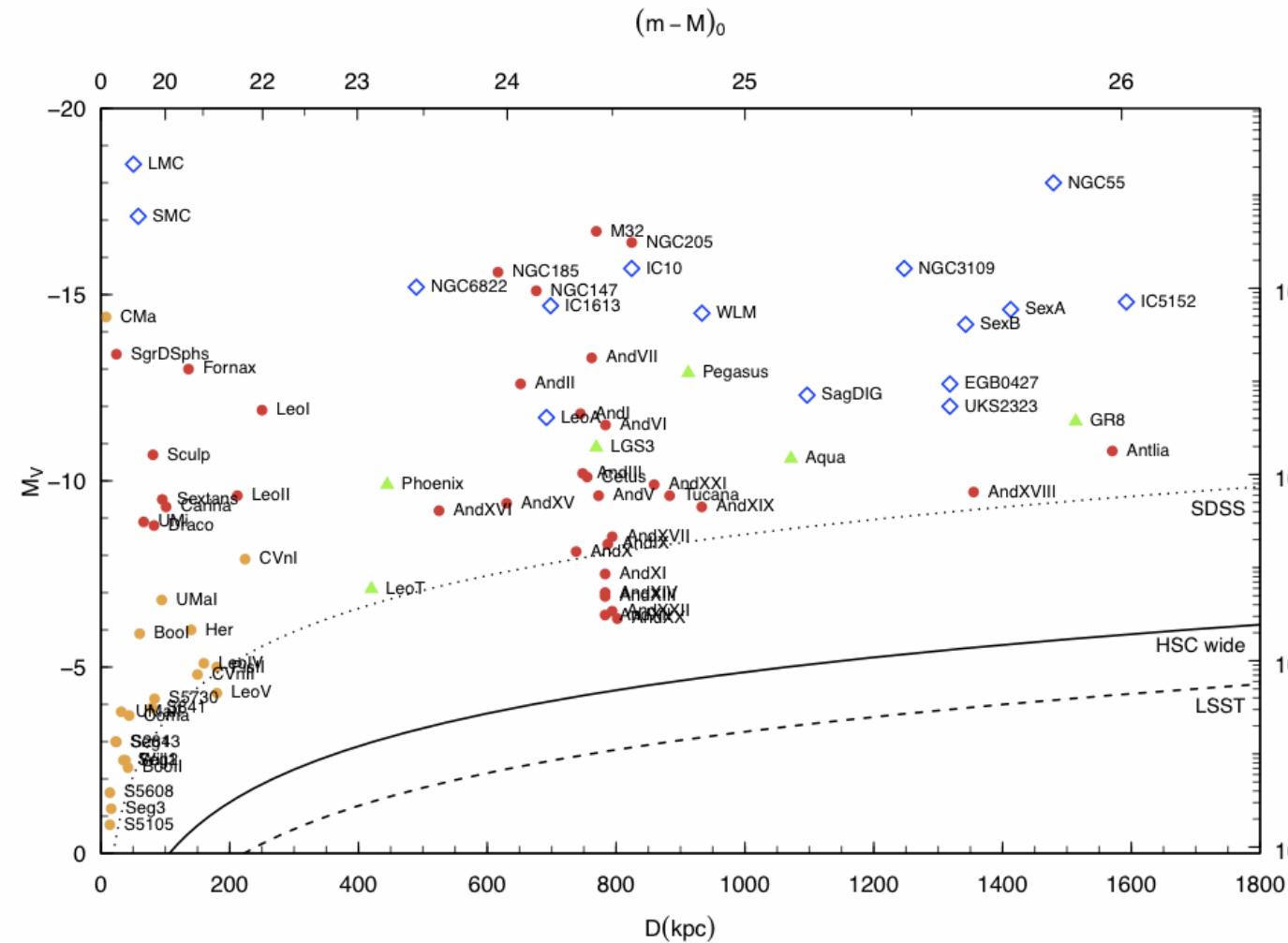
Incompleteness of detection
 $M_V > -5$? $R > 280$ kpc ?

- ✧ SF was suppressed in low-mass halos?
 Reionization (e.g. Gnedin+2000)
 SNe feedback and tidal effects (e.g. Larson+1974)
- ✧ Fewer low-mass halos ?
 WDM etc. (e.g. Zentner+2003)
 Cusp or Core (Penarrubia+2010)

(Koposov+2008)



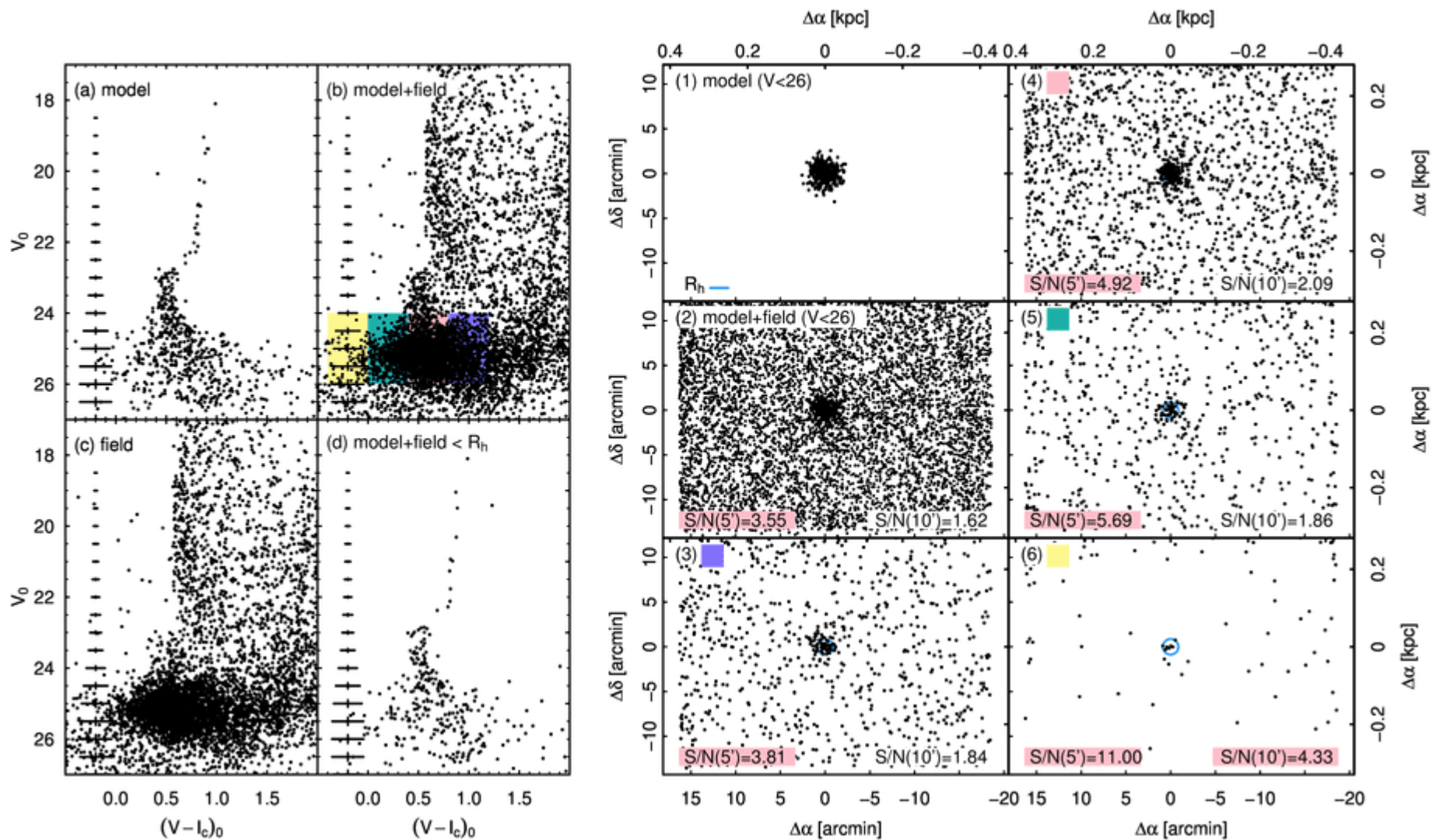
Missing dwarf galaxies?



