The Ghosts of Galaxy Formation
Part One: Recent results from SDSS

KIAA, 2nd December, 2008

Martin C. Smith
Institute of Astronomy, Cambridge

with
Paul Hewett, Gerry Gilmore, Mike Irwin, Vasily Belokurov Dan Zucker, Matt Walker, Dan Faria, Mike Fellhauer, Martin Niederste-Ostholt, Laura Watkins

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大家好!

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Talk Outline

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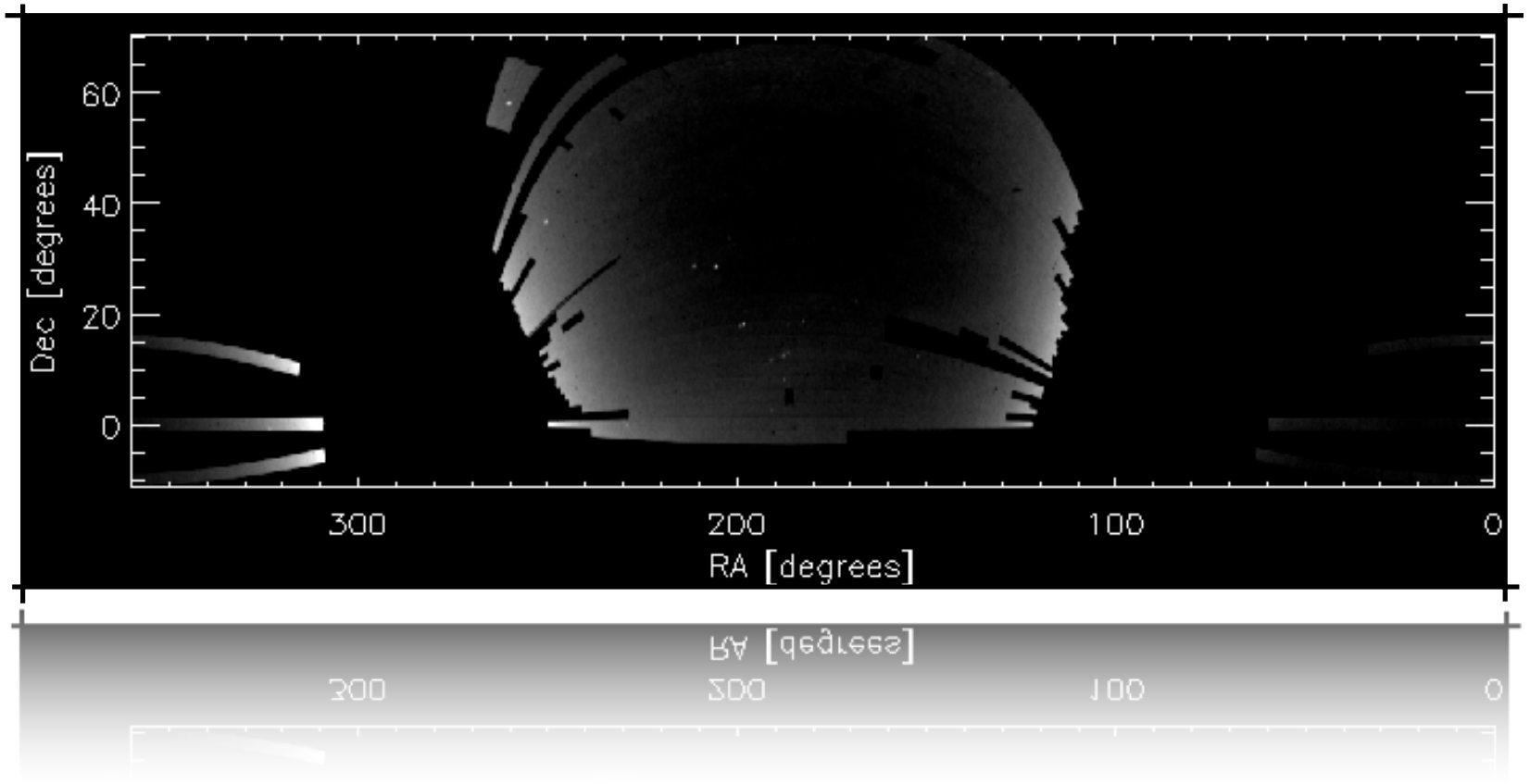
- Field of Streams
- Kittens in Leo
  - Leo V
  - Leo T
  - SEGUE-1
- Implications and conclusions

Field of SDSS

Belokurov et al. (2006)



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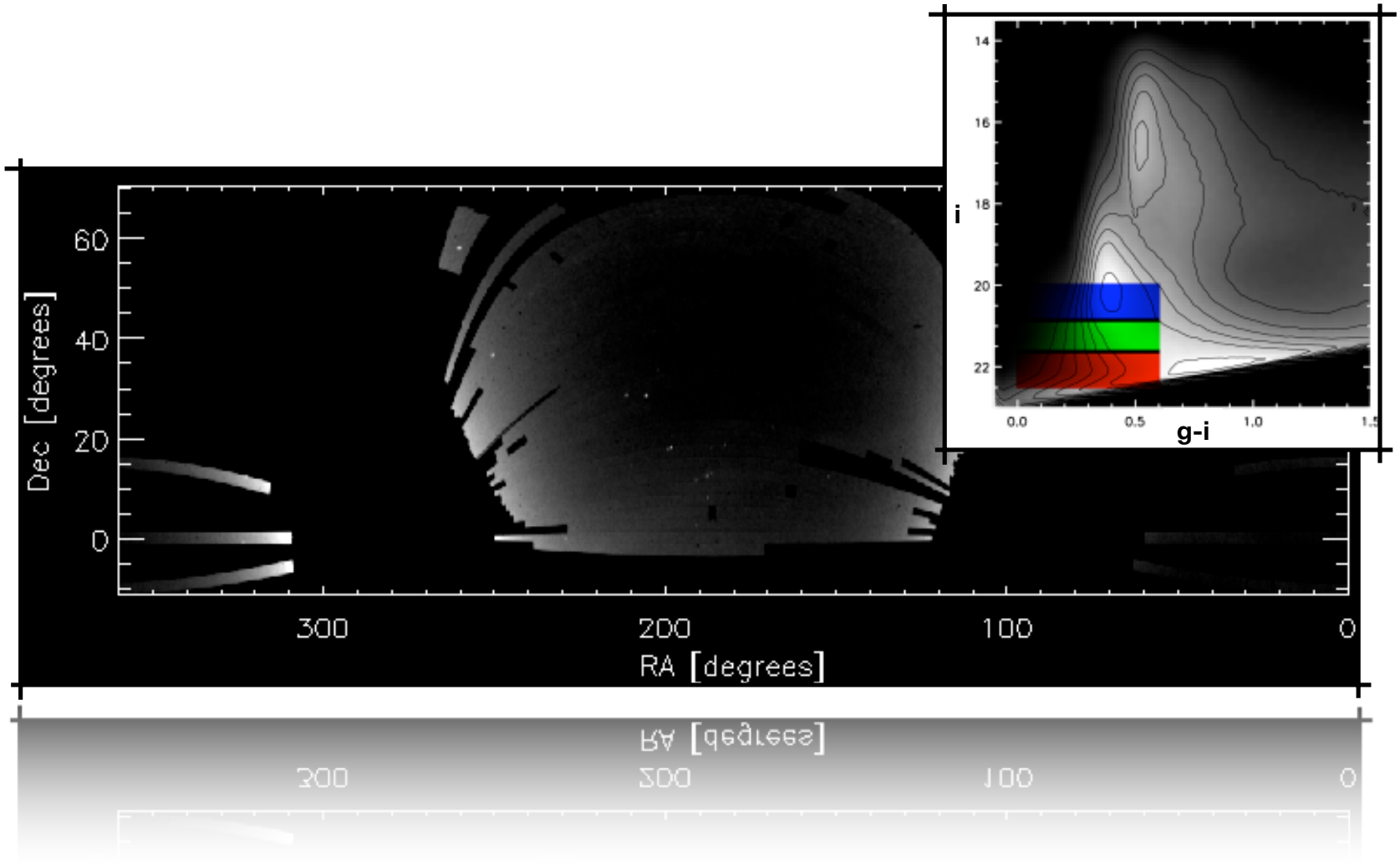

