Dwarf Galaxy Survey with Amateur Telescopes (DGSAT)

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Stellar halos across the cosmos, MPIA, Heidelberg, July 2018

Javanmardi et al. (2016)

DGSAT

David Martinez-Delgado
(Heidelberg)

Christian Henkel
(Bonn)

Pavel Kroupa
(Bonn)

+ a network of amateur astronomers

Ken Crawford
Karel Teuwen
R. Jay Gabany
Hanson, M.
Fabian Neyer

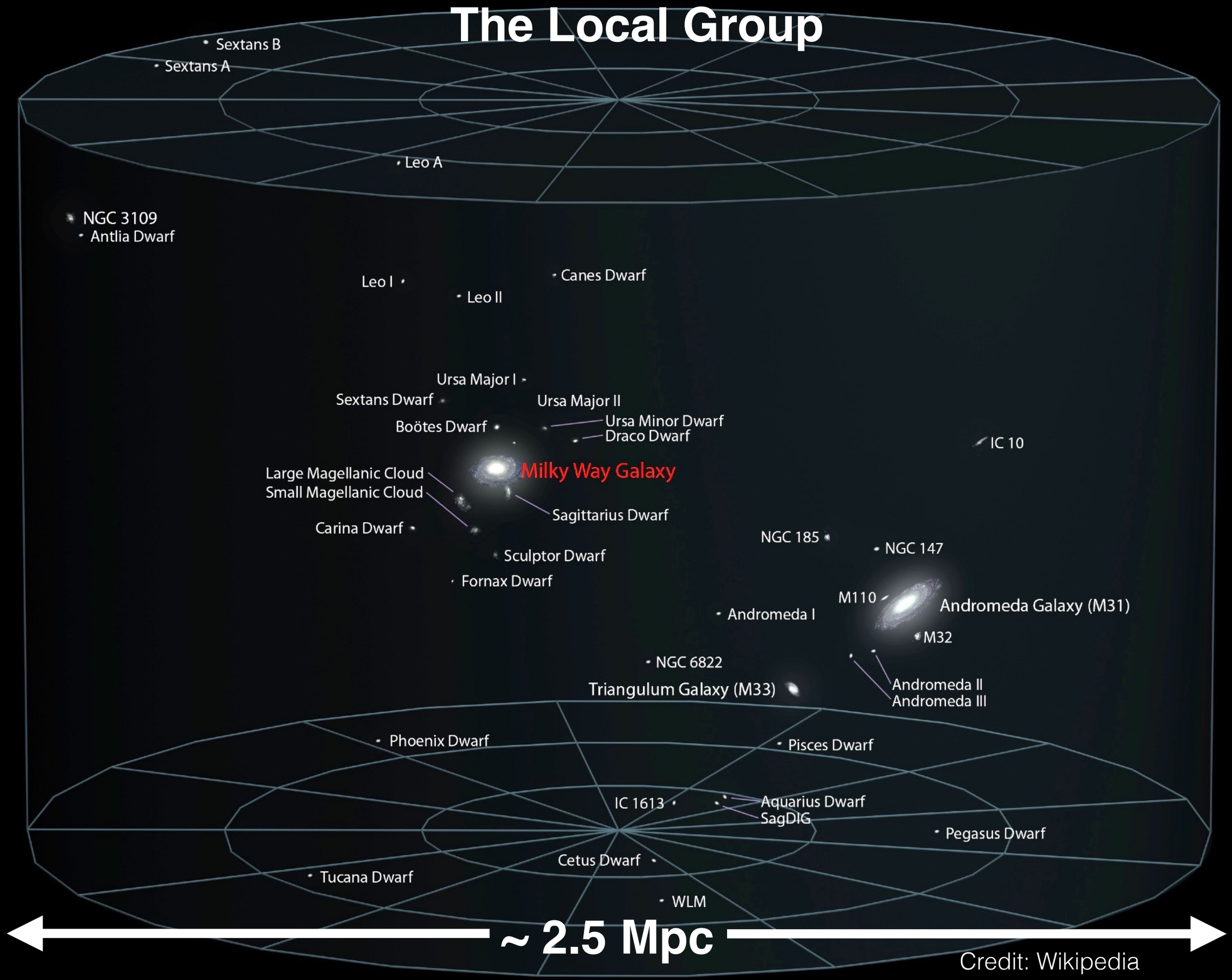
Telescopes: ~ 50 cm

Wide field deep images

5 sigma
Limiting Surface Brightness:
~28 mag/arcsec^2
(for ~4 arcsec apertures)

Rancho Del Sol Observatory, California

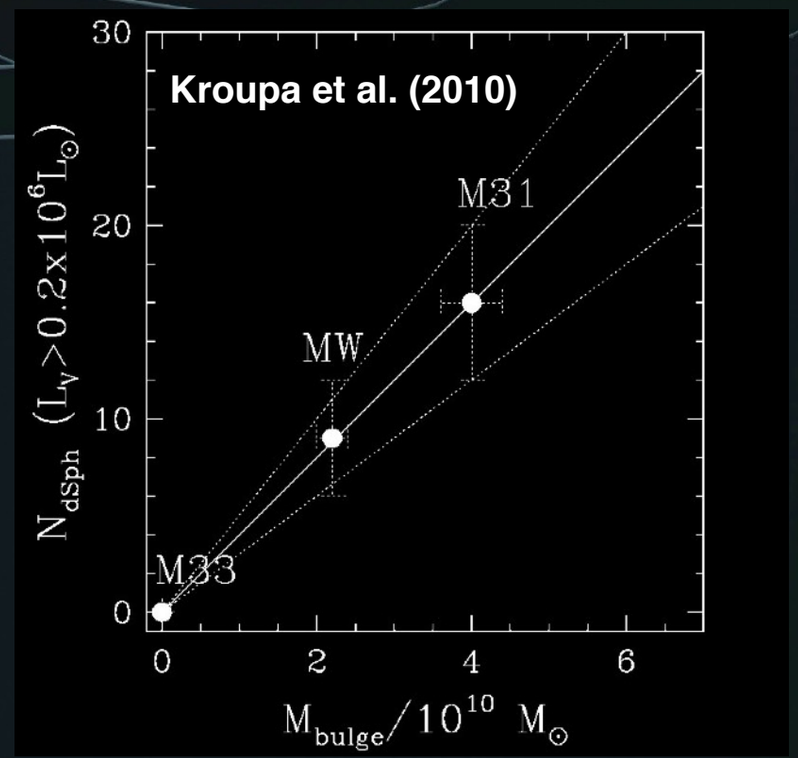
The Local Group



Credit: Wikipedia

The Local Group

The Bulge-Mass vs. Satellite-Number

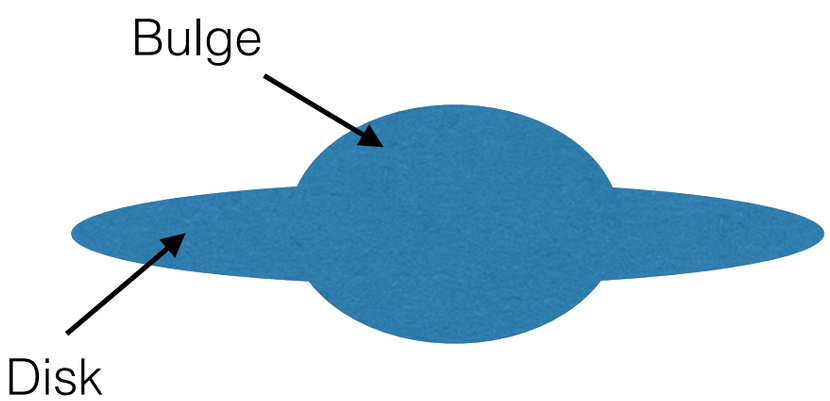


Sextans B
Sextans A
Leo A
NGC 3109
Antlia Dwarf
Leo I
Leo II
Canes Dwarf
Ursa Major I
Sextans Dwarf
Ursa Major II
Boötes Dwarf
Ursa Minor Dwarf
Draco Dwarf
Large Magellanic Cloud
Small Magellanic Cloud
Milky Way Galaxy
Sagittarius Dwarf
Carina Dwarf
Sculptor Dwarf
Fornax Dwarf
NGC 185
NGC 147
M110
Andromeda Galaxy (M31)
Andromeda I
M32
NGC 6822
Triangulum Galaxy (M33)
Andromeda II
Andromeda III
Phoenix Dwarf
Pisces Dwarf
IC 1613
Aquarius Dwarf
SagDIG
Pegasus Dwarf
Cetus Dwarf
Tucana Dwarf
WLM