$N_{\text{sat}} = 400-600?$

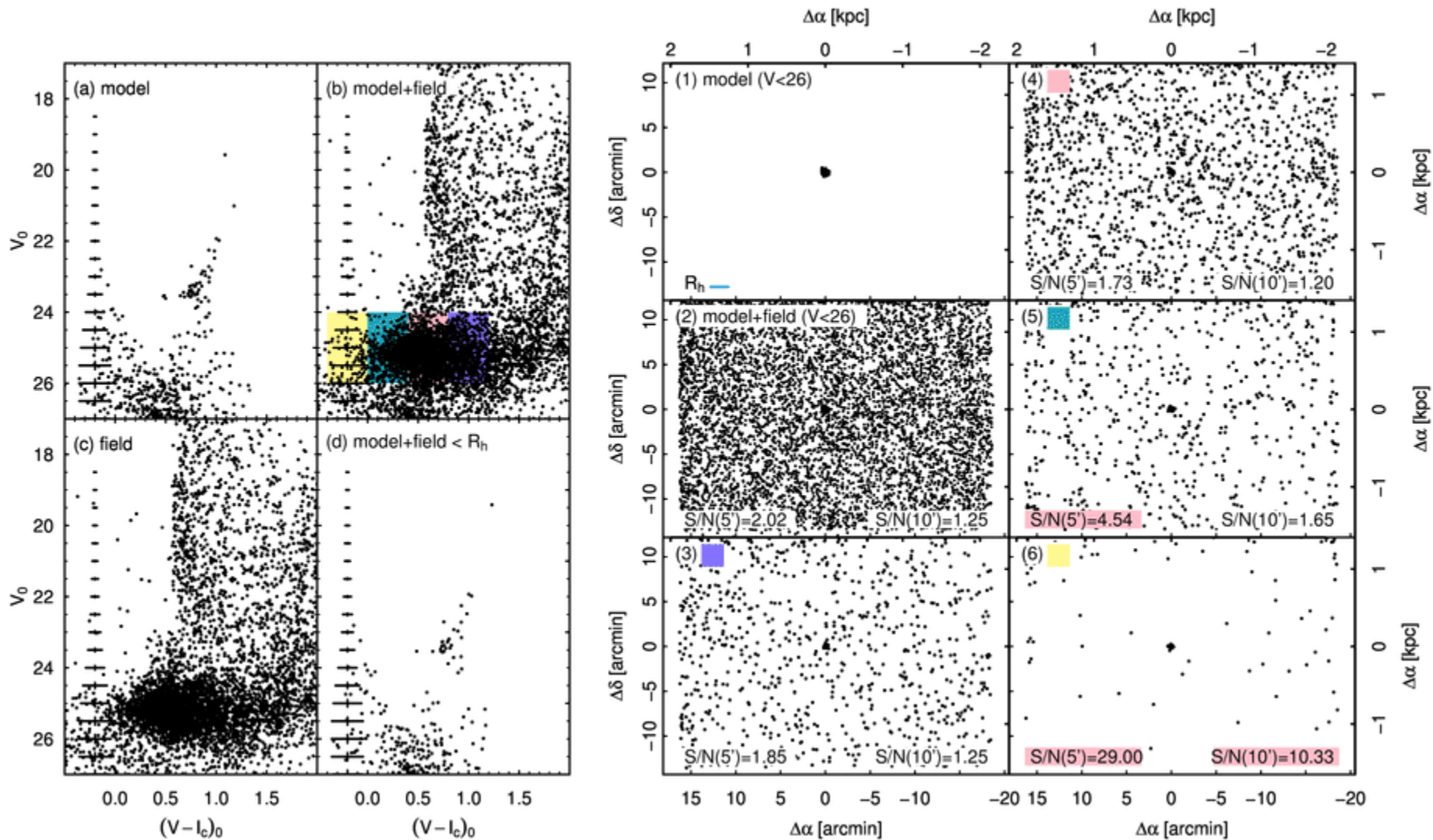
Searching new objects

$M_V = -3.0$, $(m - M)_0 = 19.5$ (79 kpc), $R_h = 0.9'$ (20 pc), $\mu_V = 27.1$ mag/sec²