Field of Streams

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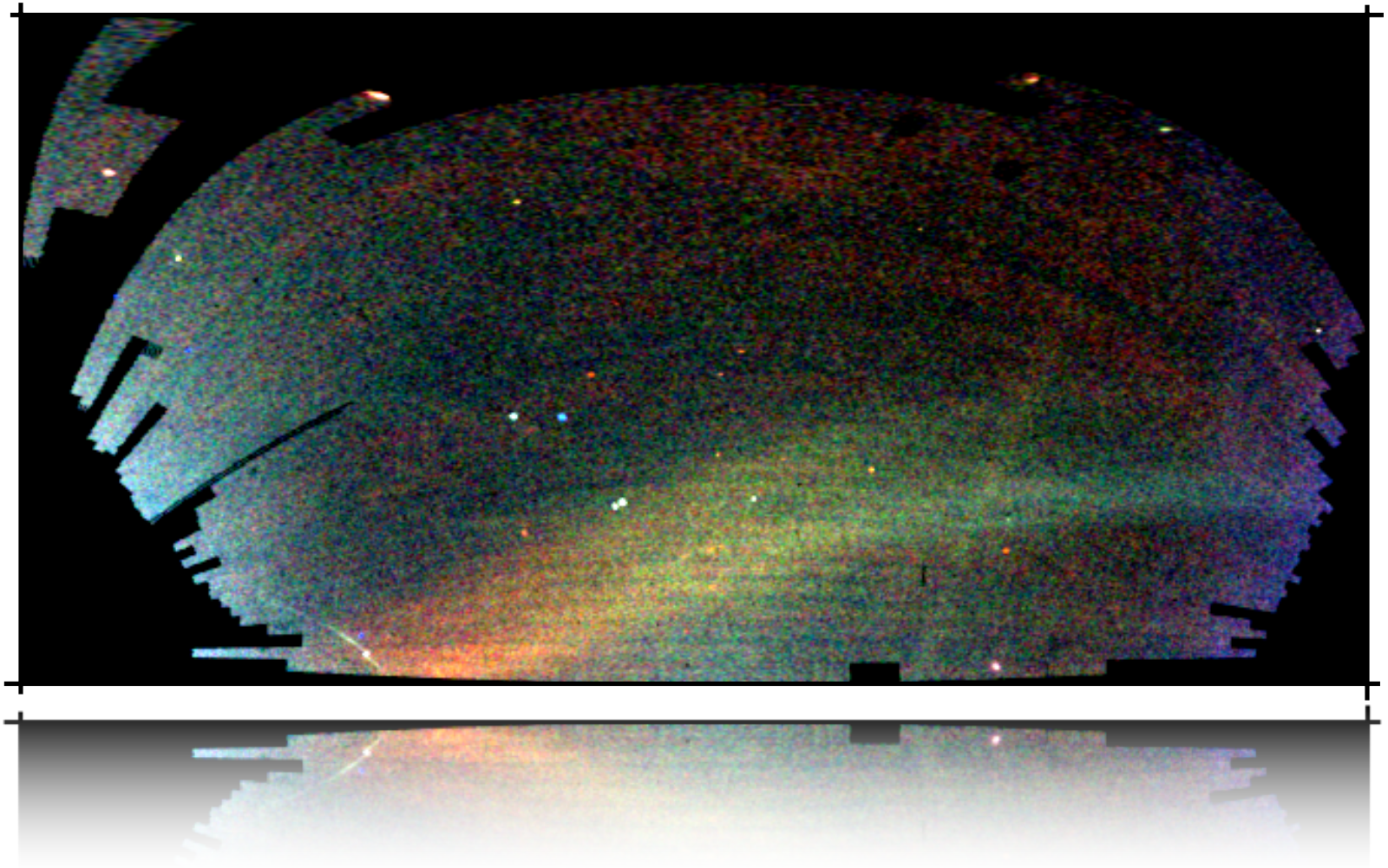