~ 2.5 Mpc

Credit: Wikipedia

Bulge Mass vs. Number of Satellites



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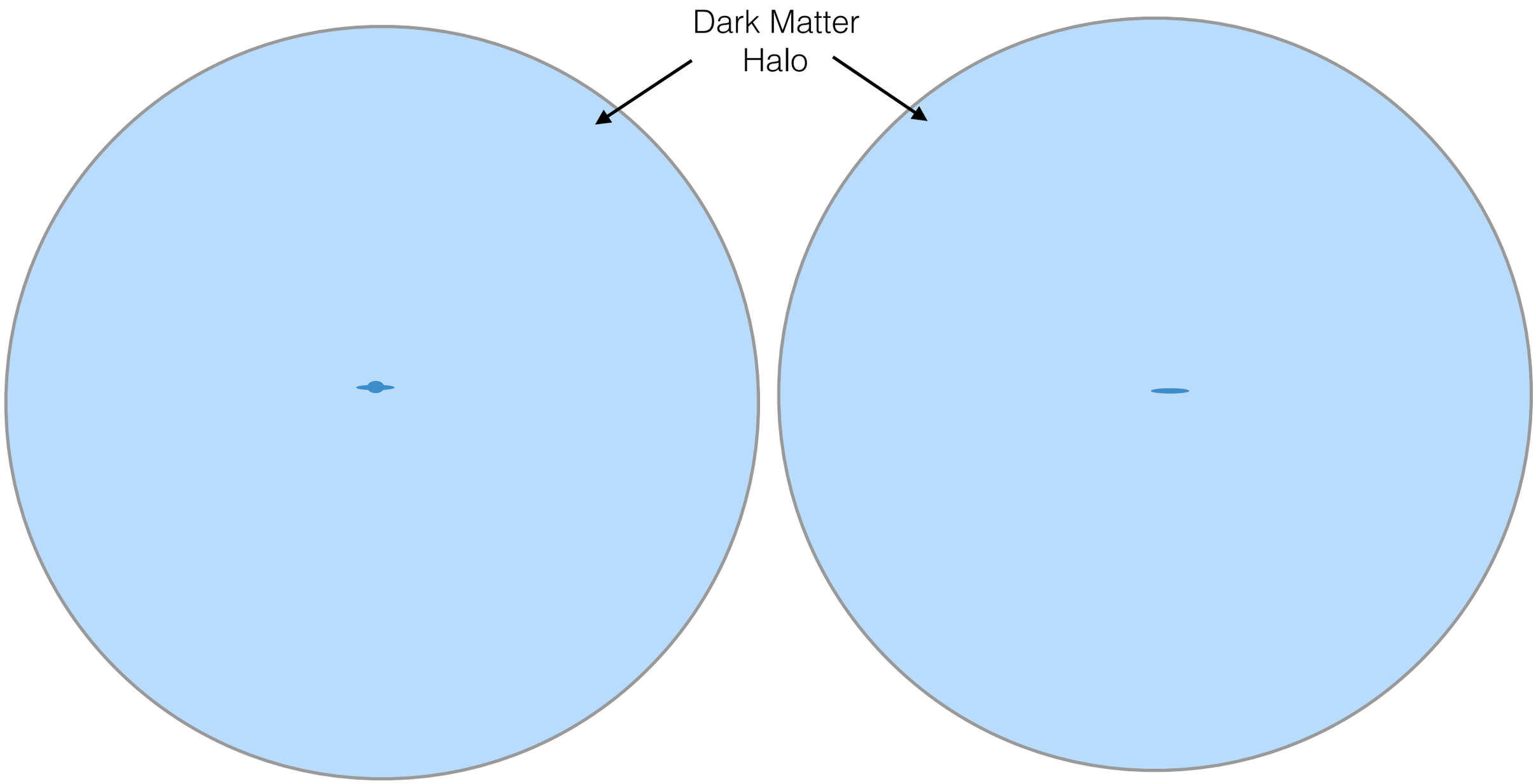

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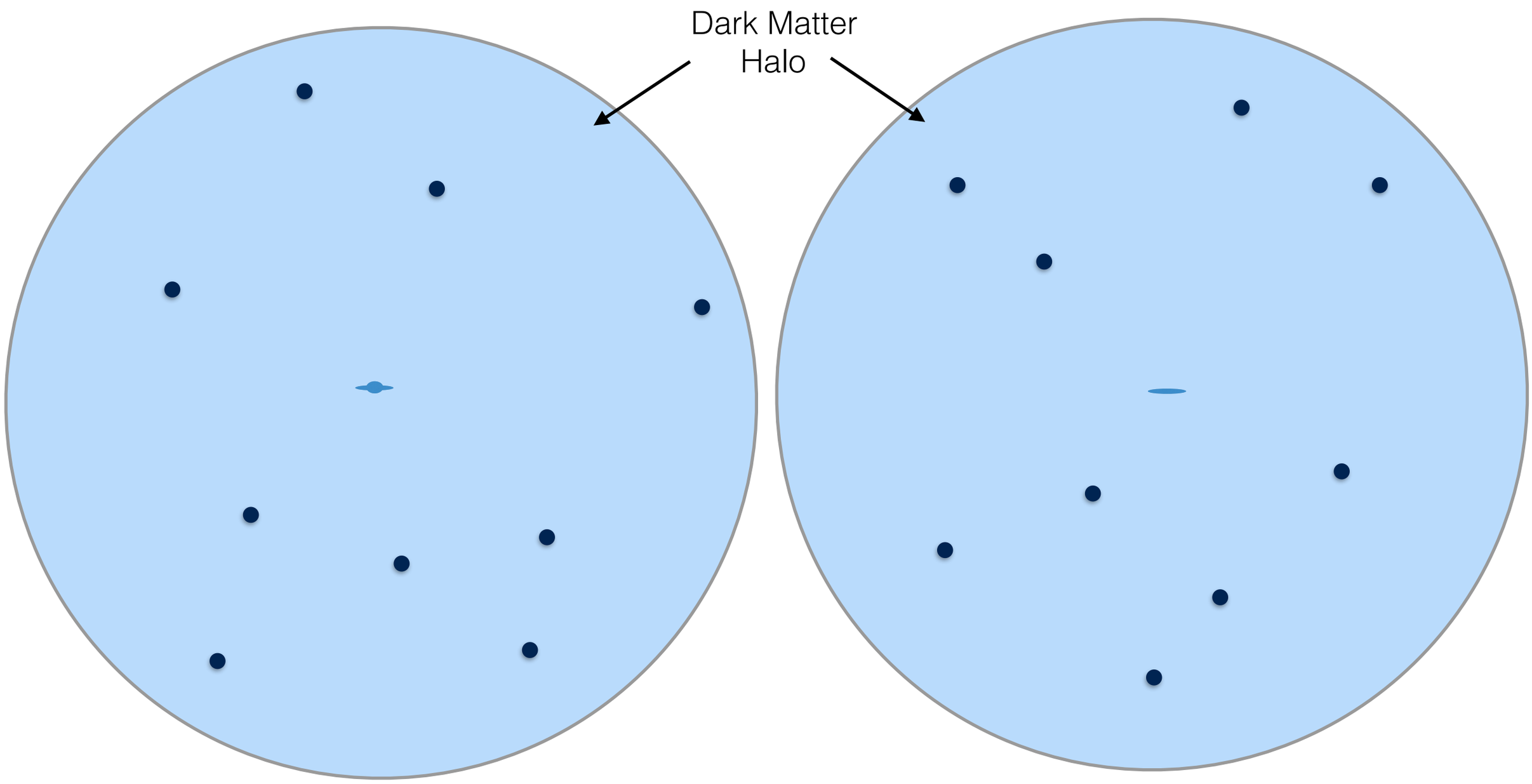