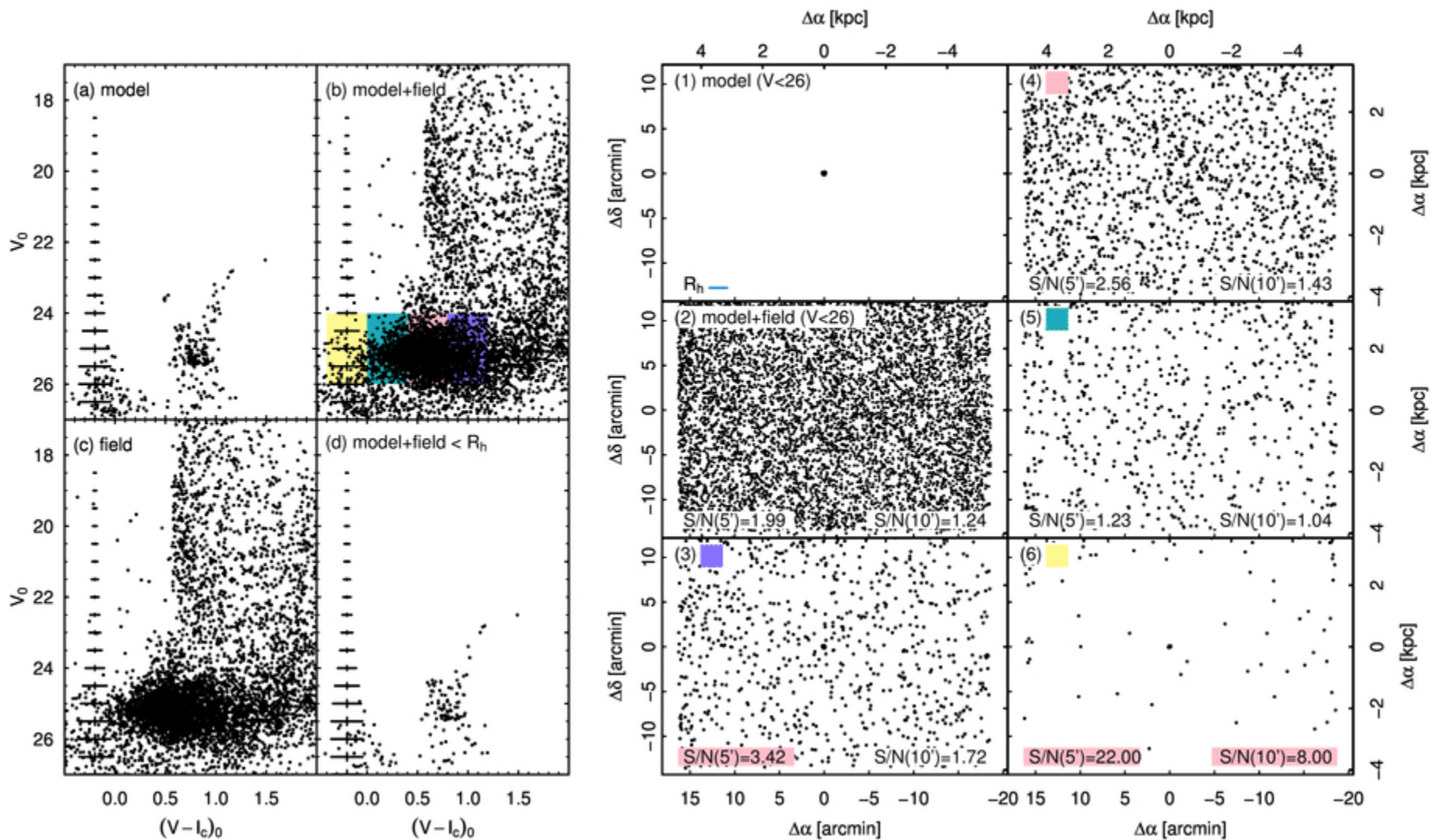
Searching new objects

$M_V = -5.0$, $(m - M)_0 = 23.0$ (398 kpc), $R_h = 0.2'$ (20 pc), $\mu_V = 25.1$ mag/sec²



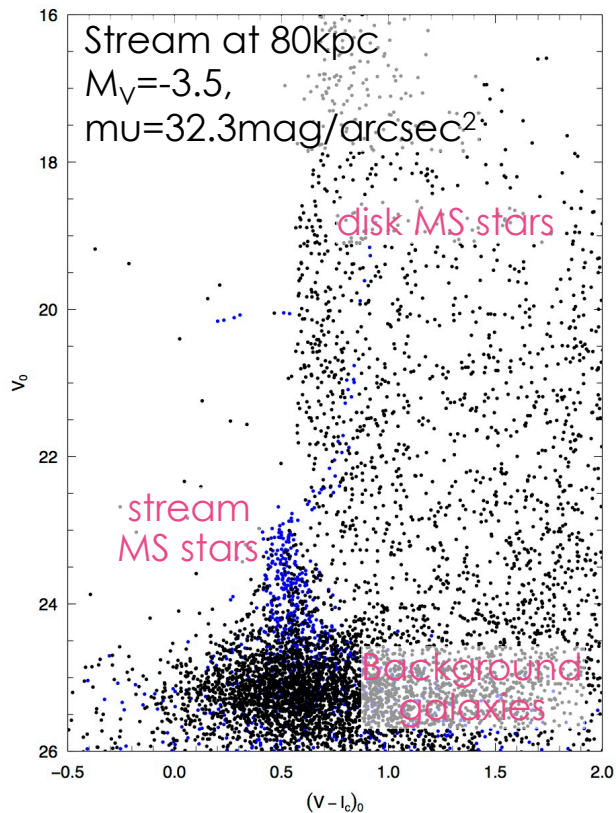
Searching new objects

$M_V = -6.0$, $(m - M)_0 = 25.0$ (1000 kpc), $R_h = 0.1'$ (20 pc), $\mu_V = 24.1$ mag/sec²