Field of Streams

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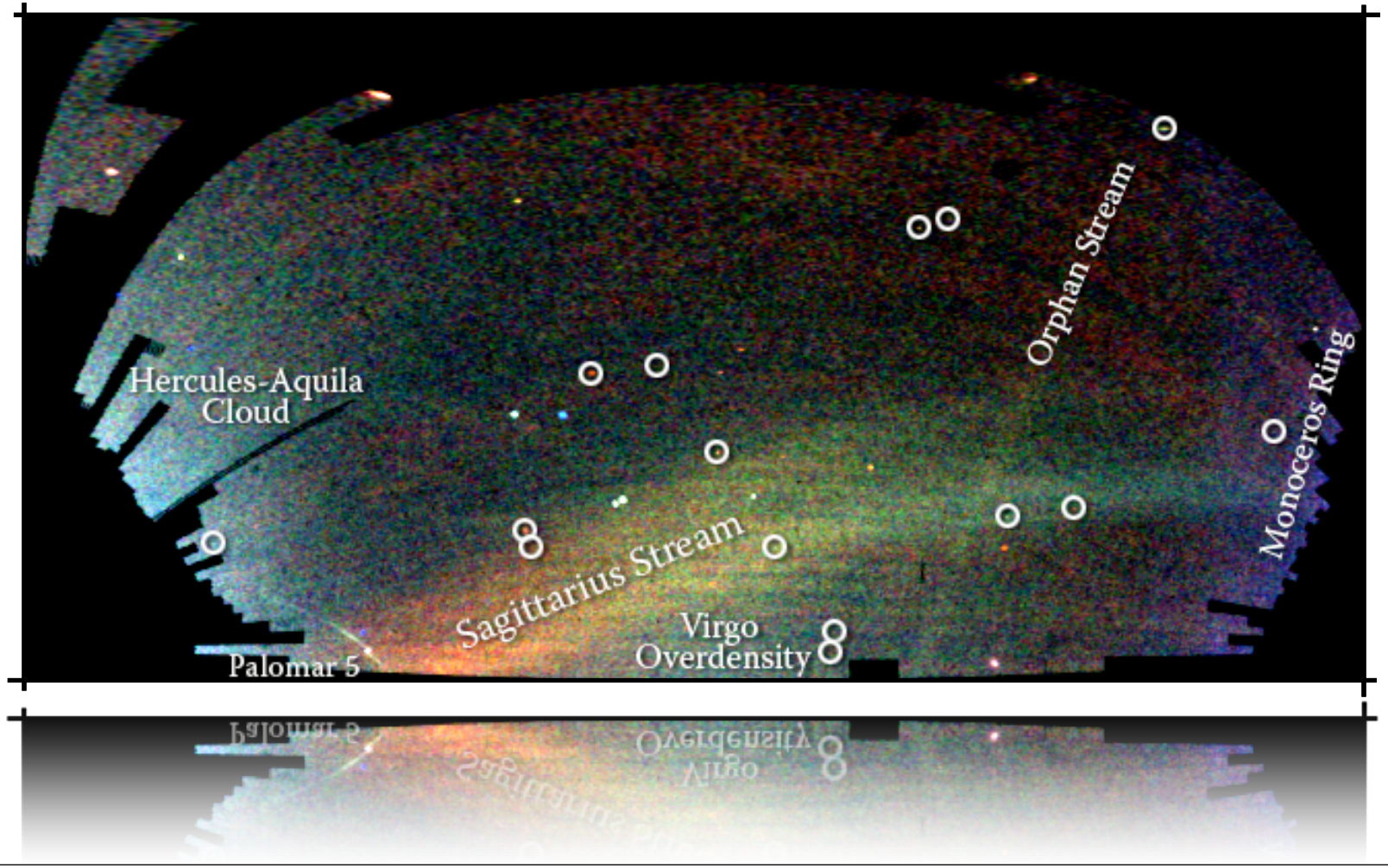
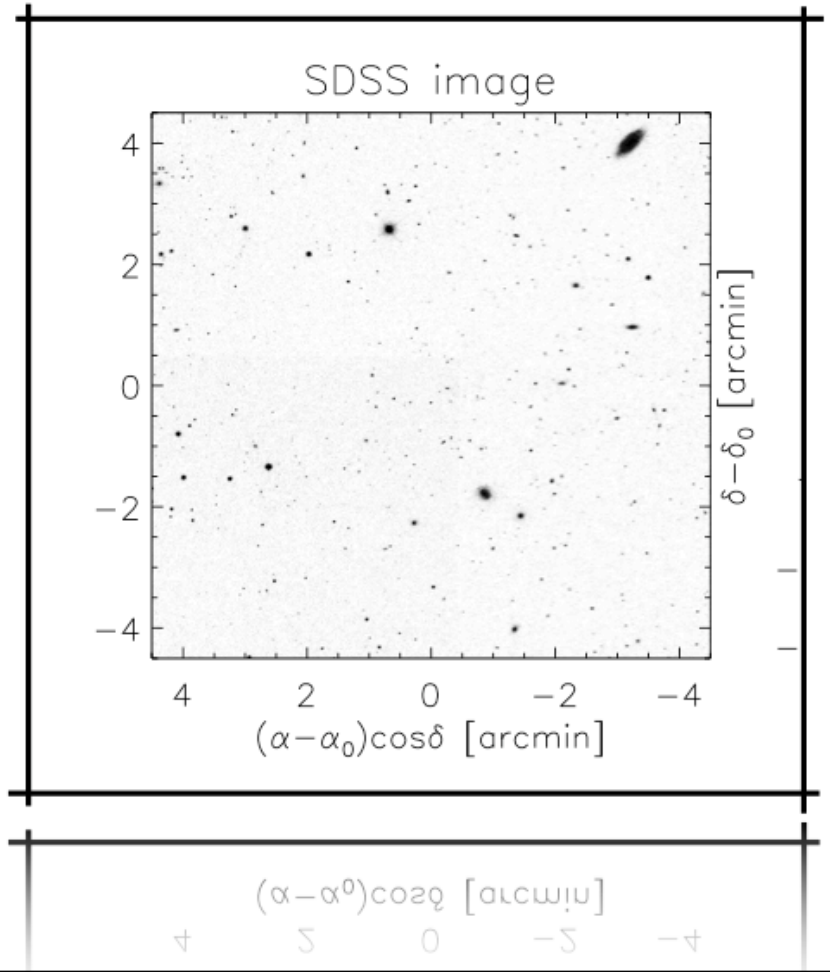