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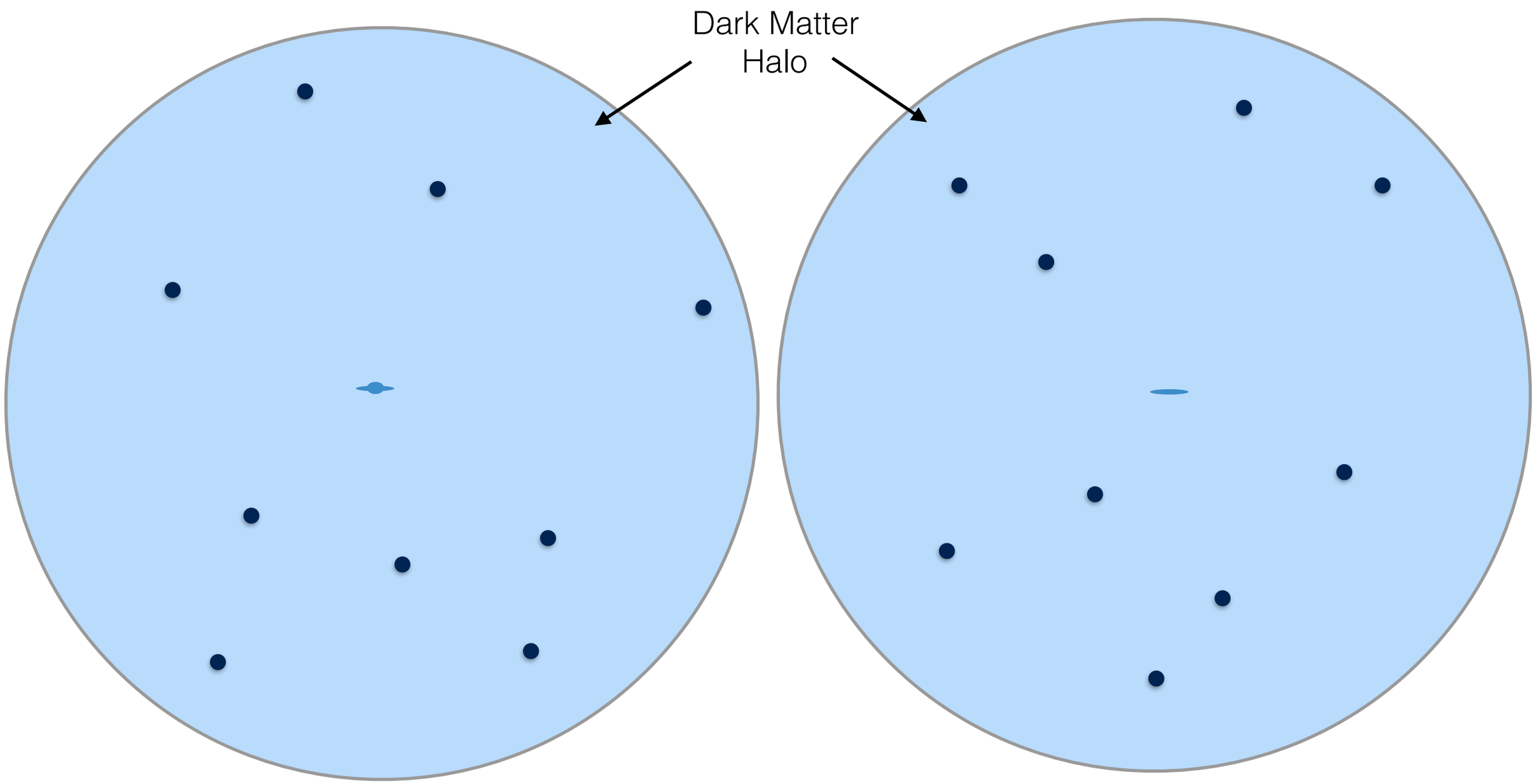
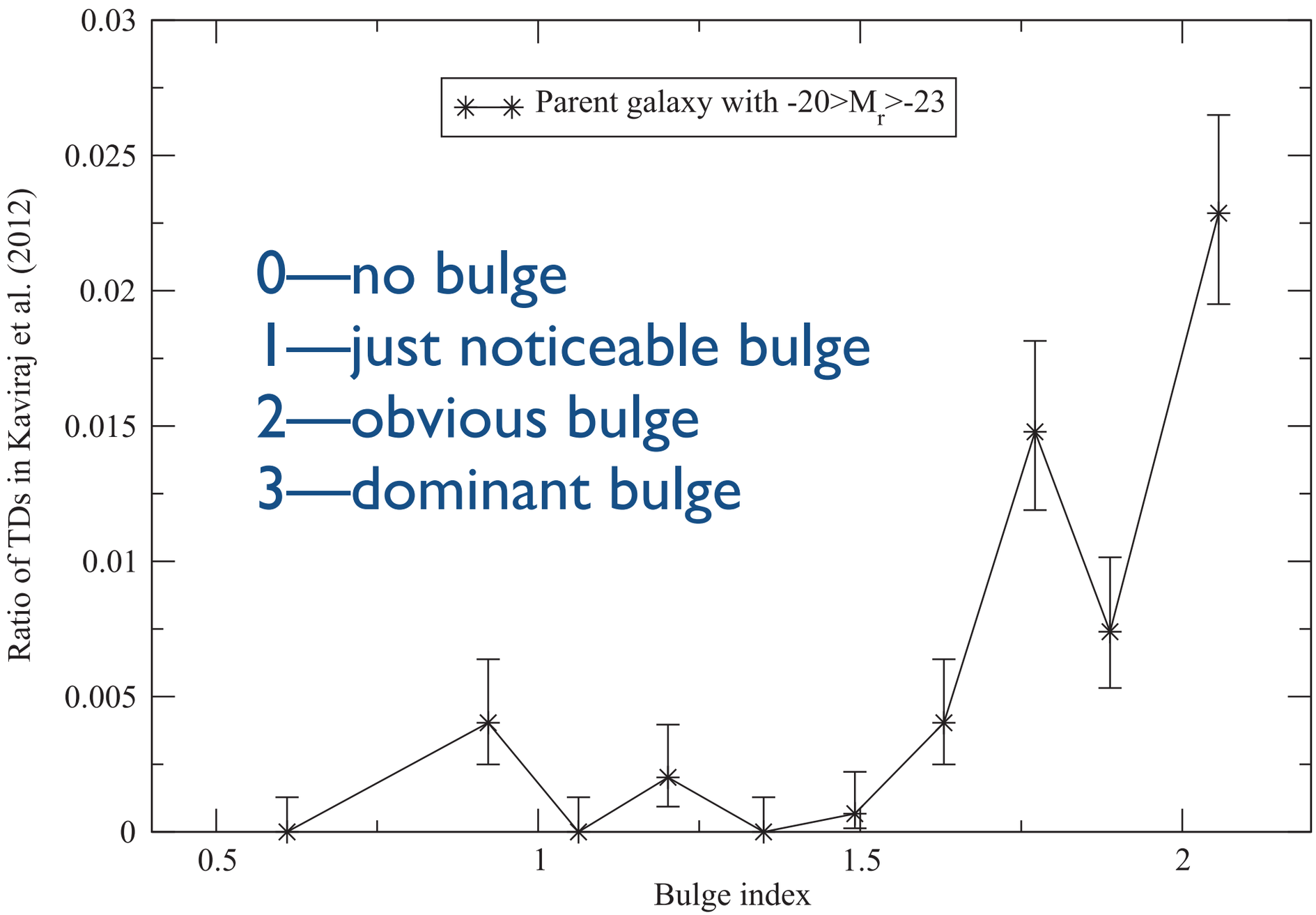