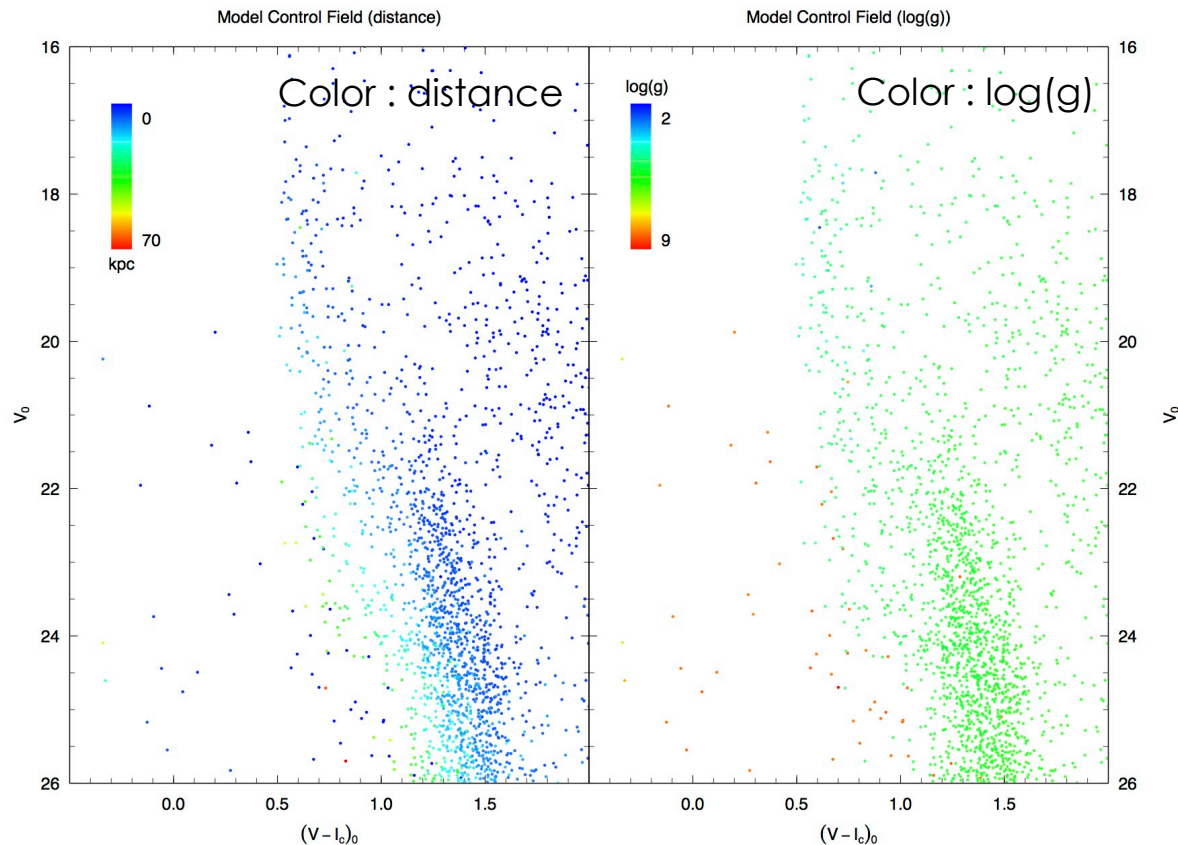


Contaminants in the CMD

- ✧ Galactic foreground stars (dwarf MS, WD,...) @ $g-i > 0.4$
- ✧ Background distant galaxies @ $g > 24.5$

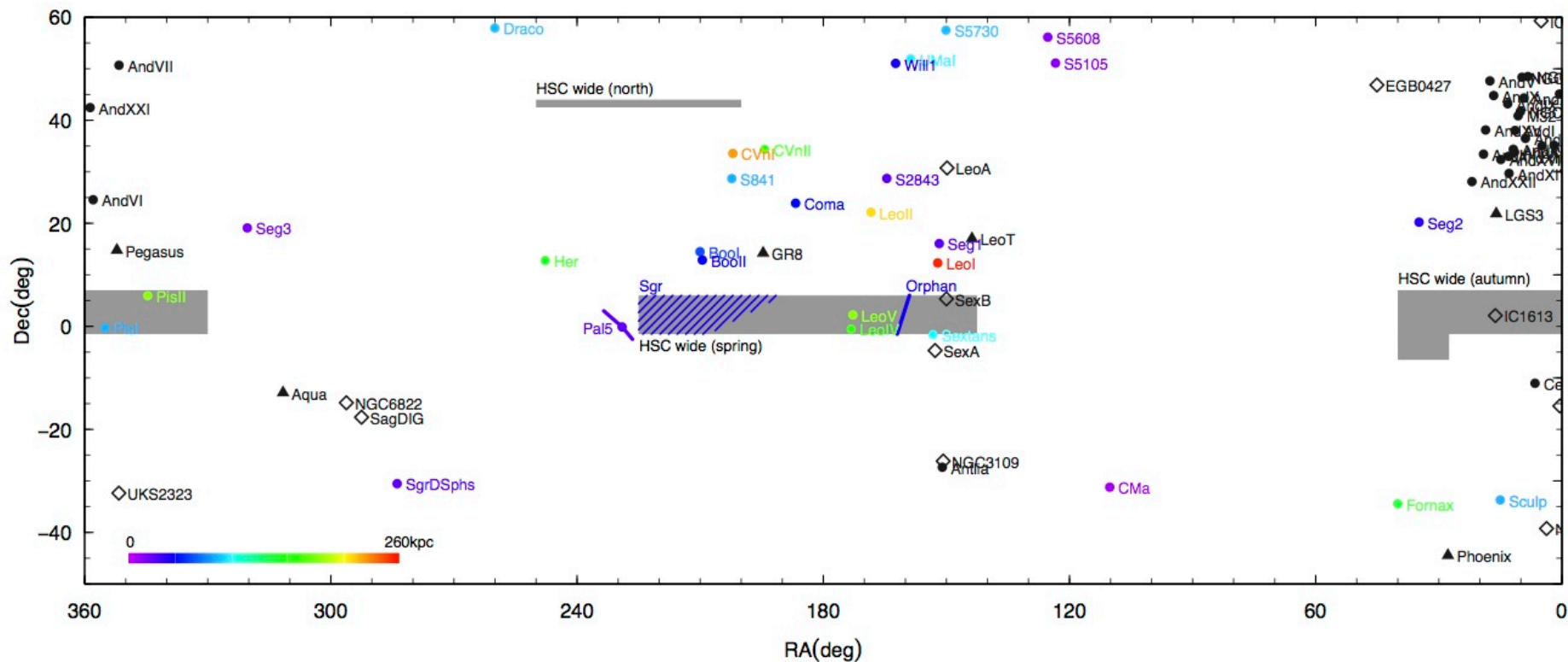


blank field (34'x27')