Leo V

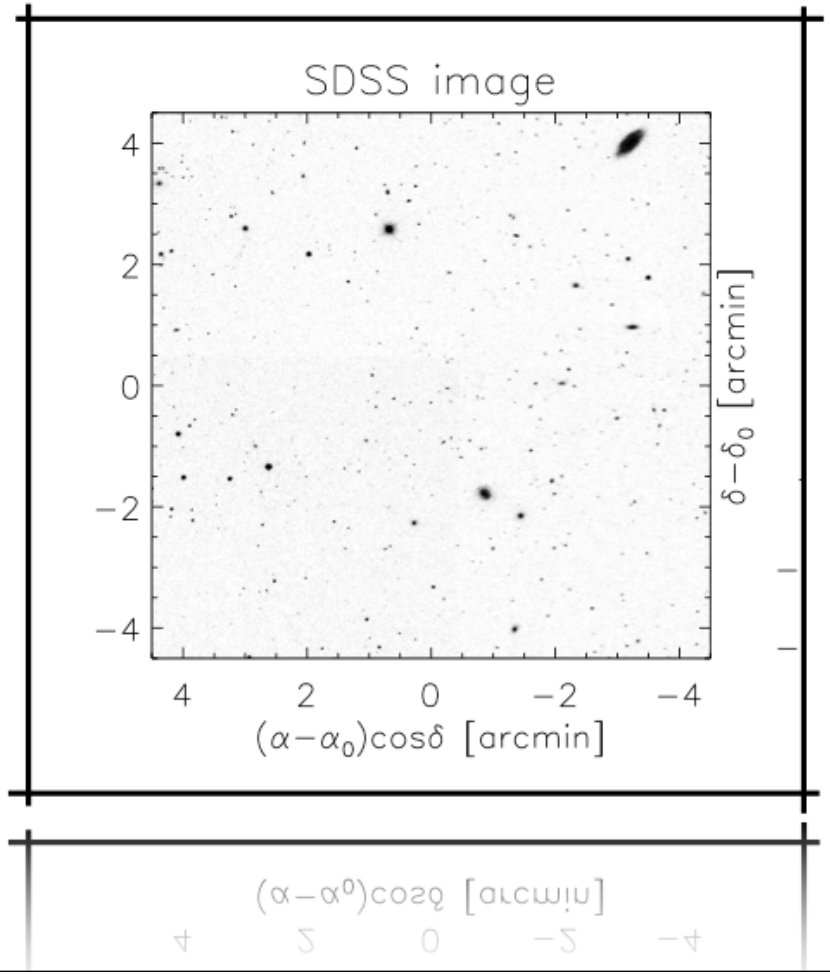
Belokurov et al. (2008)



Leo V

Belokurov et al. (2008)

- Ultra-faint dwarf at ~180kpc



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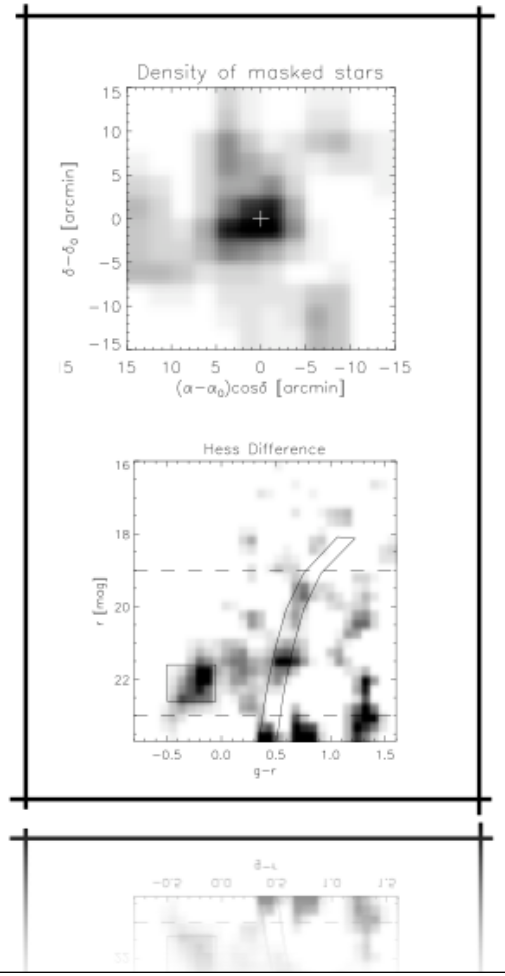
- Ultra-faint dwarf at ~180kpc
- CMD mask shows overdensity



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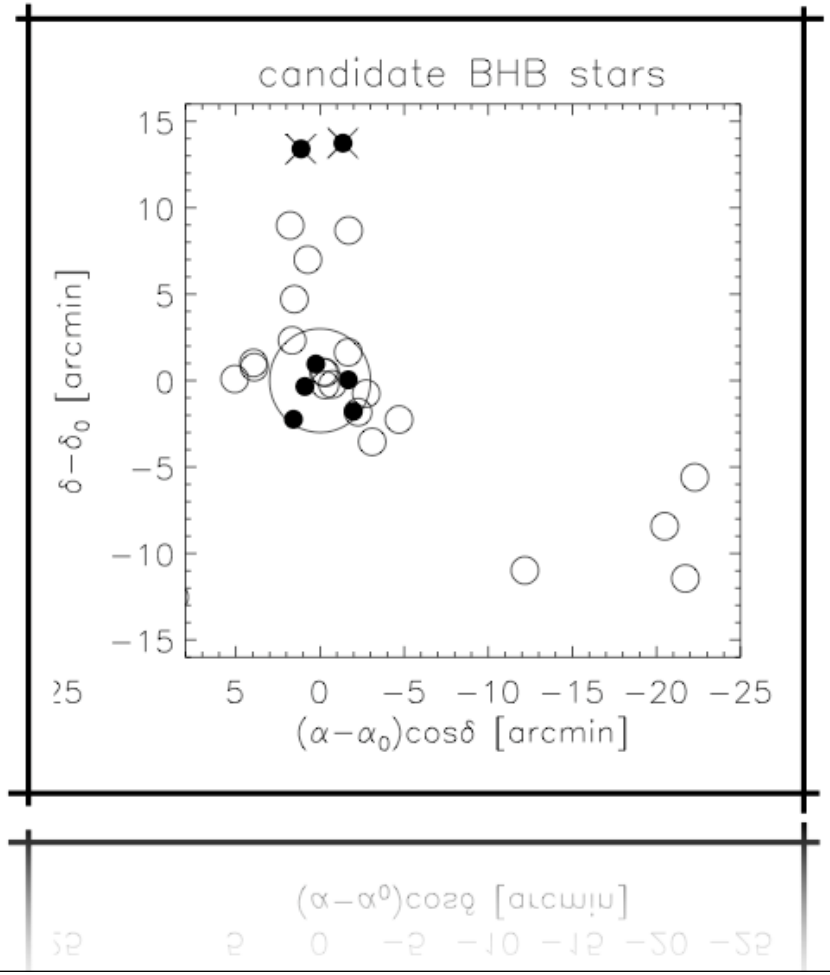
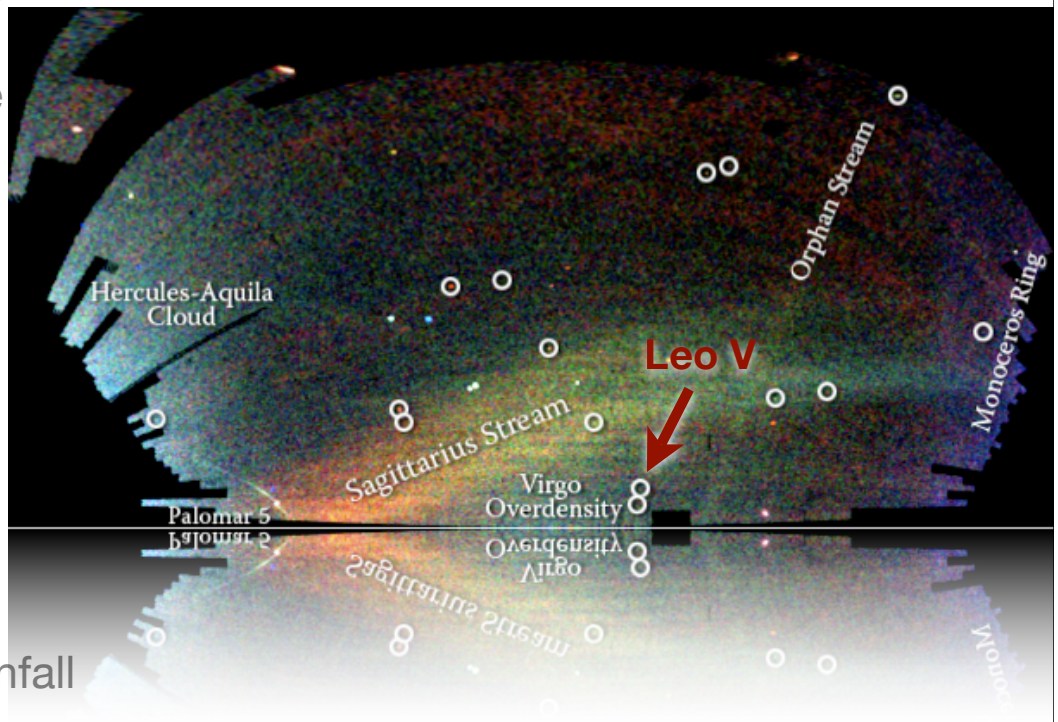
- Ultra-faint dwarf at ~180kpc
- CMD mask shows overdensity
- BHBs shows extended profile
  - Similar extension seen in other dwarfs such as Hercules and Leo IV



