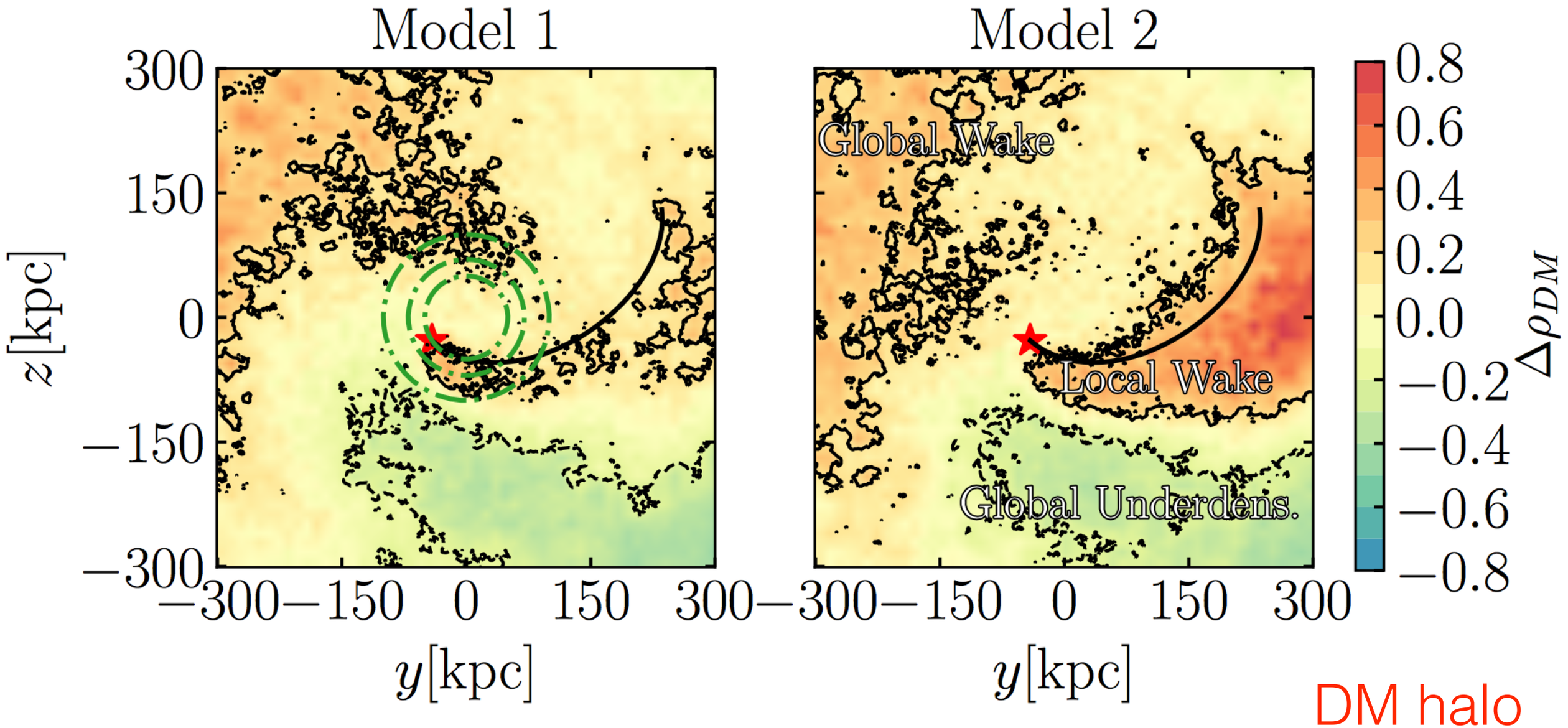
MNRAS 000, 000–000 (0000) Preprint 16 April 2019 Compiled using MNRAS LATEX style file v3.0

The Pisces Plume and the Magellanic Wake

Vasily Belokurov[1,2*], Alis J. Deason[3], Denis Erkal[4], Sergey E. Koposov[1,5],
Julio A. Carballo-Bello[6,7], Martin C Smith[8], Prashin Jethwa[9], Camila Navarrete[6,10]
[1]*Institute of Astronomy, Madingley Rd, Cambridge, CB3 0HA*
[2]*Center for Computational Astrophysics, Flatiron Institute, 162 5th Avenue, New York, NY 10010, USA*
[3]*Institute for Computational Cosmology, Department of Physics, University of Durham, South Road, Durham DH1 3LE, UK*
[4]*Department of Physics, University of Surrey, Guildford GU2 7XH, UK*
[5]*Department of Physics, McWilliams Center for Cosmology, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213, USA*
[6]*Instituto de Astrofísica, Pontificia Universidad Católica de Chile, Av. Vicuña Mackenna 4860, 782-0436 Macul, Santiago, Chile*
[7]*Chinese Academy of Sciences South America Center for Astronomy, National Astronomical Observatories, CAS, Beijing 10010*
[8]*Key Laboratory for Research in Galaxies and Cosmology, Shanghai Astronomical Observatory, Chinese Academy of Sciences, 80 Nandan Road, Shanghai 200030, Peoples Republic of China*
[9]*European Southern Observatory, Karl-Schwarzschild-Str. 2, 85748 Garching, Germany*
[10]*10 Millennium Institute of Astrophysics, Av. Vicuña Mackenna 4860, 782-0436, Macul, Santiago, Chile*