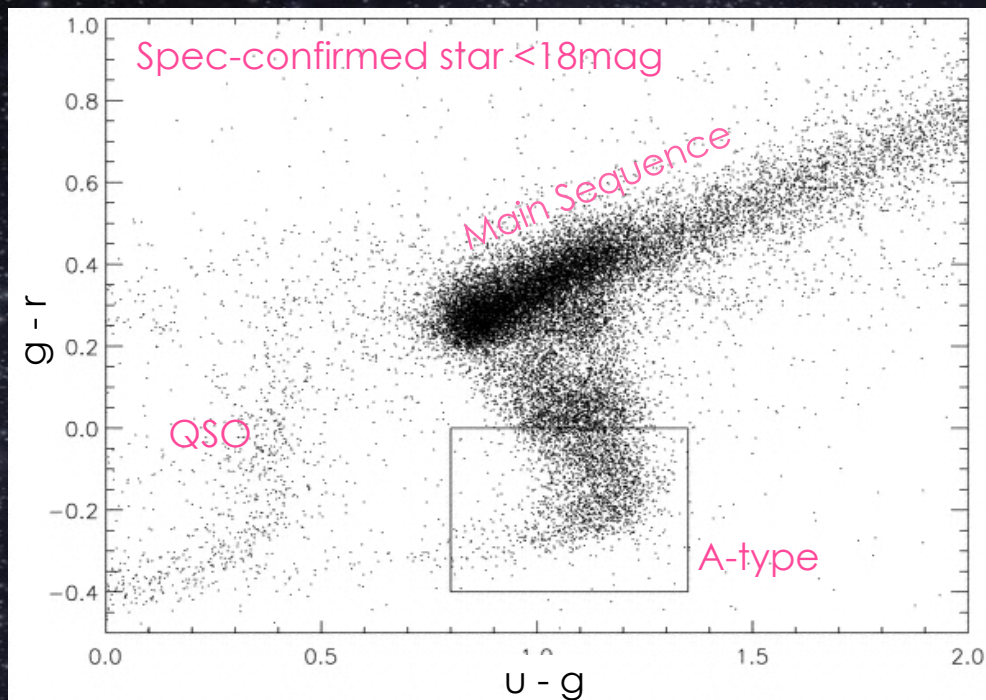


Simulated foreground stars (34'x27')

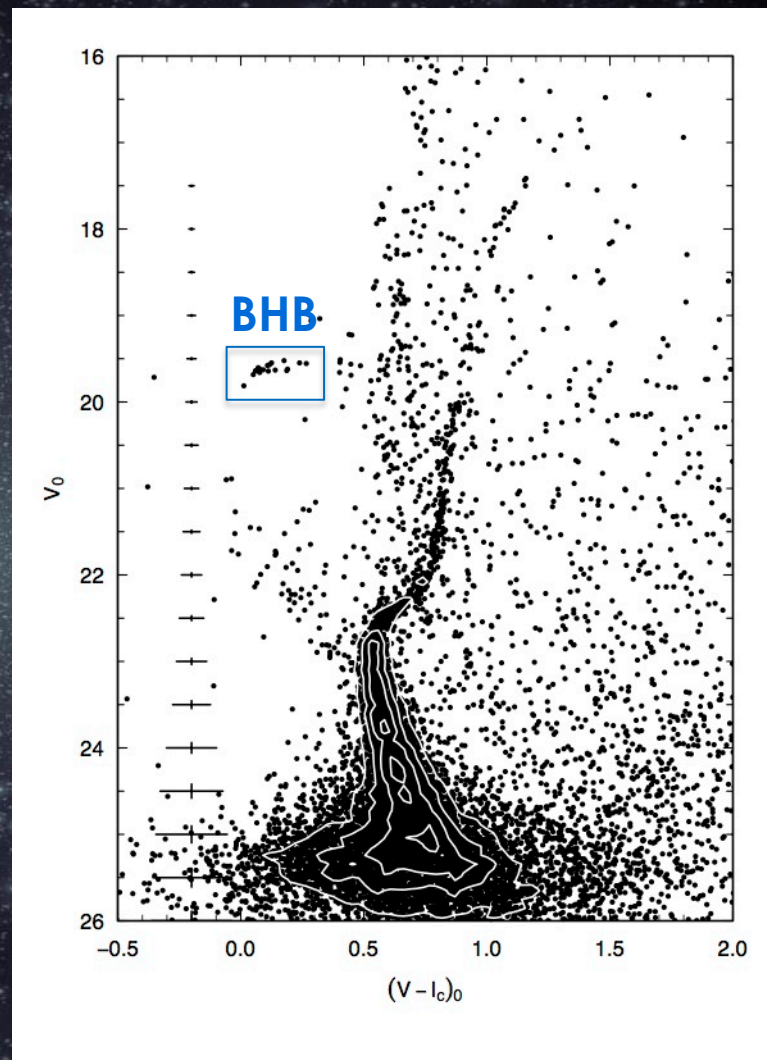
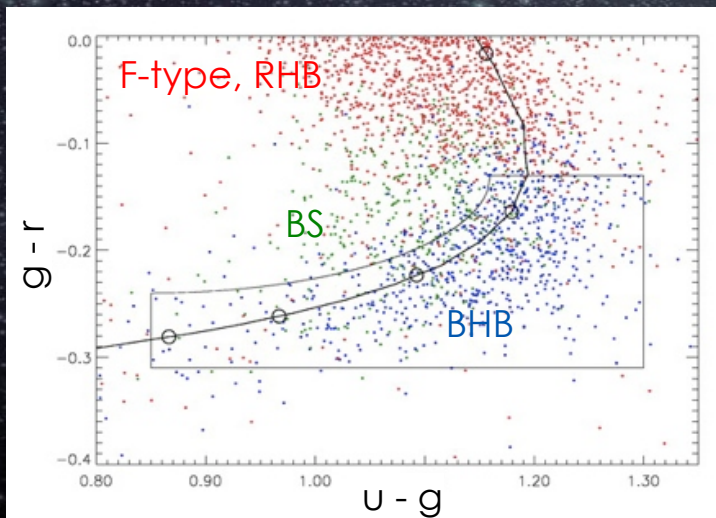
Known nearby objects in the HSC footprint