Leo V

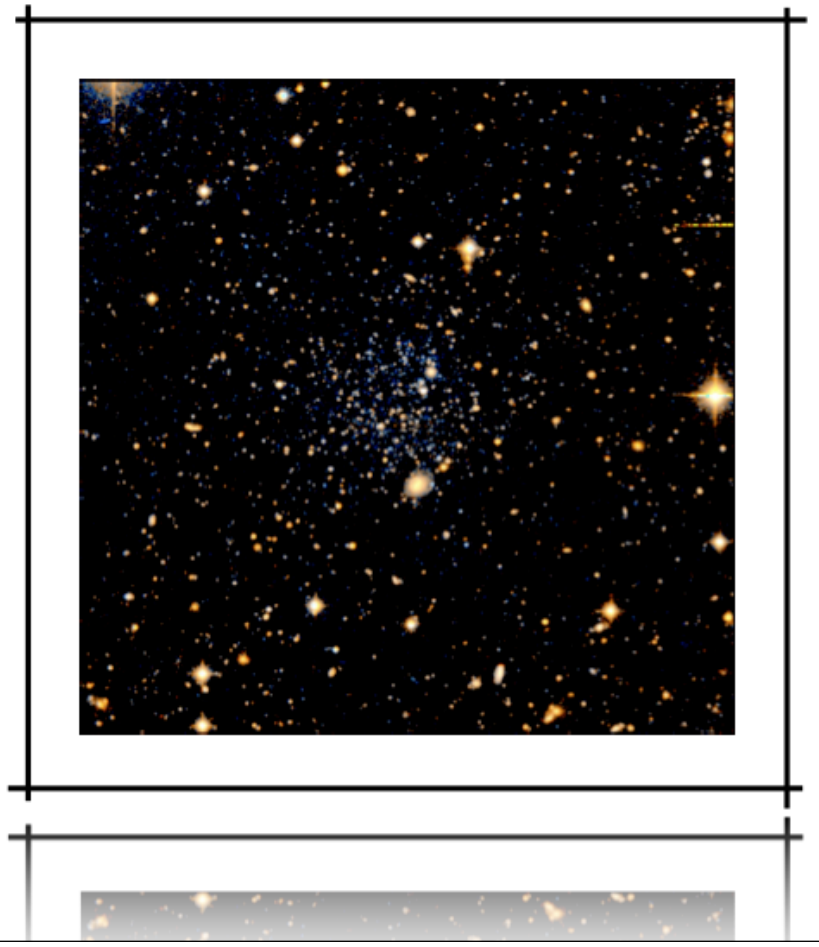
Belokurov et al. (2008)

- Ultra-faint dwarf at ~180kpc
- CMD mask shows overdensity
- BHBs shows extended profile
  - Similar extension seen in other dwarfs such as Hercules and Leo IV
- But is this a companion of a companion?
  - Is this part of a stream, i.e. direct evidence for group infall



Leo T

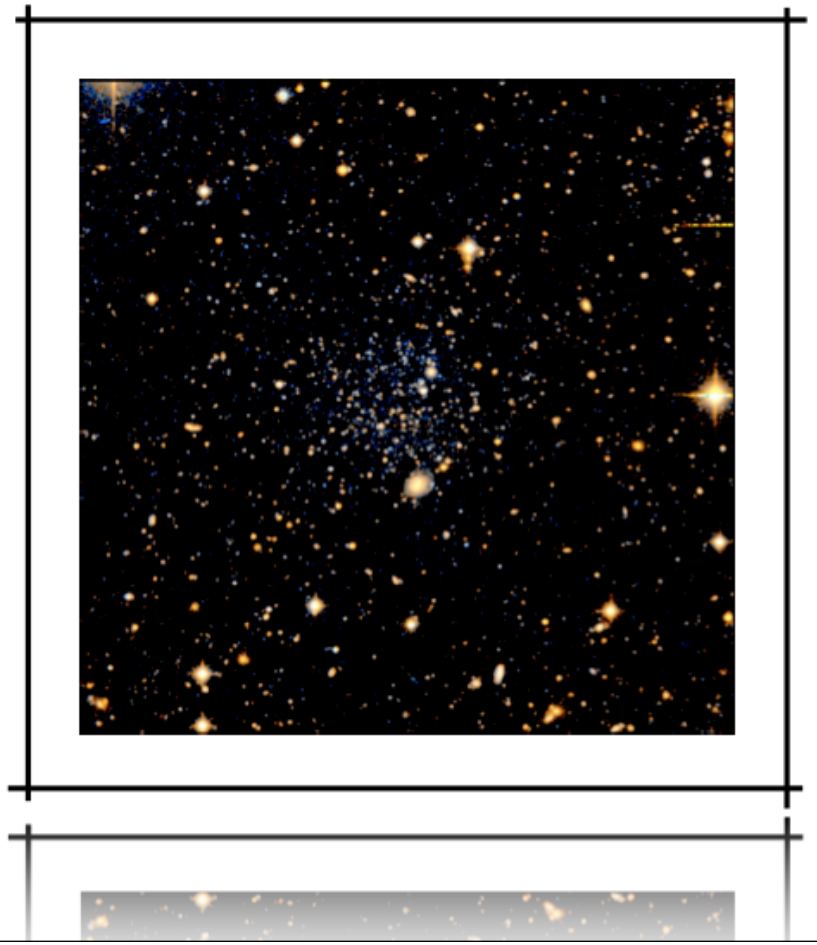
Irwin et al. (2007)
Ryan-Weber et al. (2008)