16 April 2019

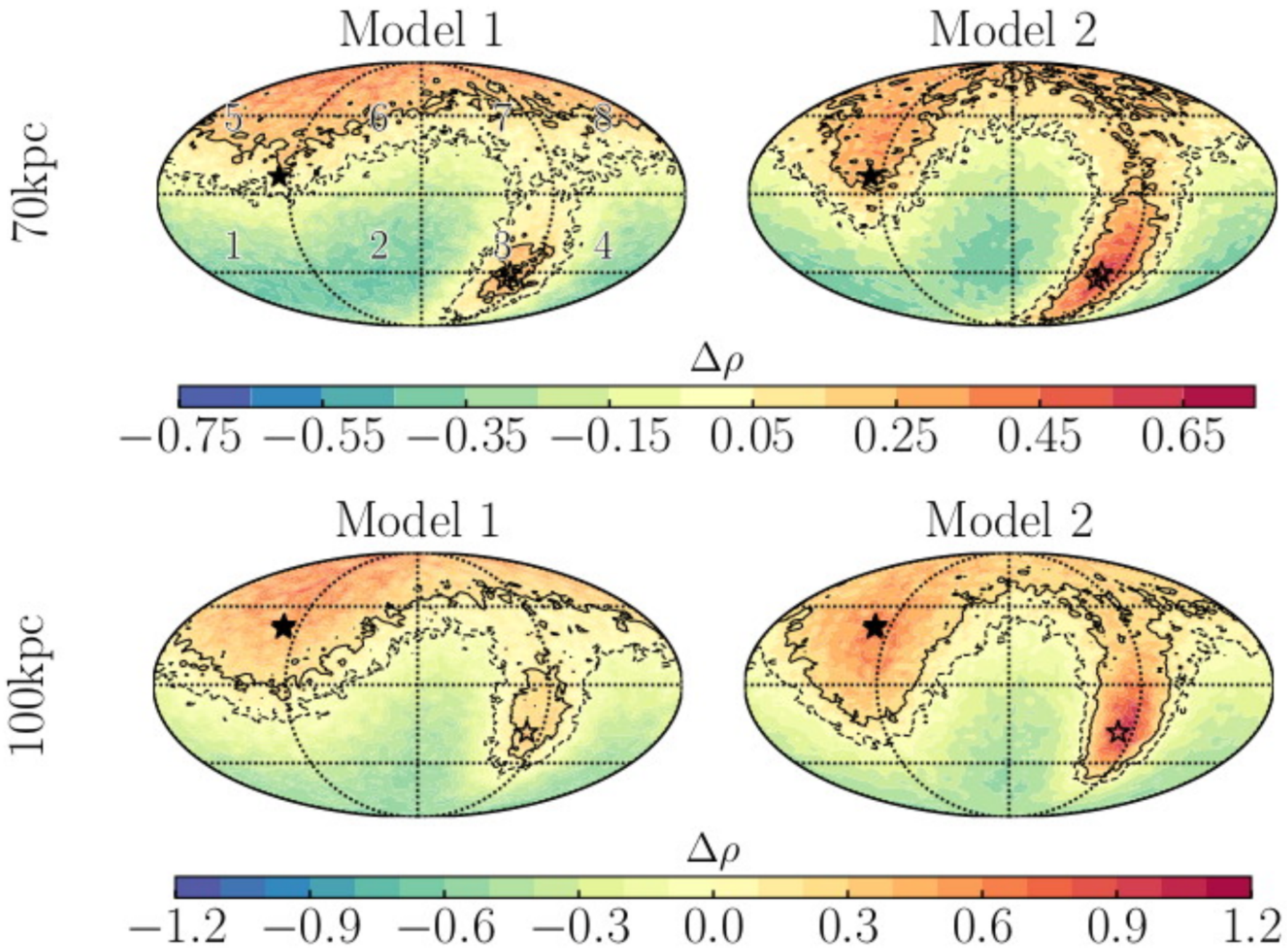
The Magellanic Wake



DM halo

Garavito-Camargo et al 2019

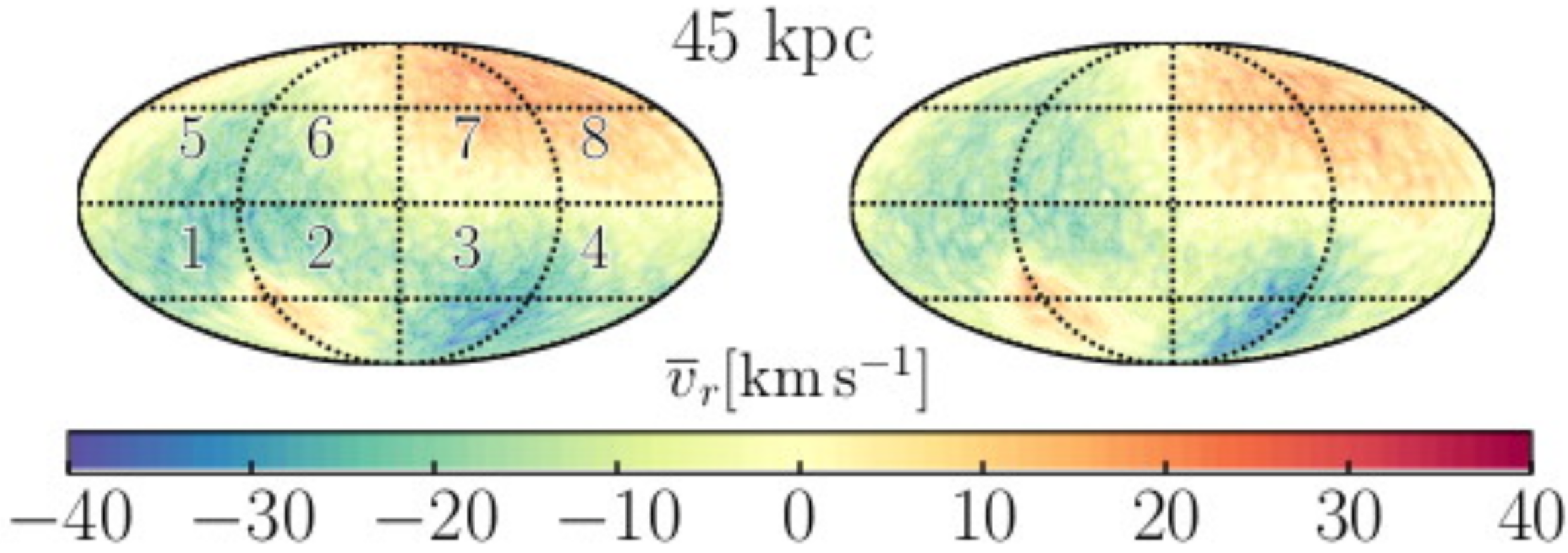