BHB stars in Galactic halo

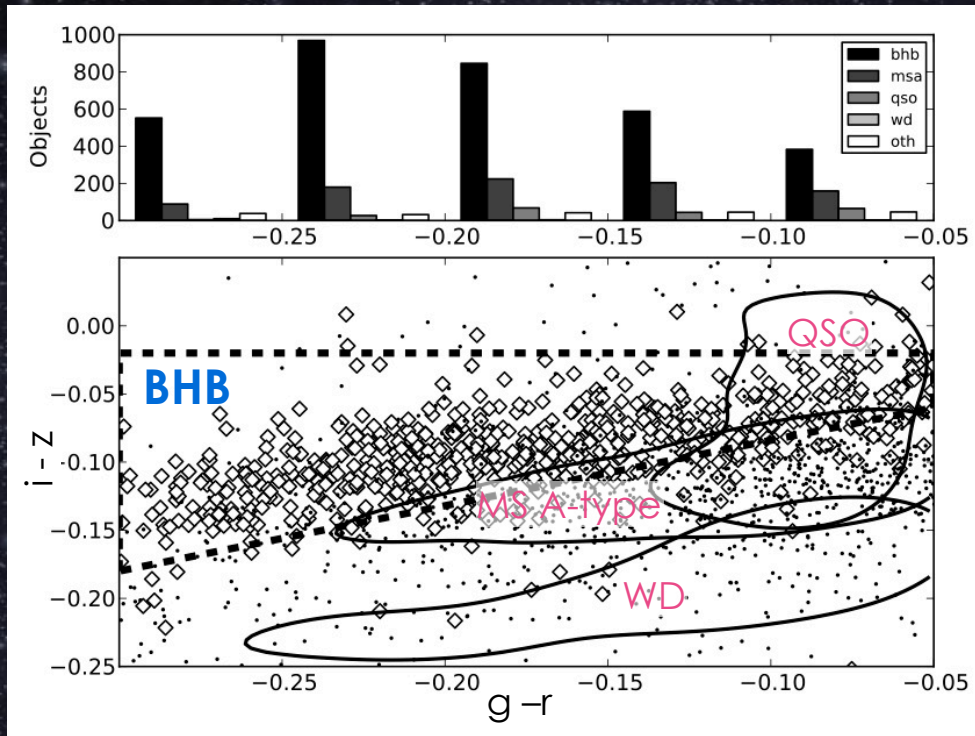


(Sirko+2004)



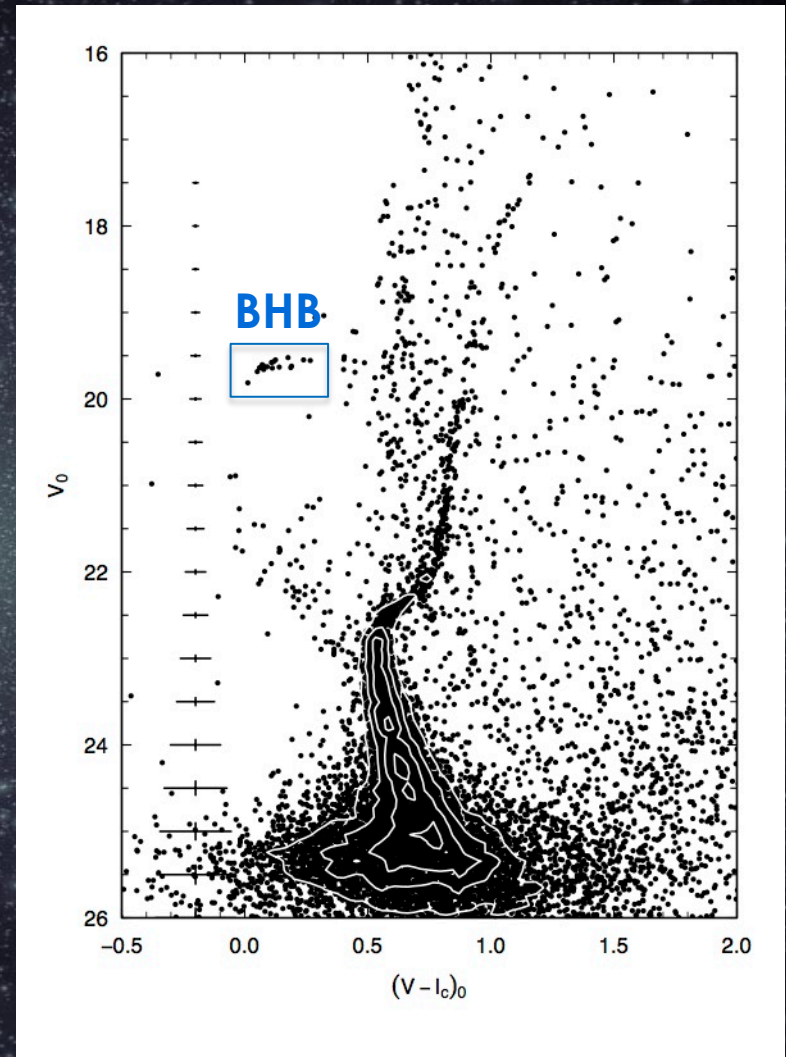
Bootes dSph (Okamoto+2012)

BHB stars in Galactic halo



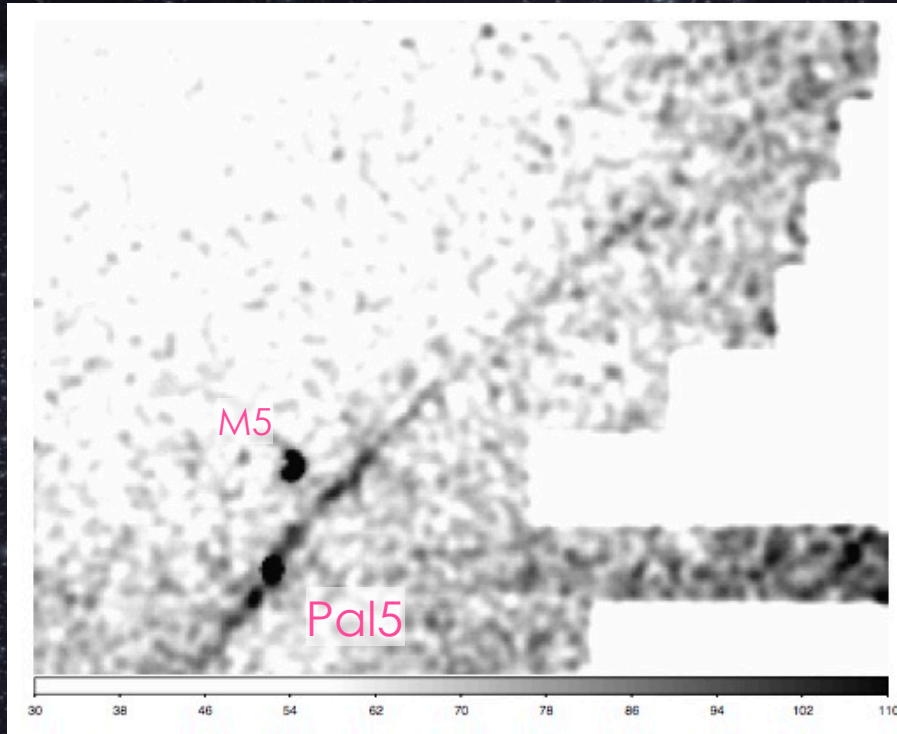
(Vickers+2012)

- ✧ z-based photometric BHB sample
77% pure, 51% complete
(c.f. u-based : 74% pure, 57 complete)
- ✧ $g < 24 \Rightarrow D < 400 \text{ kpc}$ ($M_{g, \text{BHB}} \sim -0.6$)
 $\Rightarrow$ 3D mapping of Galactic outer halo