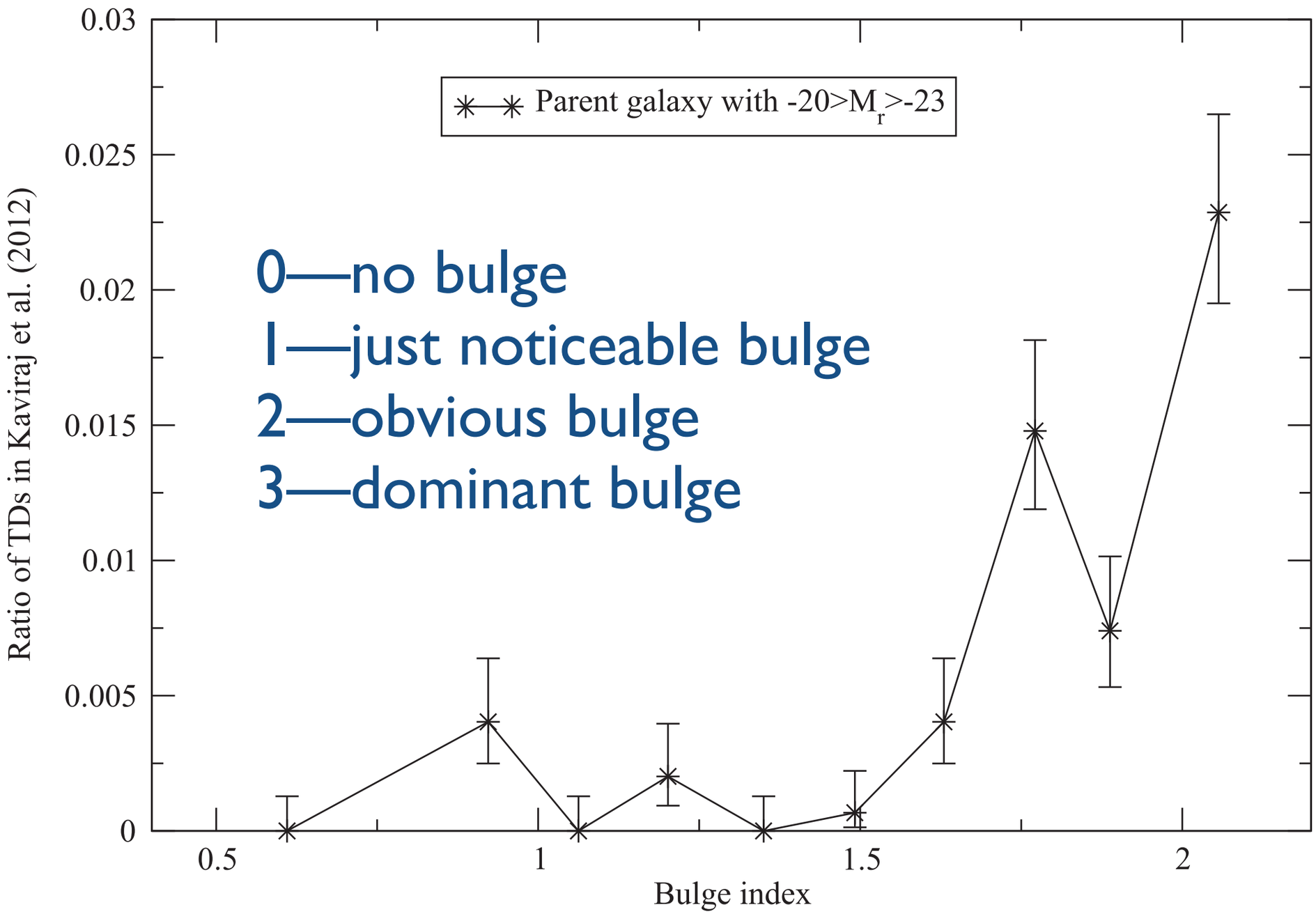
Galaxies with and without bulge but with similar rotation velocity (hence similar dark matter halo mass) are expected to have similar number of satellites. A correlation between bulge mass and number of satellites seems not be emerged in the standard scenario (should be investigated further).

The number of tidal dwarf satellite galaxies in dependence of bulge index



 Lopez-Corredoira & Kroupa (ApJ, 817, 75, 2016)

The number of tidal dwarf satellite galaxies in dependence of bulge index

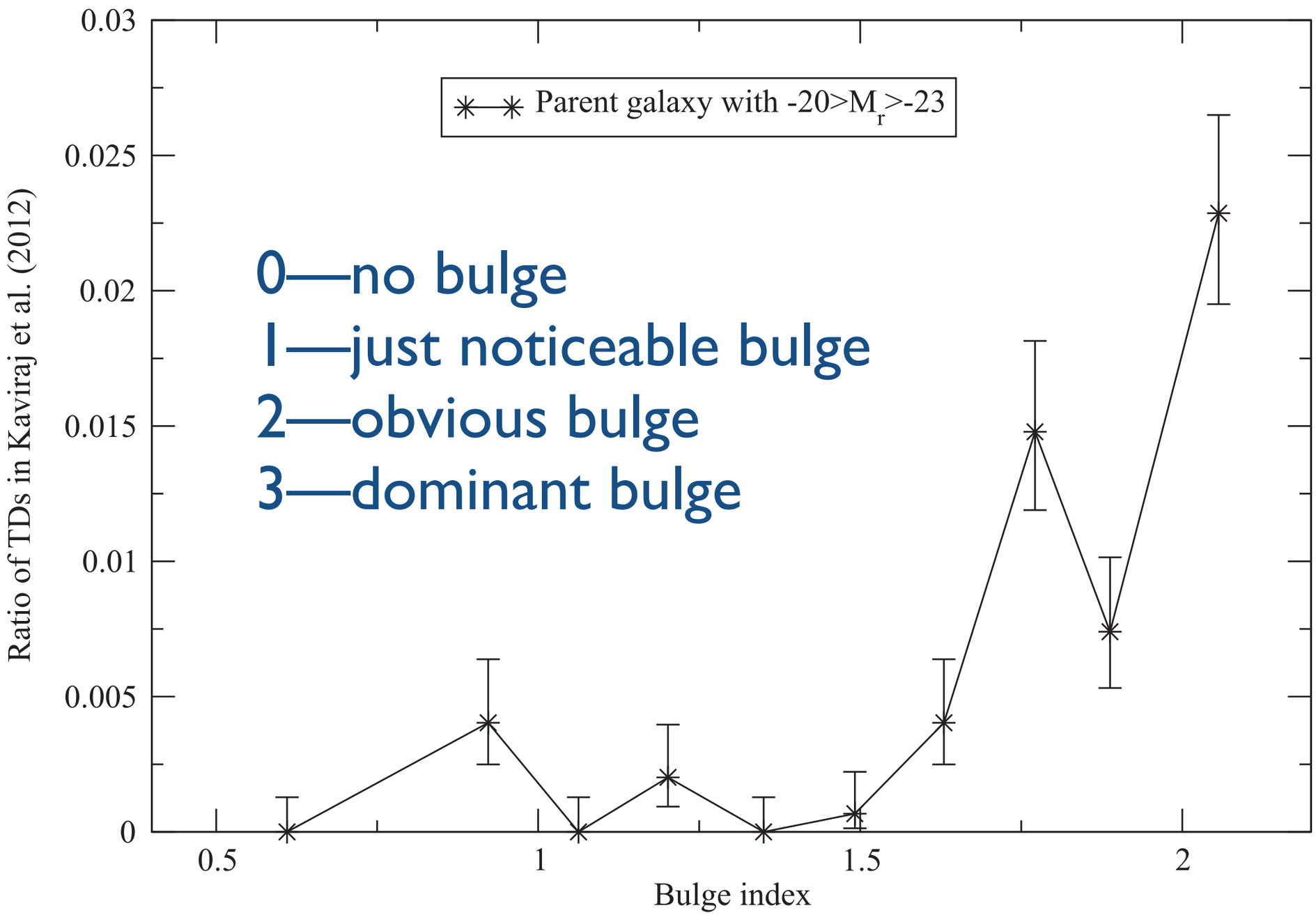


0—no bulge
1—just noticeable bulge
2—obvious bulge
3—dominant bulge

Spiral galaxies with similar luminosities in the SDSS

Lopez-Corredoira & Kroupa (ApJ, 817, 75, 2016)