Leo T

Irwin et al. (2007)
Ryan-Weber et al. (2008)

- ~420 kpc and ~3.3x10^6 $M_\odot$



Leo T

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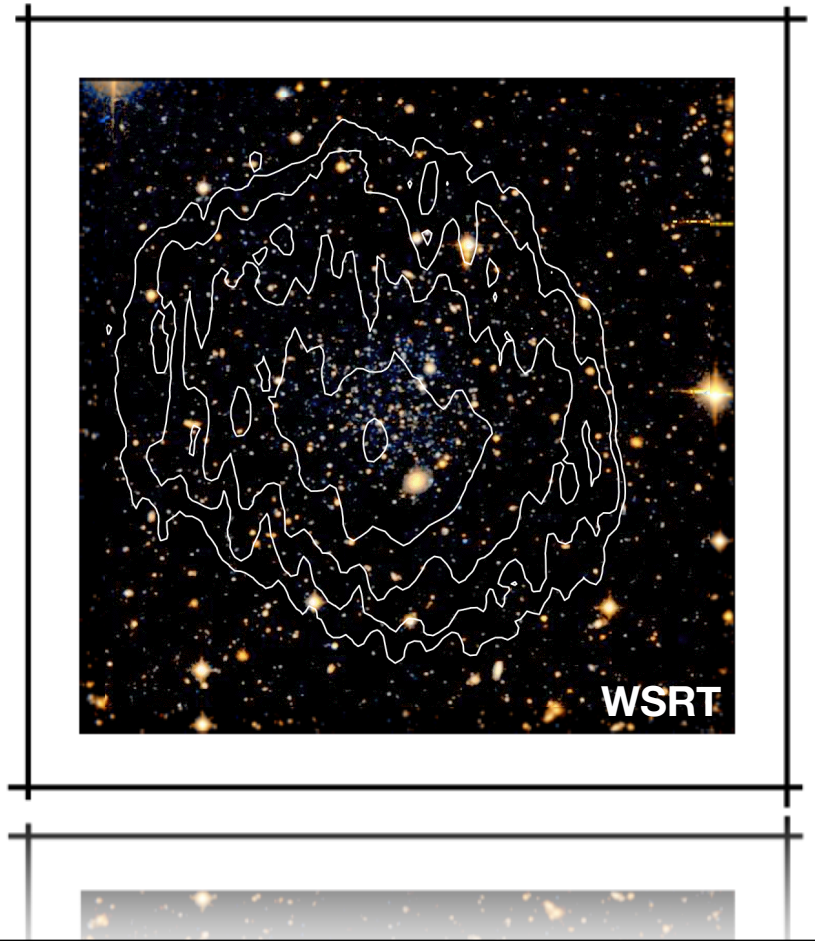
- ~420 kpc and ~3.3x10^6 $M_\odot$
- "H_I on the brink of star formation": ~3x10^5 $M_\odot$ of H_I



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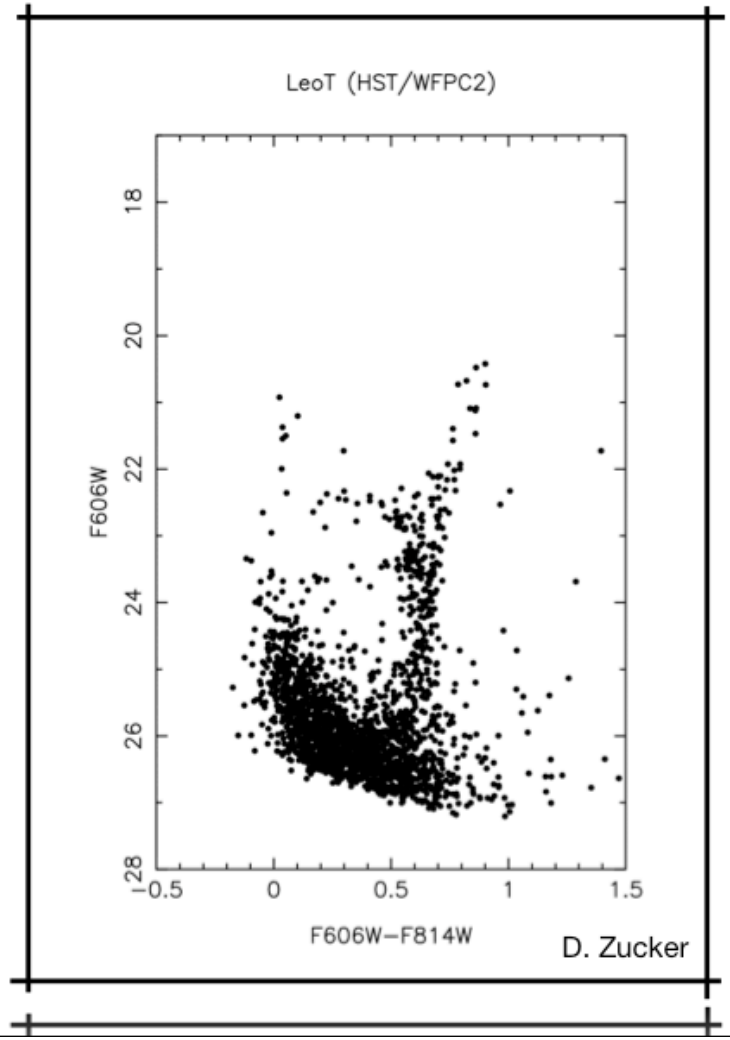
- ~420 kpc and ~3.3x10^6 $M_\odot$
- "H_I on the brink of star formation": ~3x10^5 $M_\odot$ of H_I
- Both intermediate age (~6-8 Gyr) and young (~200 Myr) stellar populations
- But given the low mass, it's surprising that it can retain gas and form stars