The Magellanic Wake



Stellar halo

Garavito-Camargo et al 2019

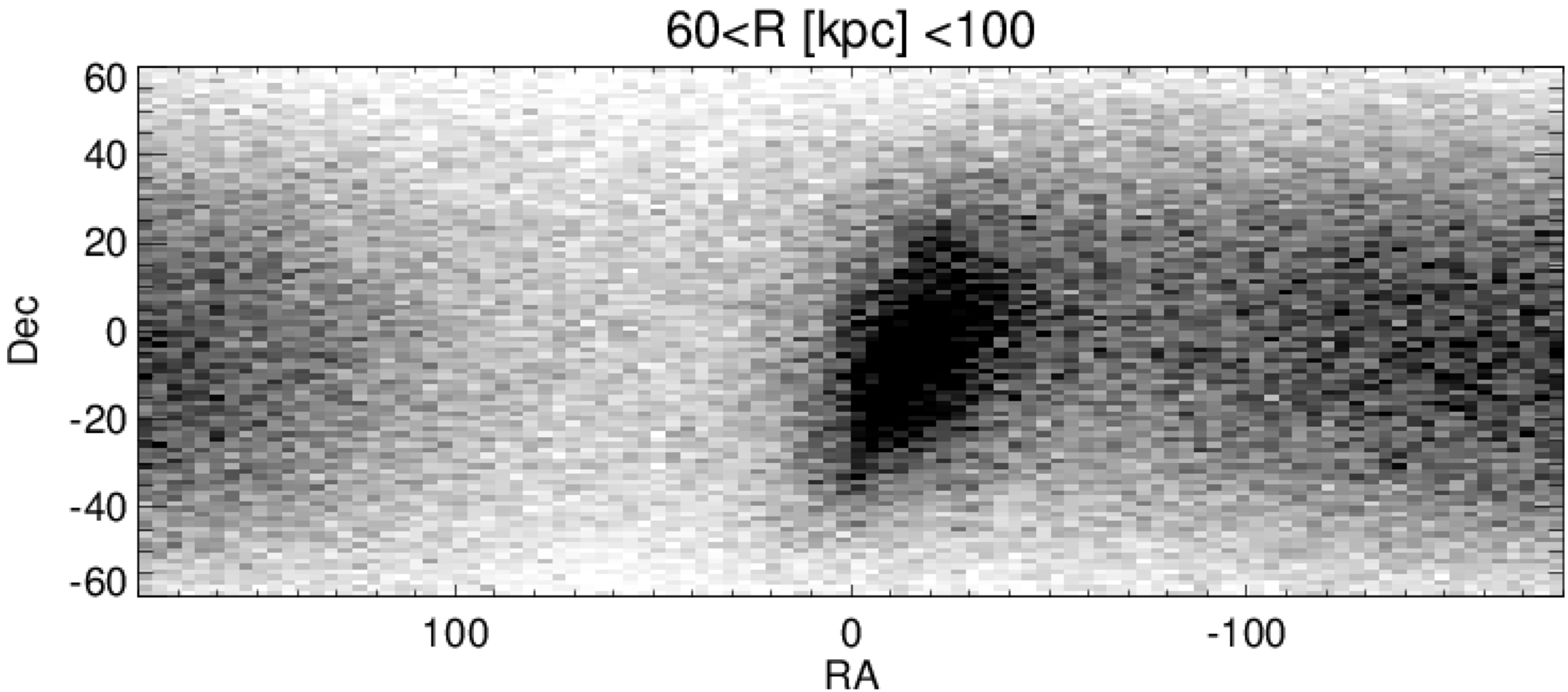
The Magellanic Wake