The number of tidal dwarf satellite galaxies in dependence of bulge index



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5sigma Correlation

Spiral galaxies with similar luminosities in the SDSS

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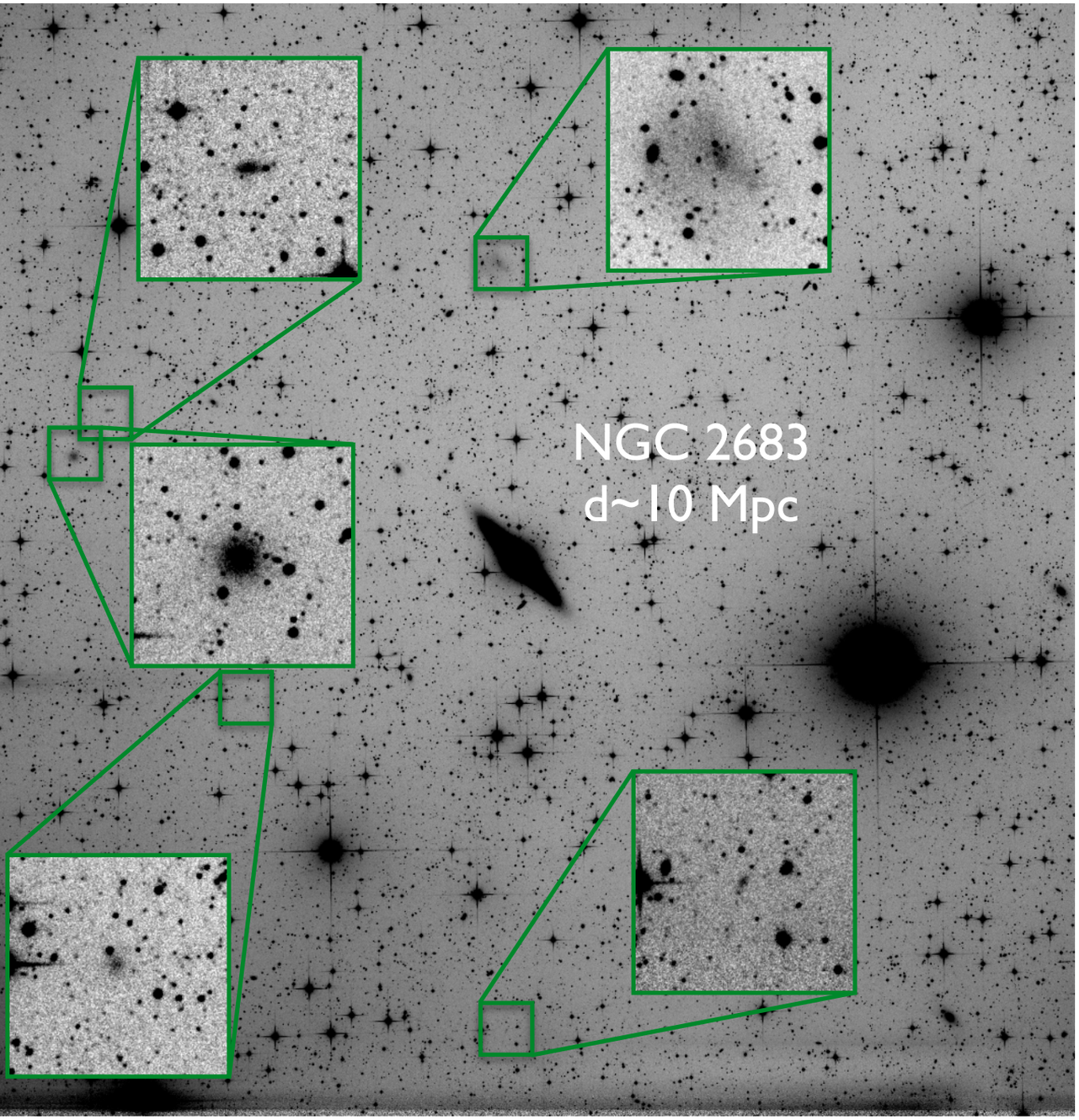
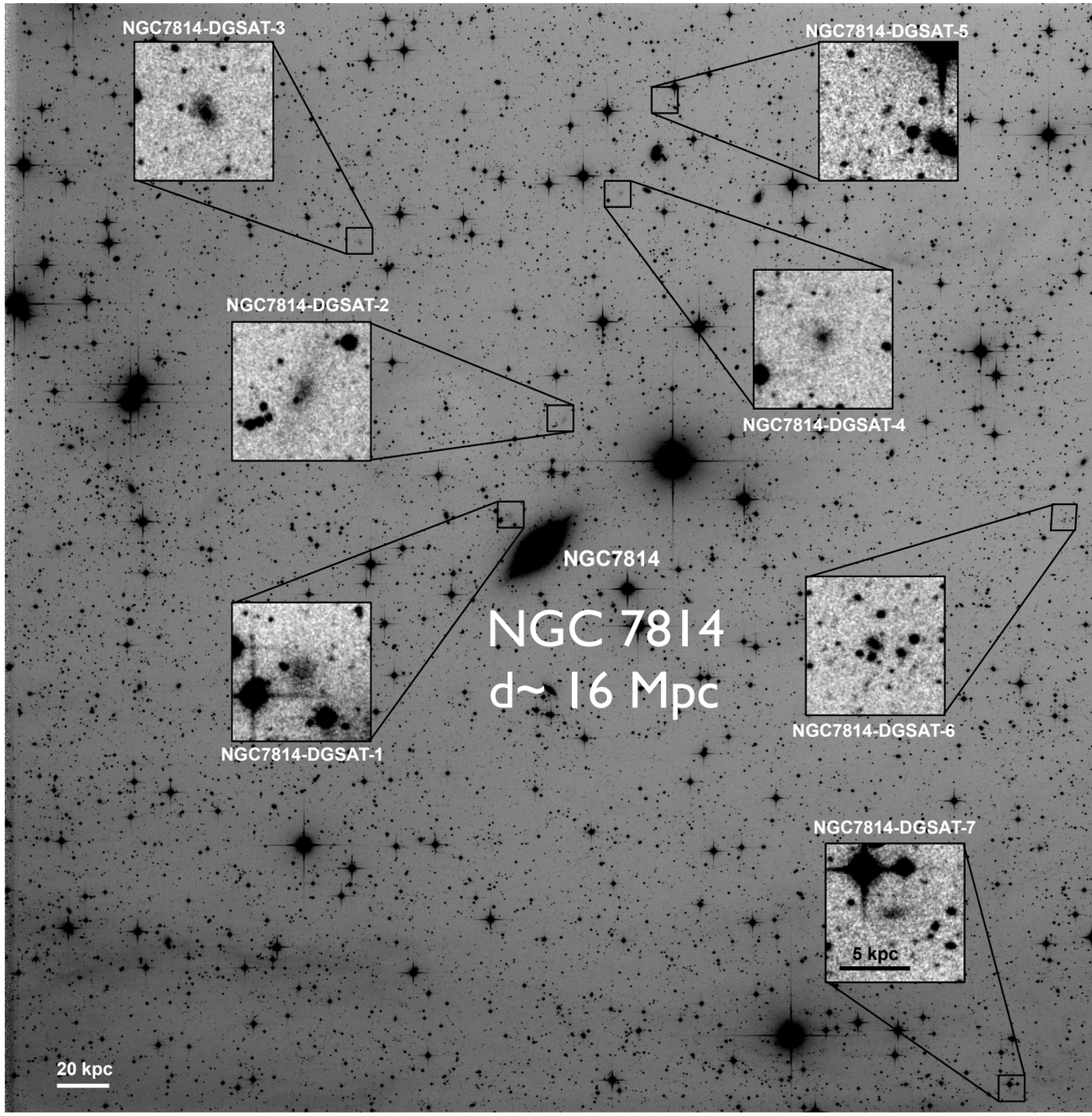
DGSAT