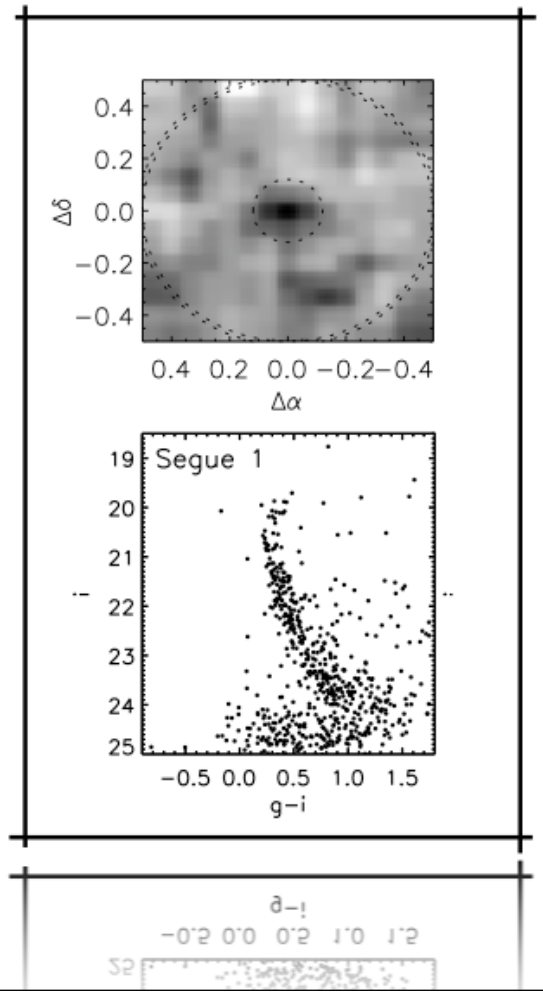
Segue-1

Segue-1


FOX
NEWS.com
We Report.
You Decide.
Astronomers have identified the least luminous galaxy known, but it's surprisingly massive. The reason: It is loaded with invisible matter.

Segue-1

Belokurov et al. (2007)
Niederste-Ostholt et al. (in prep)



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Belokurov et al. (2007)
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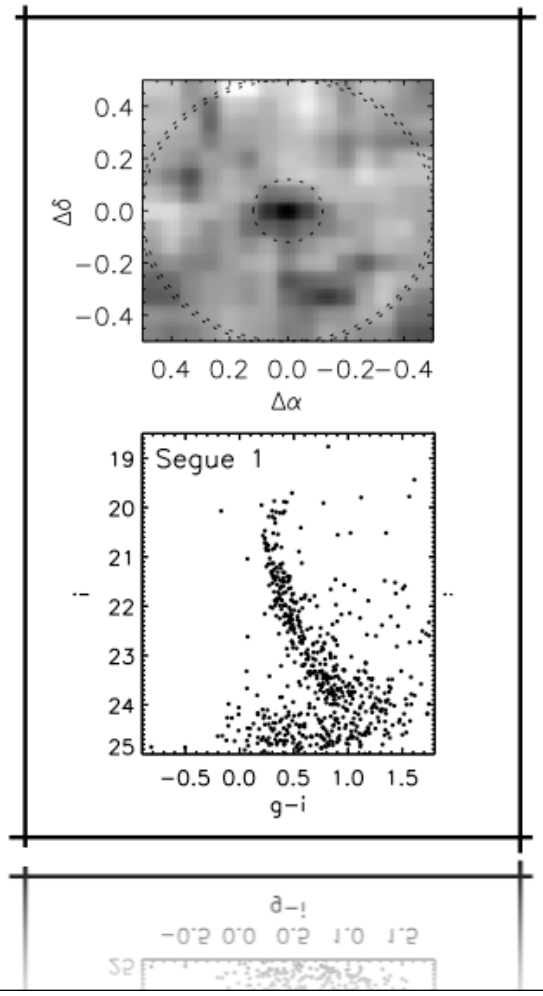
- Originally classified as “an unusually extended globular cluster”, but this is subject of on-going debate



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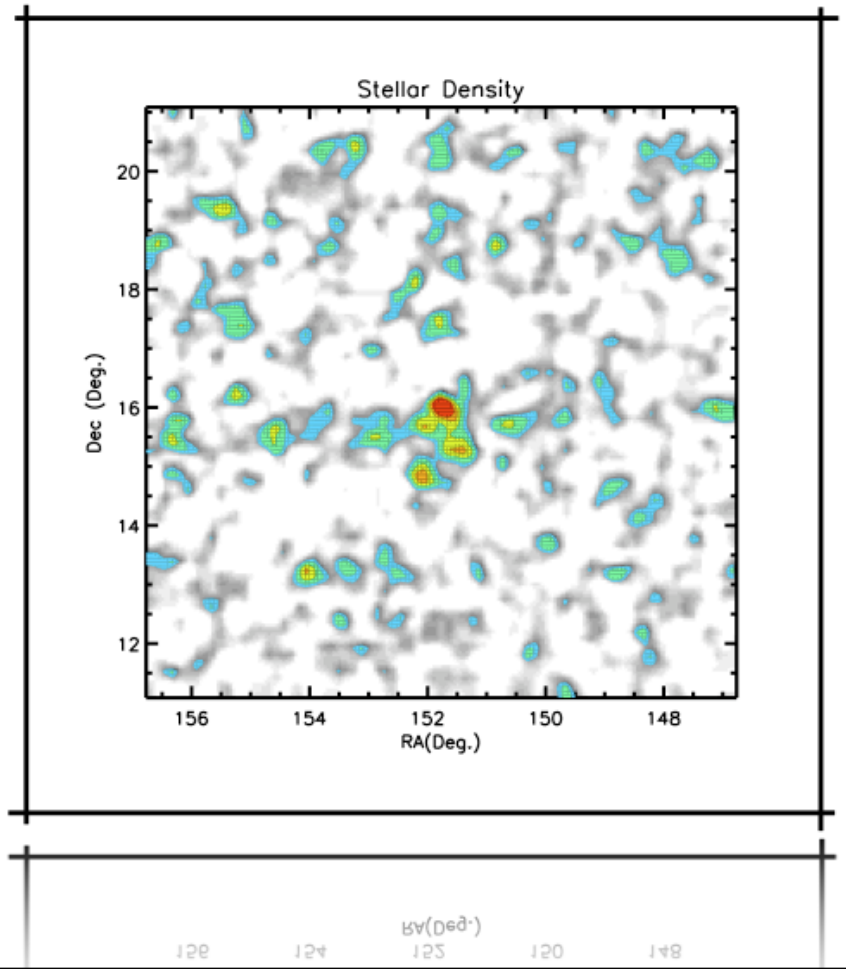