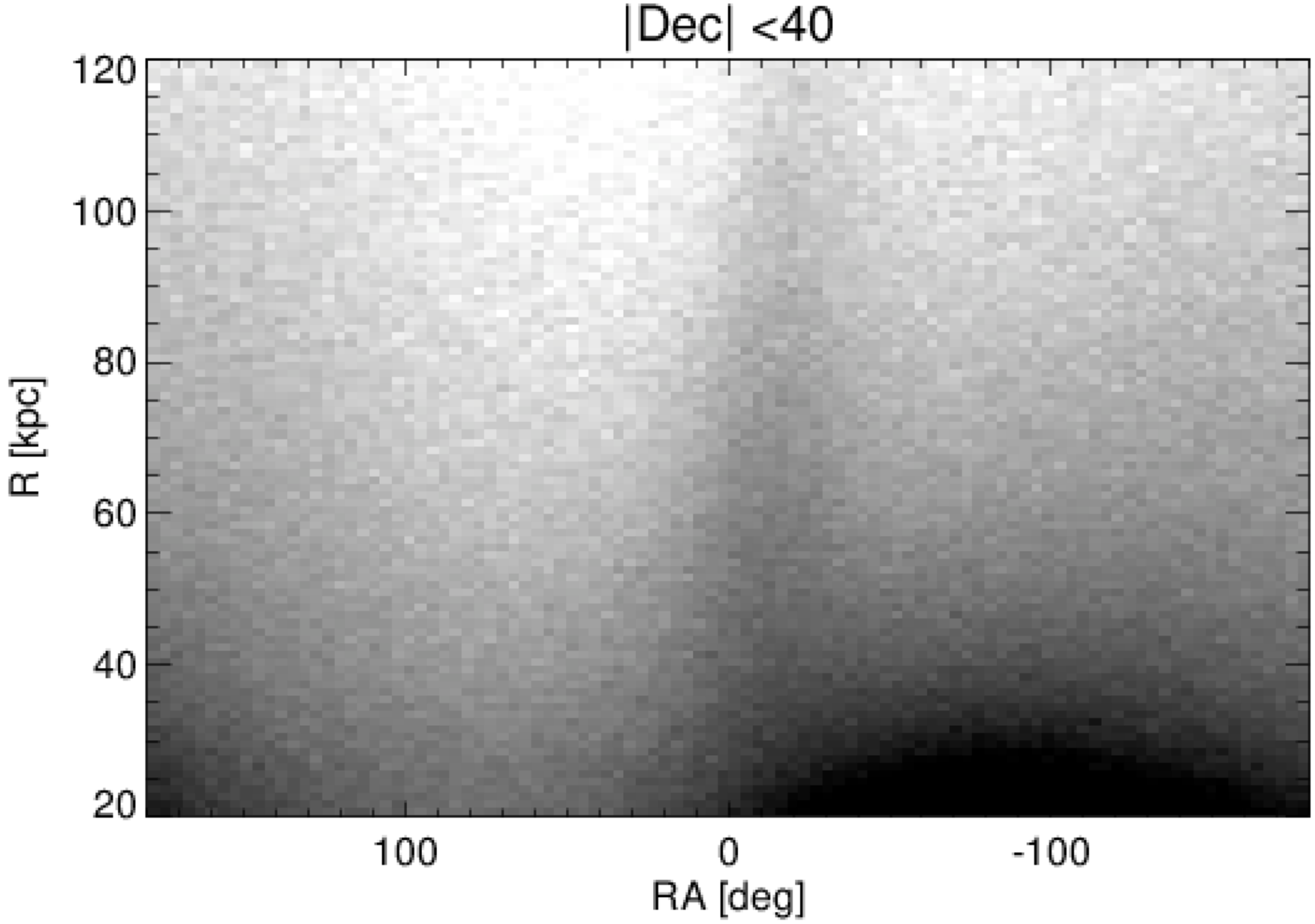
Stellar halo

Garavito-Camargo et al 2019

Magellanic Wake on the sky



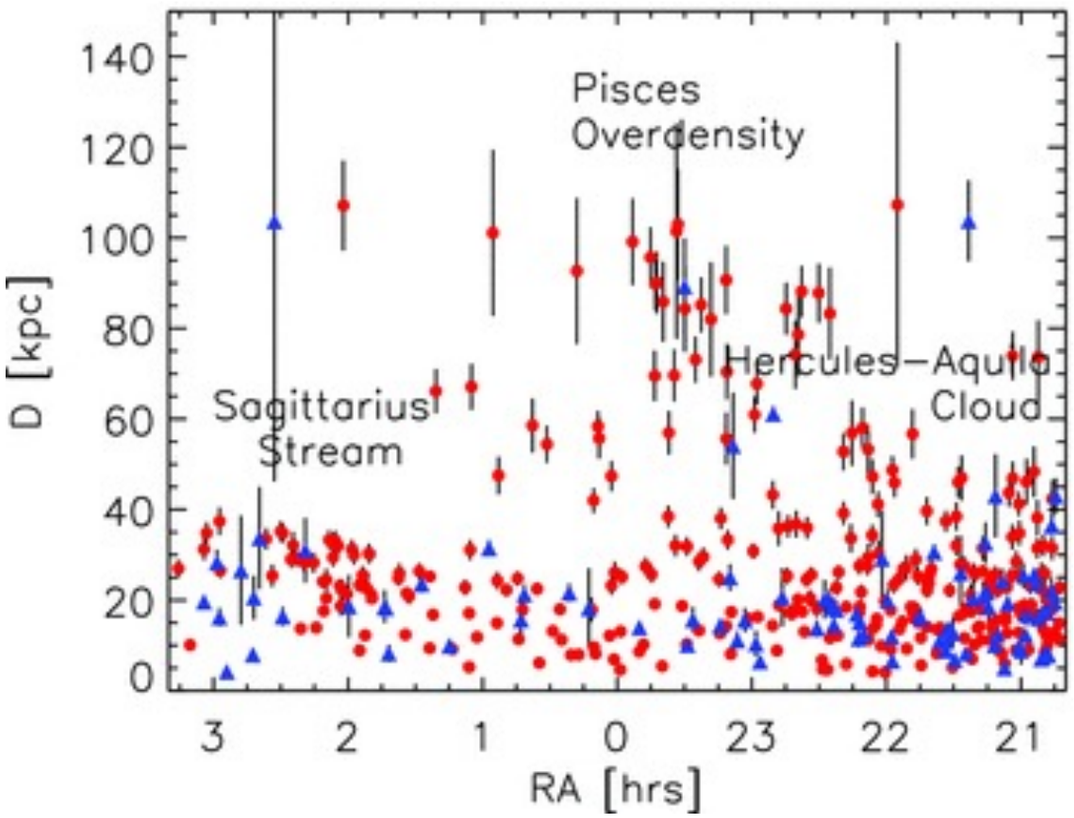