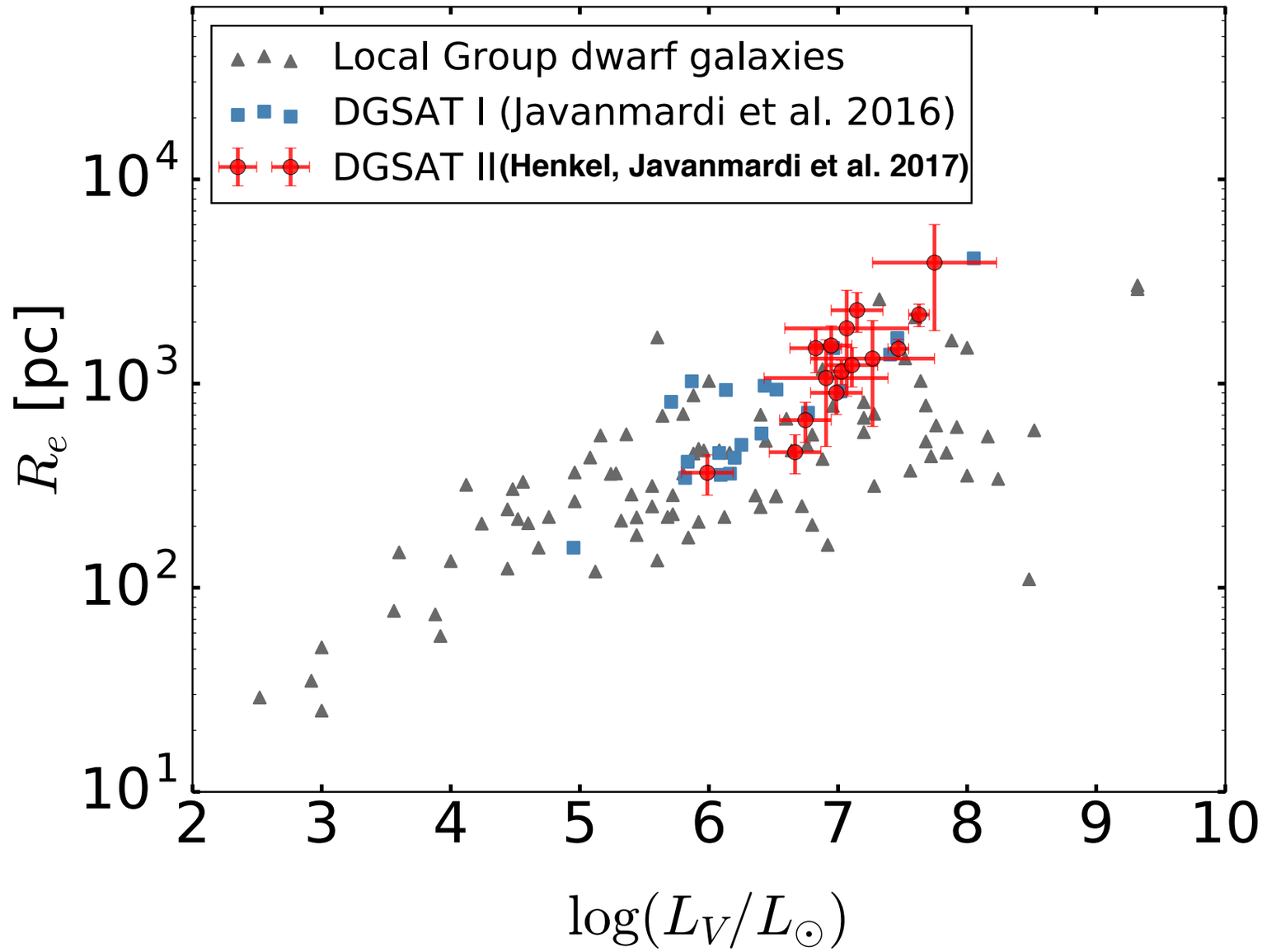


1.4 deg
~260 kpc

1.4 deg
~390 kpc

Javanmardi et al. (2016)
Henkel, Javanmardi, et al (2017)

Discovered dwarf galaxy candidates



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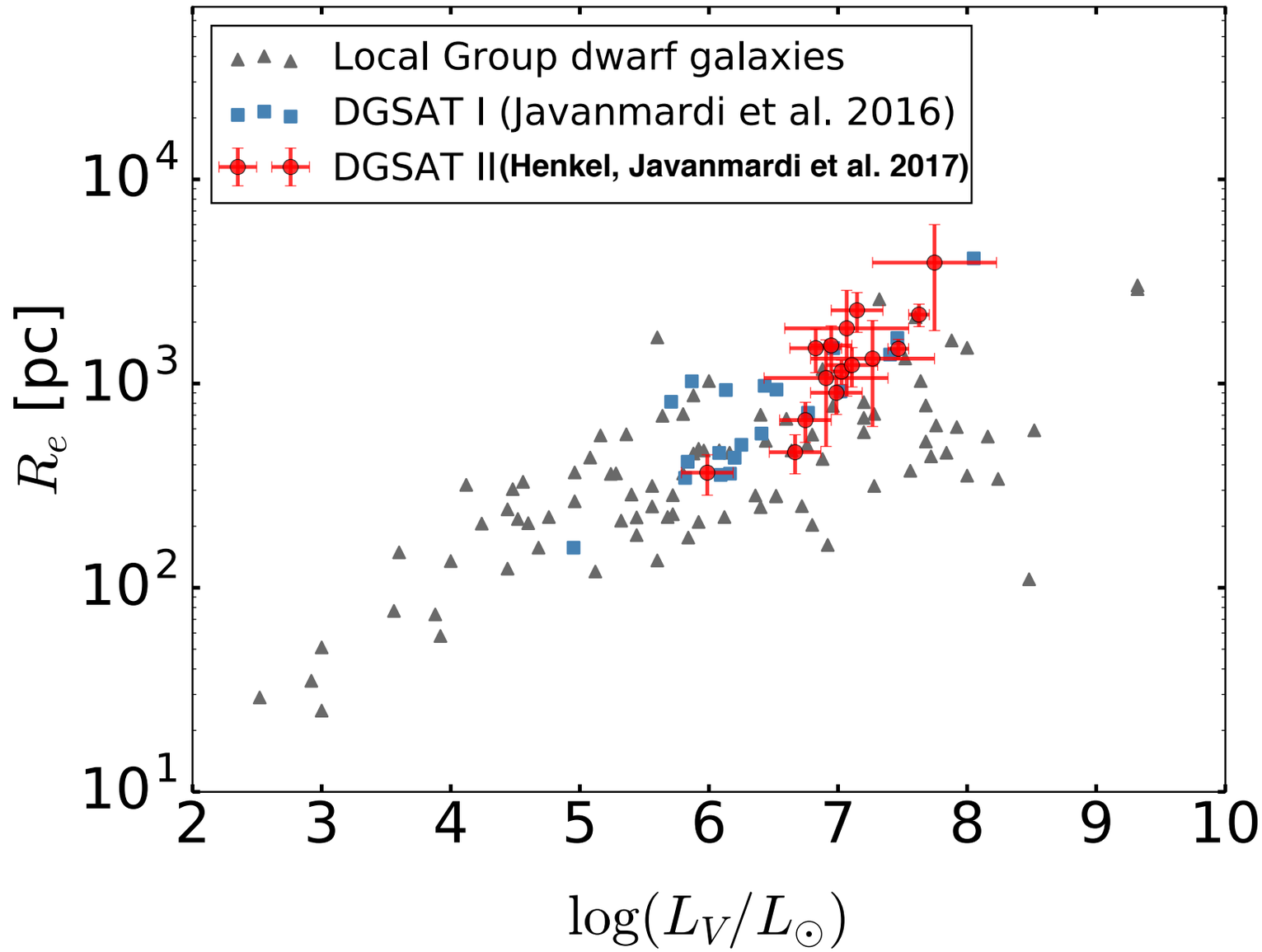
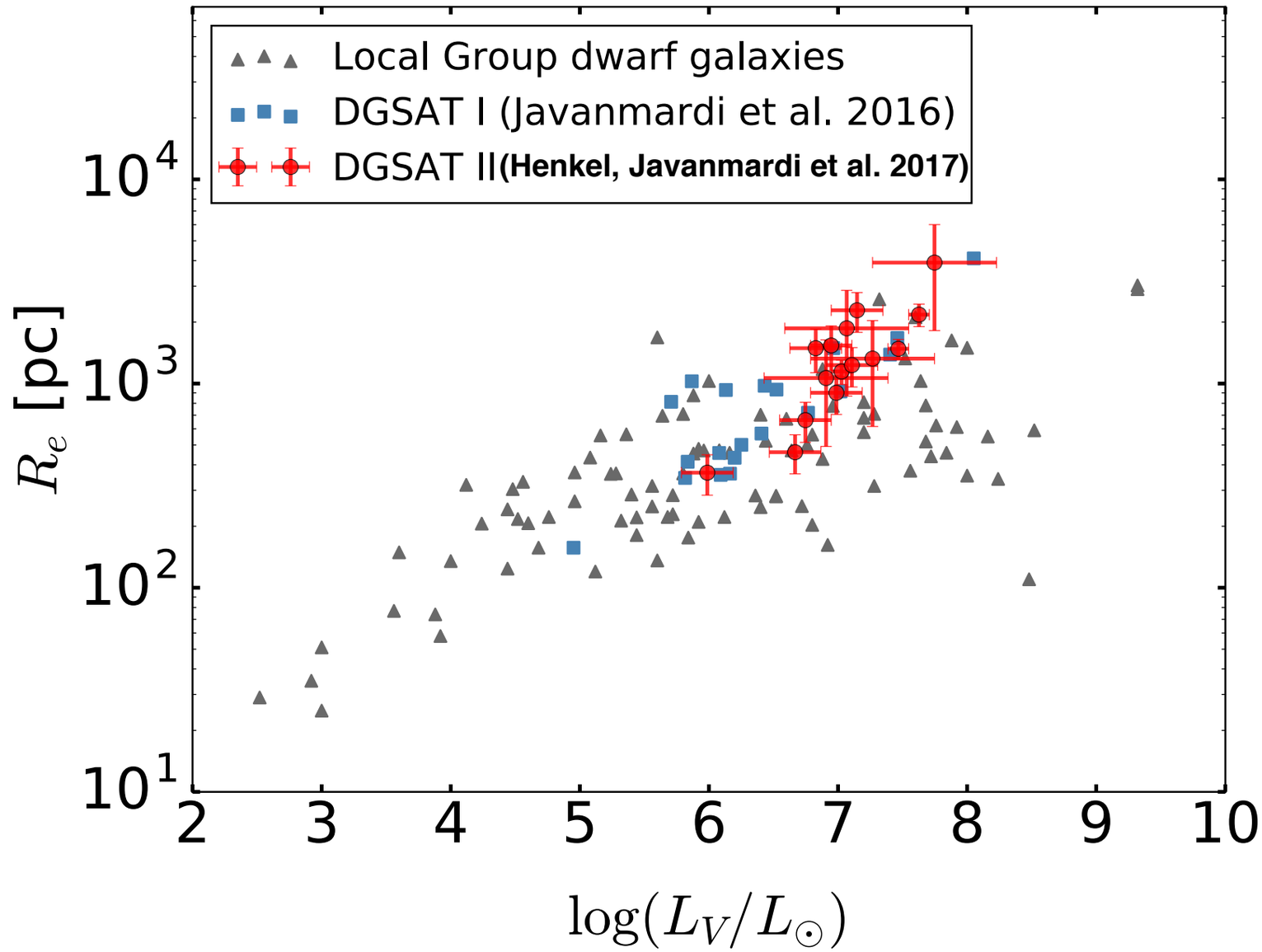