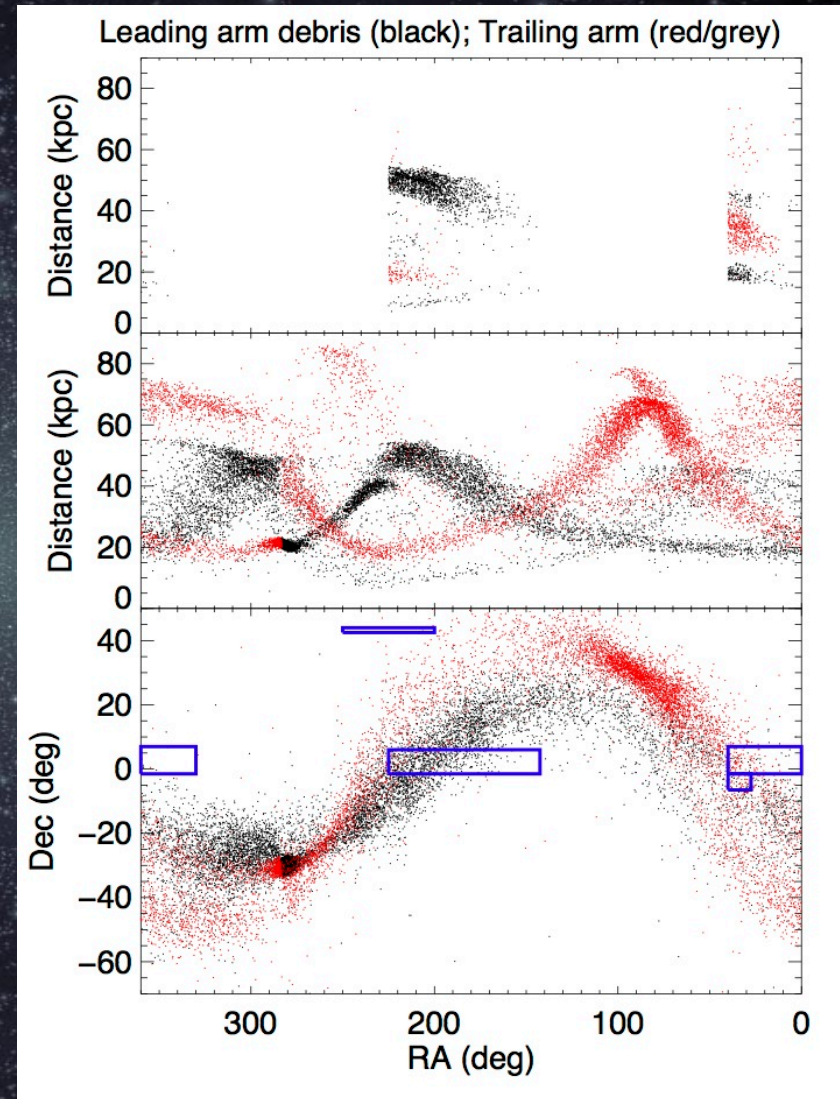
Bootes dSph (Okamoto+2012)

Stellar streams



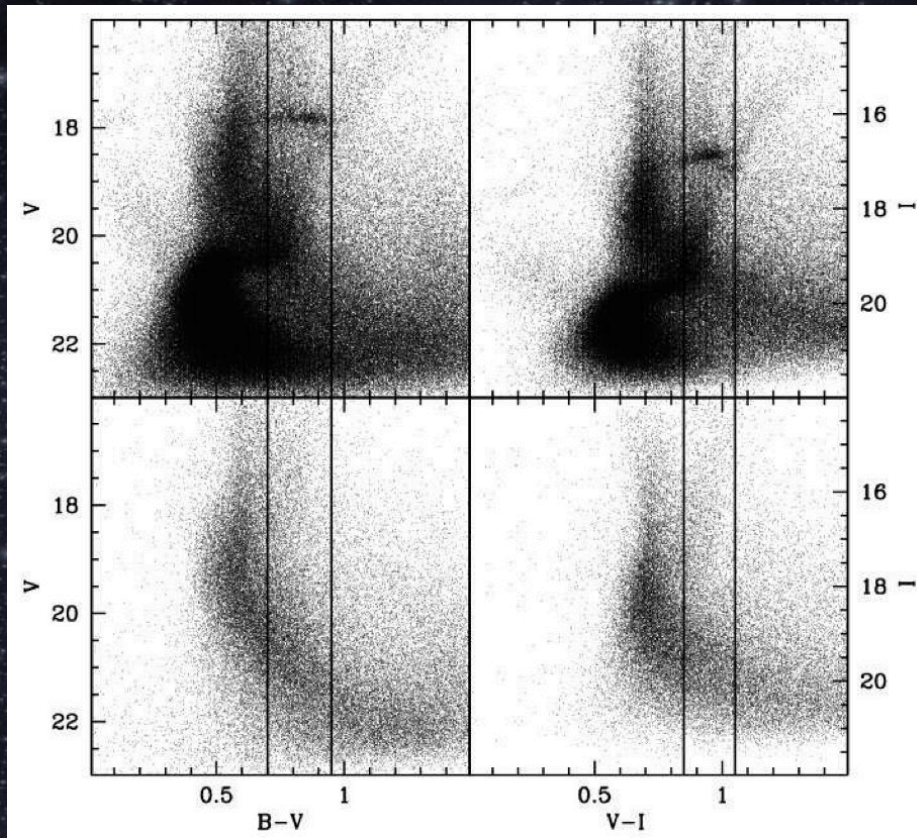
Pal5 (Carlberg+2012)

Gaps in the trailing stream of Pal5
~ 900-5000 sub-halos inside 30 kpc?
(Carlberg+2012)