Line-of-sight density



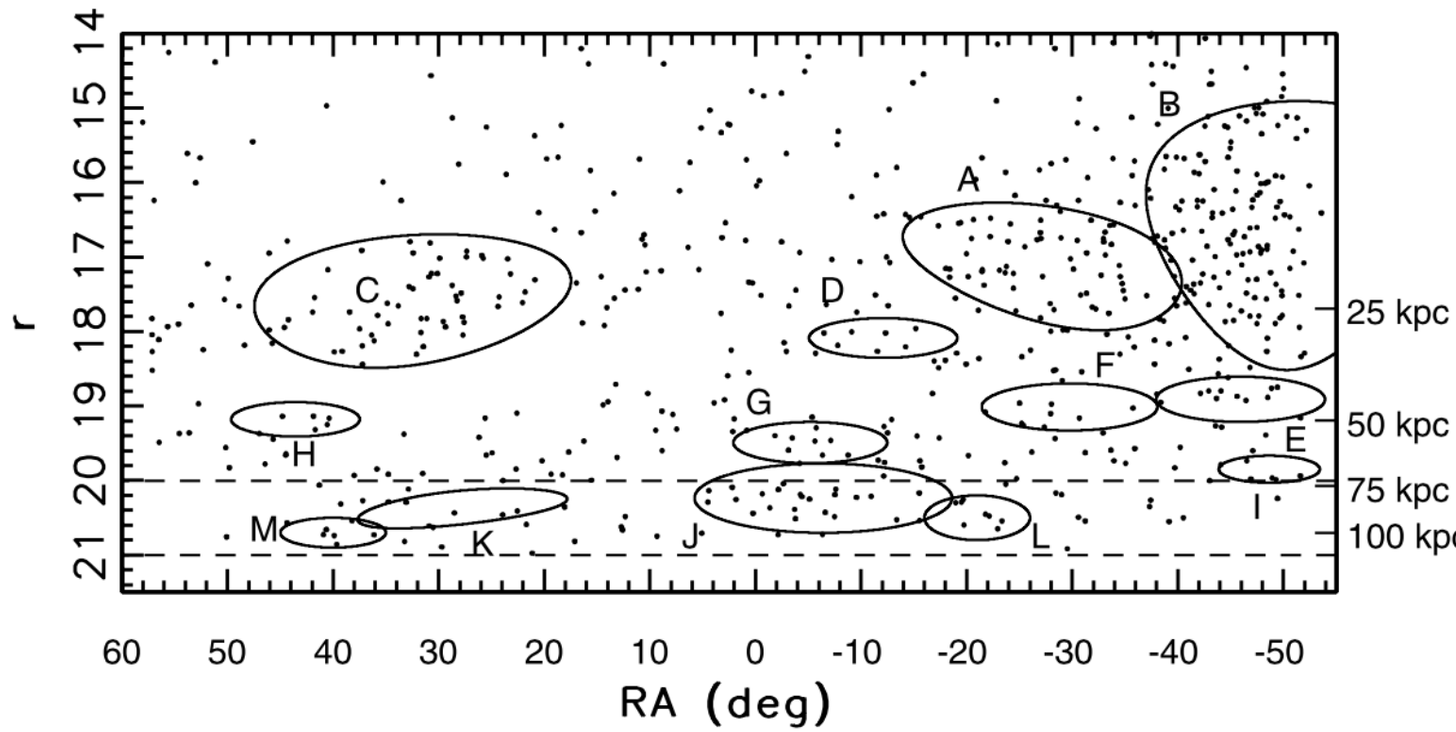
The Pisces Overdensity

Discovery in the SDSS Stripe 82 RR Lyrae data