Number of Milky-Way-like galaxies field of which was observed by the DGSAT so far: 8

Discovered dwarf galaxy candidates



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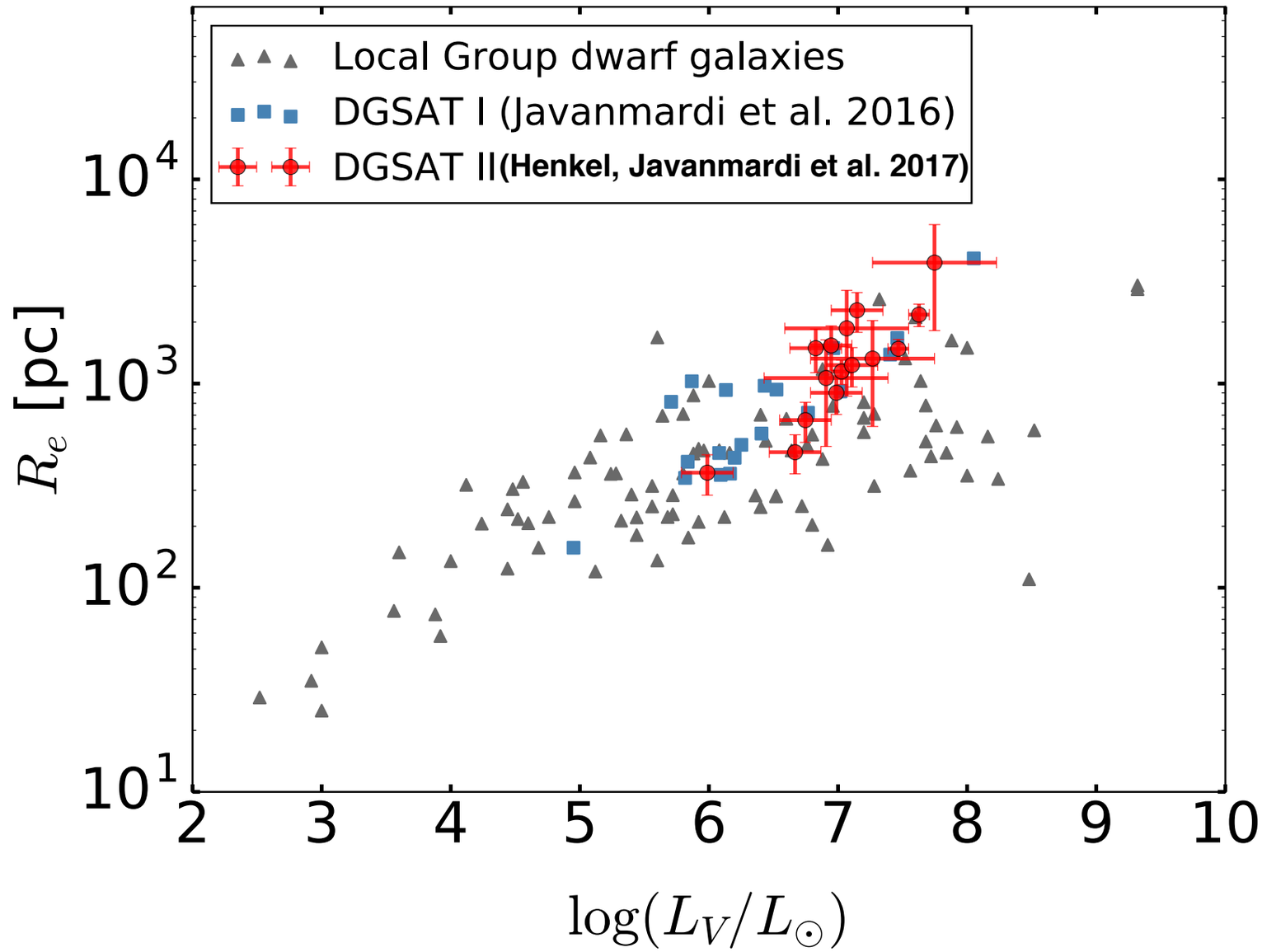
Number of new LSB galaxies discovered by the DGSAT so far: 13

Discovered dwarf galaxy candidates



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Total number of LSB galaxies observed by the DGSAT so far: 33