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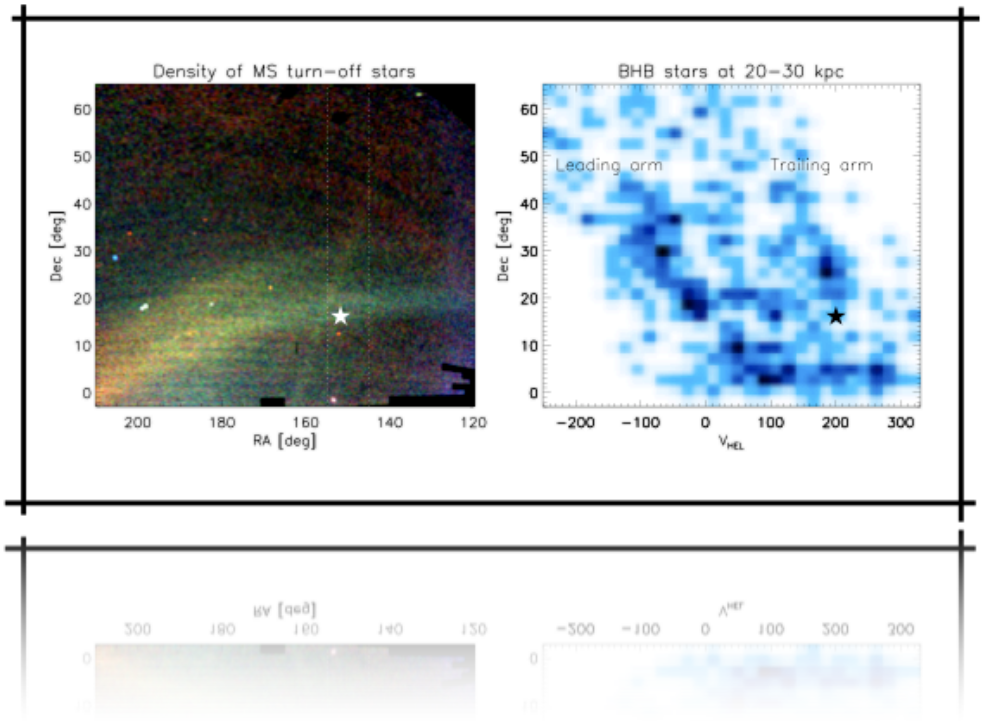
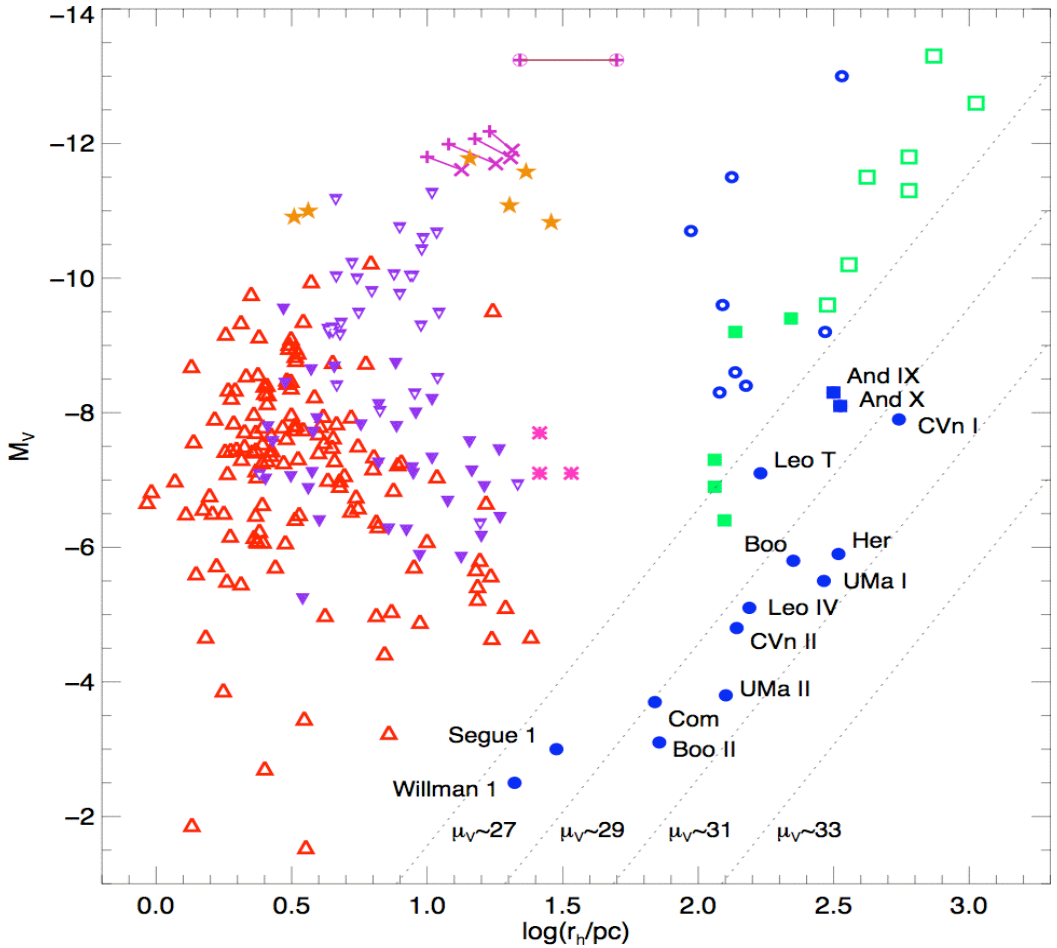
- Originally classified as “an unusually extended globular cluster”, but this is subject of on-going debate
- Optimal Filter Technique (e.g. Odenkirchen) uncovers extended features out to as much as a degree
- For the first time, BHBs reveal kinematic sigature of trailing arm



Size Luminosity



Conclusions

- SDSS has revolutionised our understanding of the Galactic halo
- The number of new satellites has doubled
  - These can tell us about underlying physical processes of galaxy formation
  - However, it's important to know whether some of these are clusters rather than galaxies

Fin