Watkins et al 2009



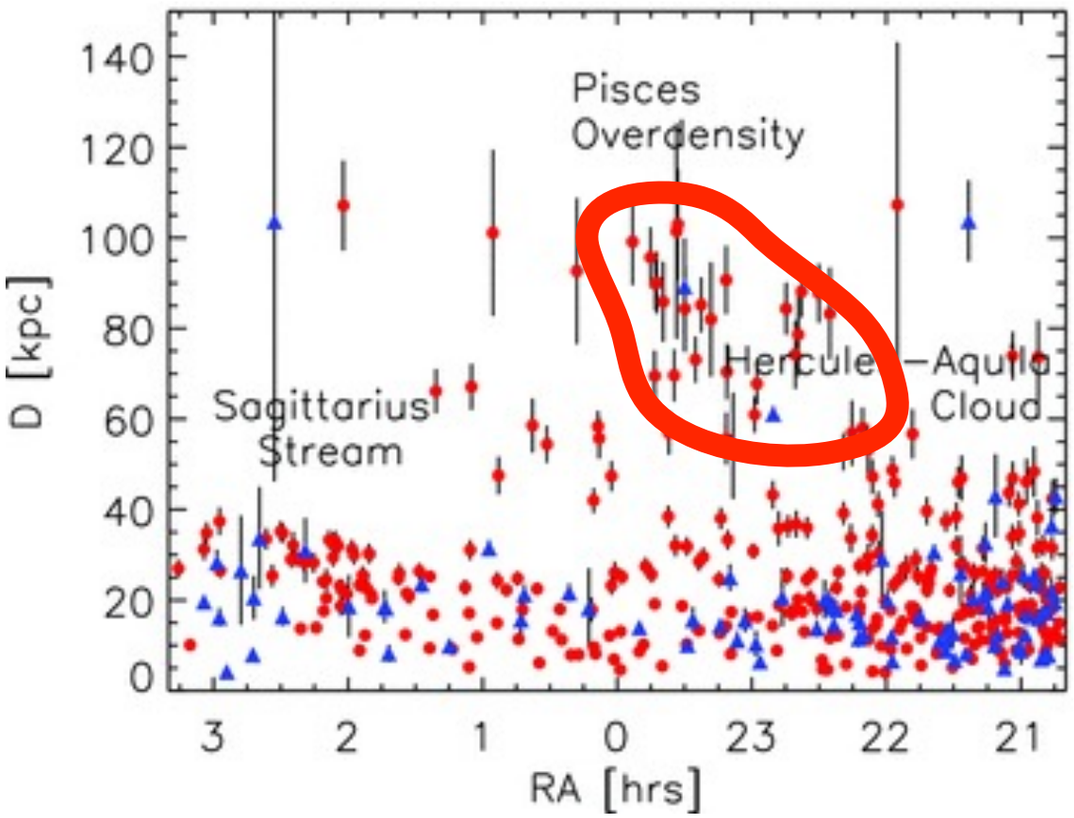
Sesar et al 2007



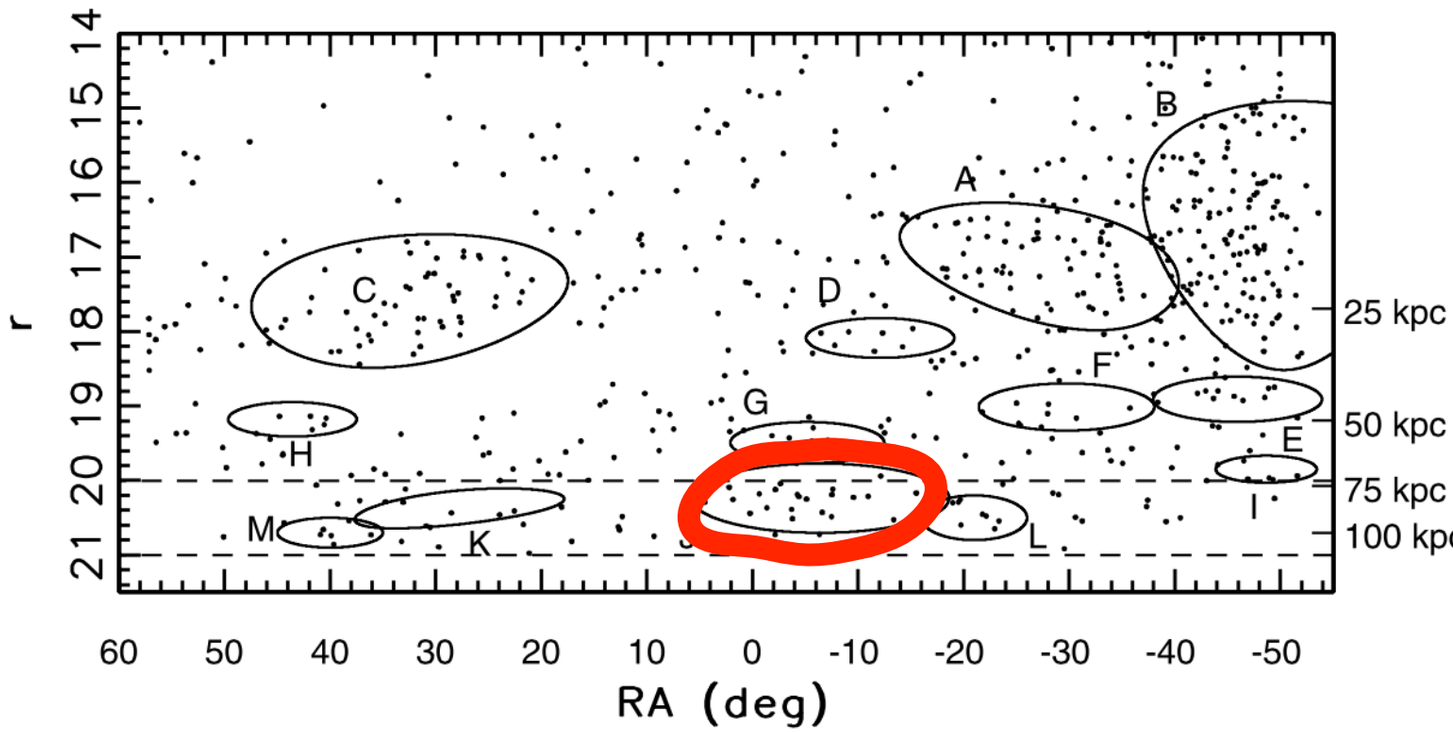
The Pisces Overdensity