Summary

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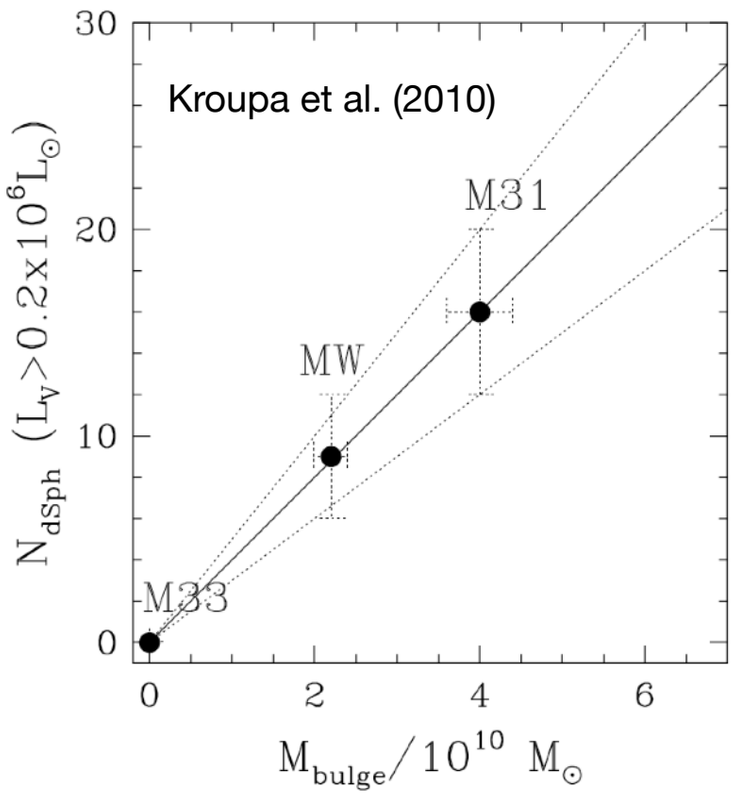

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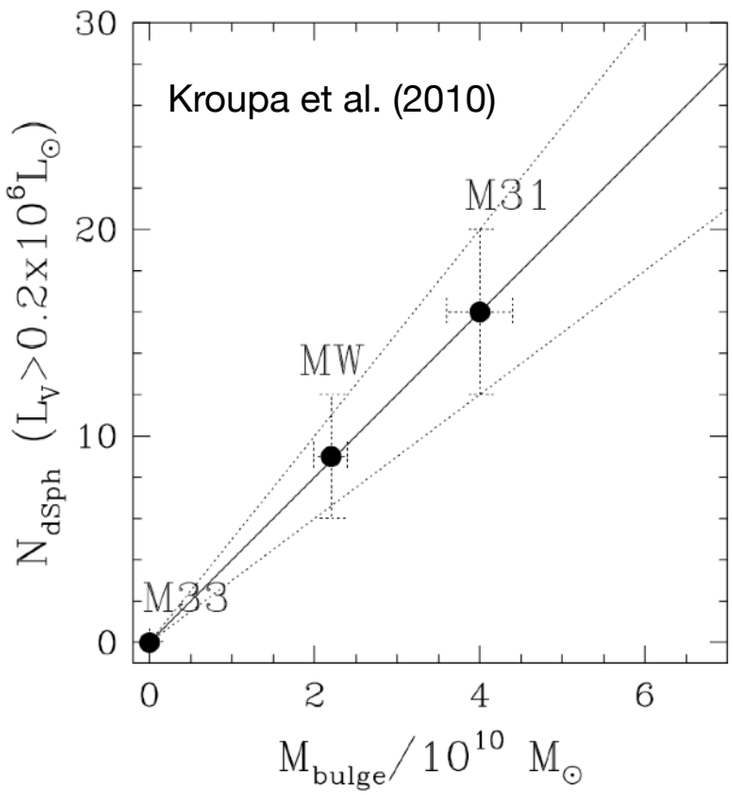
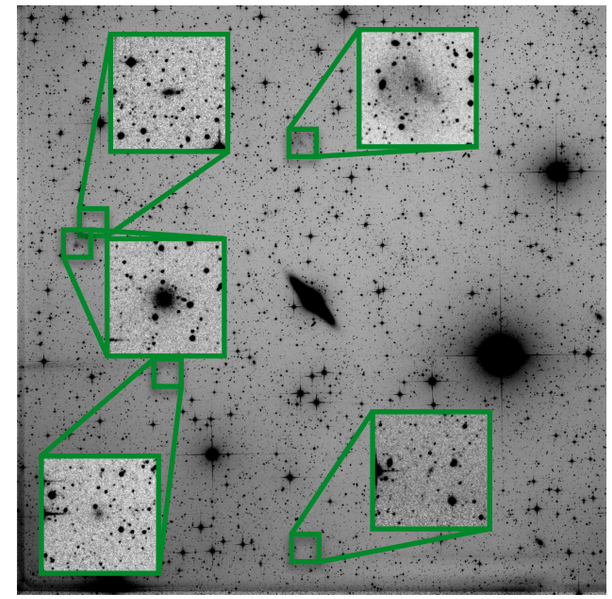


DGSAT

Rancho Del Sol Observatory, California



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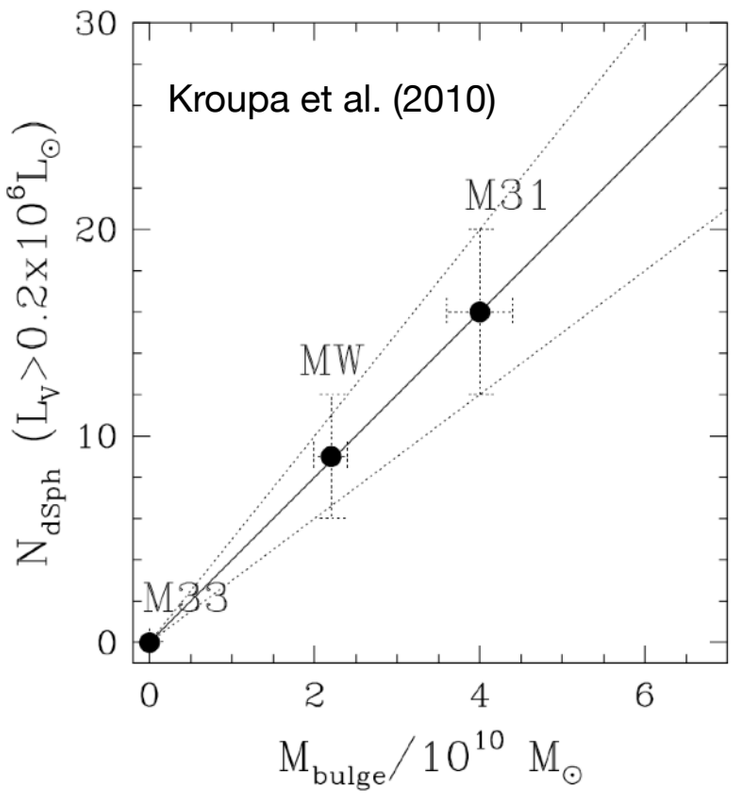

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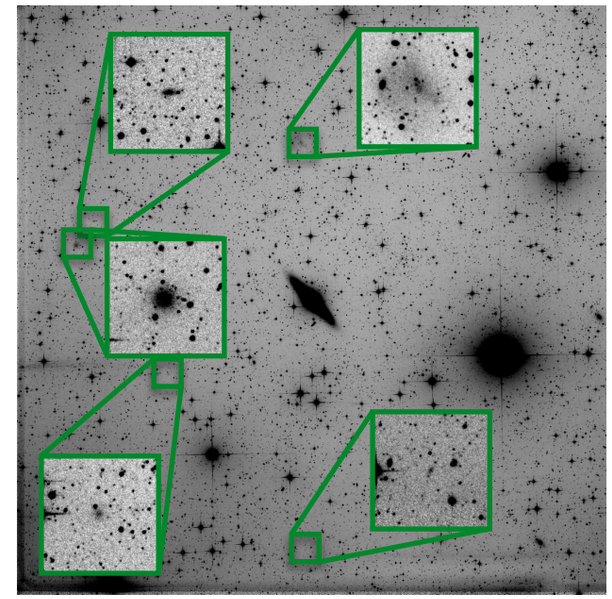

DGSAT I (arXiv:1511.04446)
DGSAT II (arXiv:1703.05356)