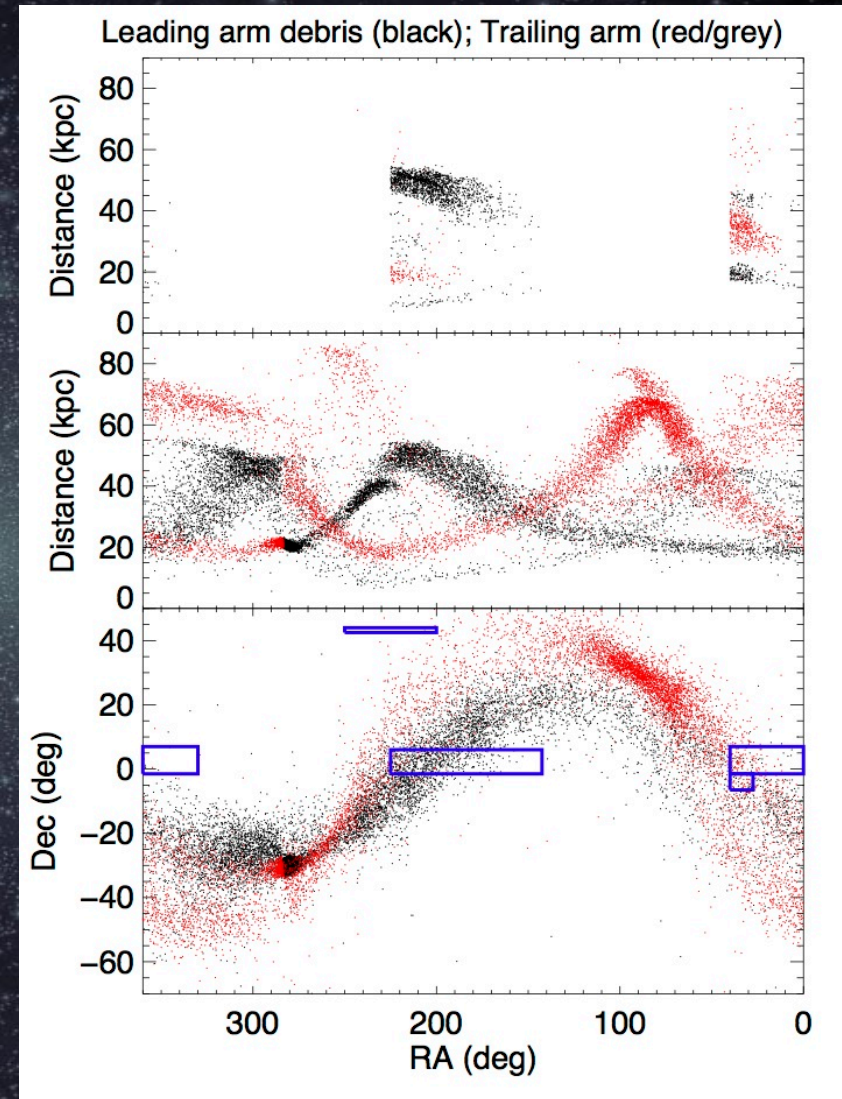
Sgr stream (courtesy of M. Smith)

Stellar streams



Sgr dSph (Correnti+2010)

- ✧ Complex populations
- ✧ Distance determination
 $\leq$ BHB, RR Lyrae?, PFS?,
- ✧ Heavy contaminants for the detection of unknown objects



Sgr stream (courtesy of M. Smith)

Galactic Archaeology with HSC wide survey

Wide survey: 1,400 deg², griz ~ 26mag

- ✧ Search unknown Galactic faint satellites
- ✧ Search unknown stellar streams at the outer halo
- ✧ Search unknown distant faint galaxies in the Local Group
- ✧ Study the properties of known streams, dSphs and dlrrs
- ✧ Probe 3D structure of Galactic outer halo by using blue HB stars

Complete sample of visible MW satellites

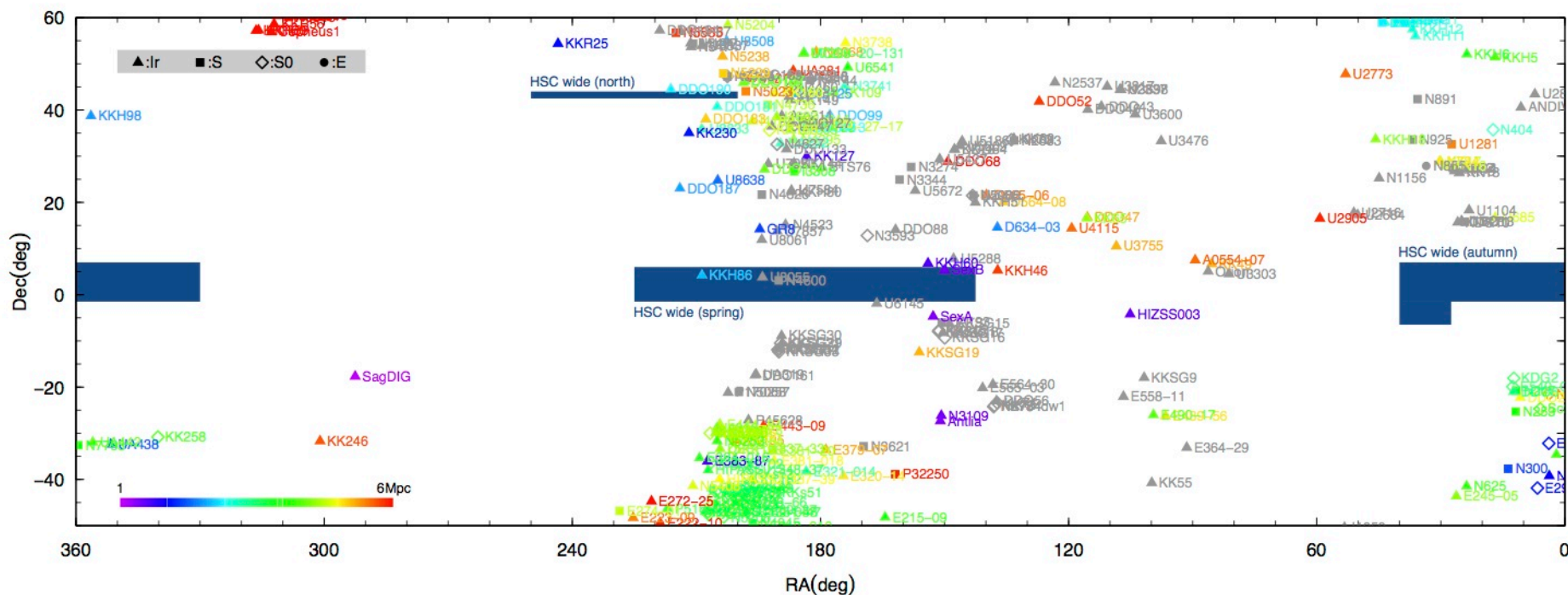
SFH of the faintest galaxy

Internal/External effects on SF in low-mass halo

Distribution and Lumpiness of DM (sub)-halo

Verification of LCDM in the MW scale

Known nearby objects in the HSC footprint



KKH86 (lr, B=17mag, D=2.61Mpc, $R_{\text{major}}=0.7'$)

UGC8055 (lr, B=16mag, D=6.8Mpc, $R_{\text{major}}=0.9'$)

NGC4600 (S, B=14mag, D=7.35Mpc, $R_{\text{major}}=1.2'$)