Discovery in the SDSS Stripe 82 RR Lyrae data

Watkins et al 2009

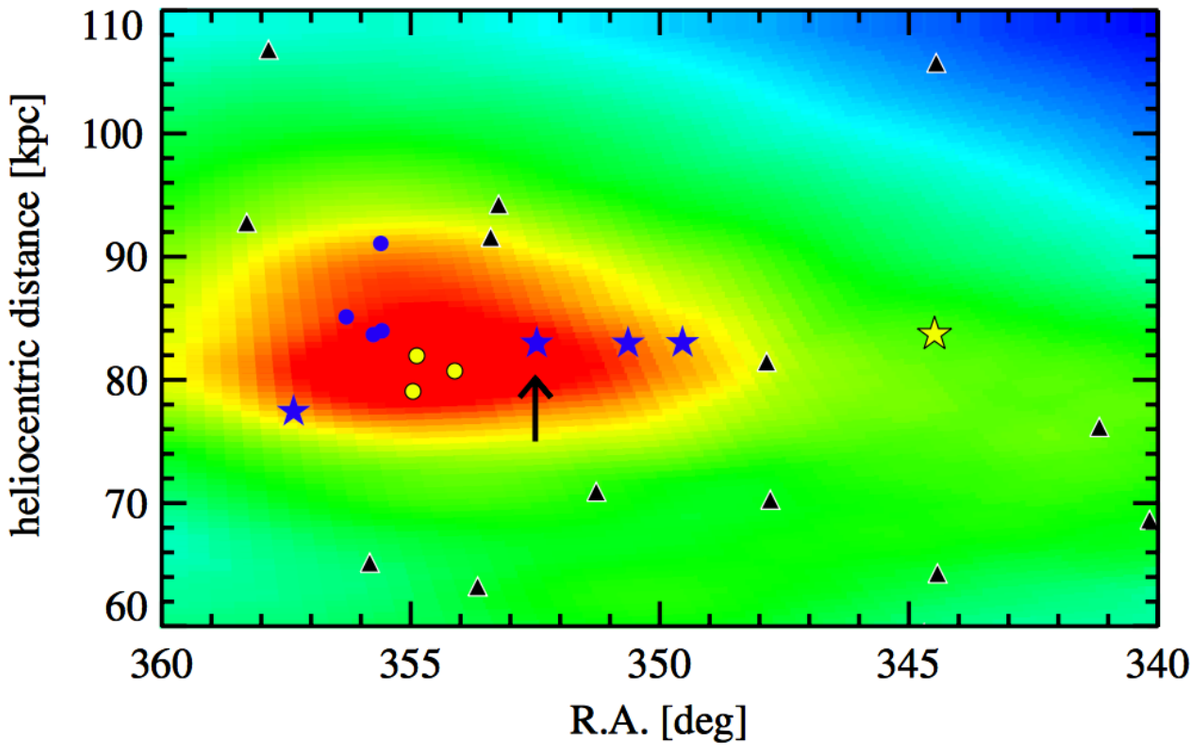


Sesar et al 2007



Kinematic Follow-up

Kollmeier et al 2009 + Sesar et al 2010



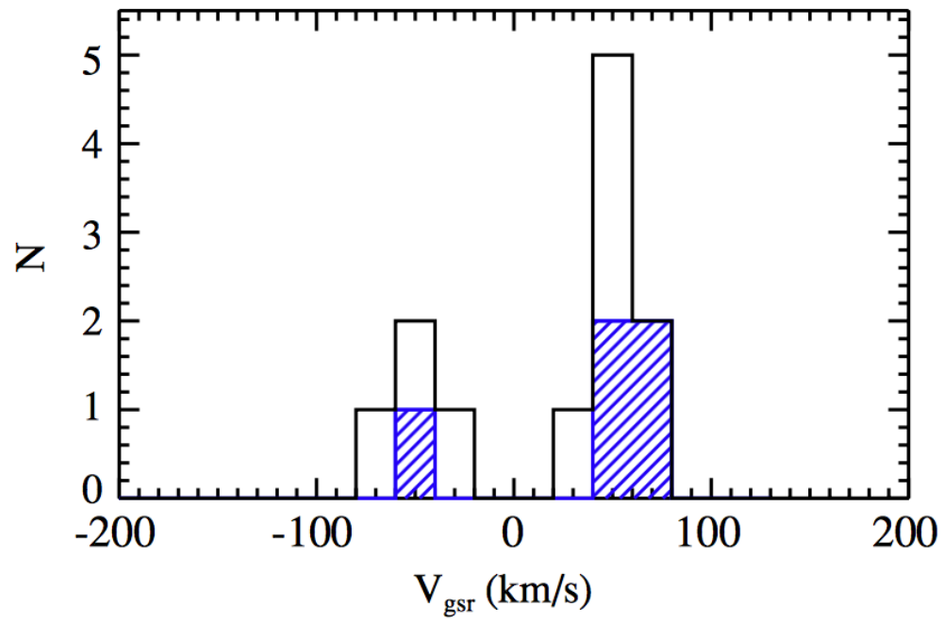
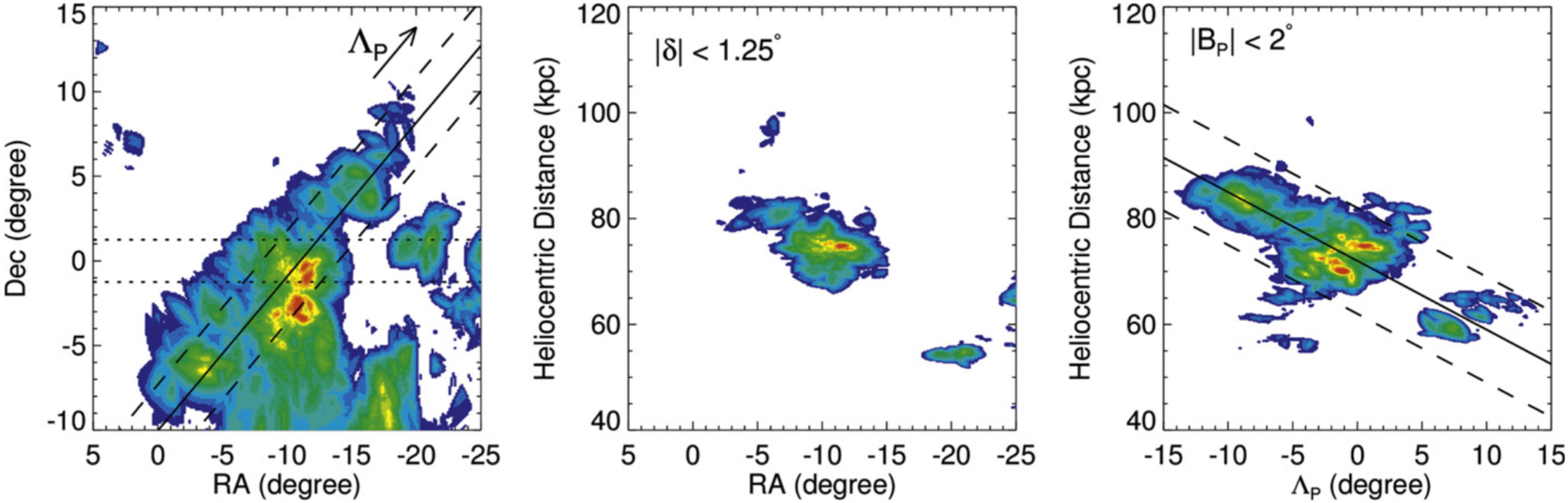


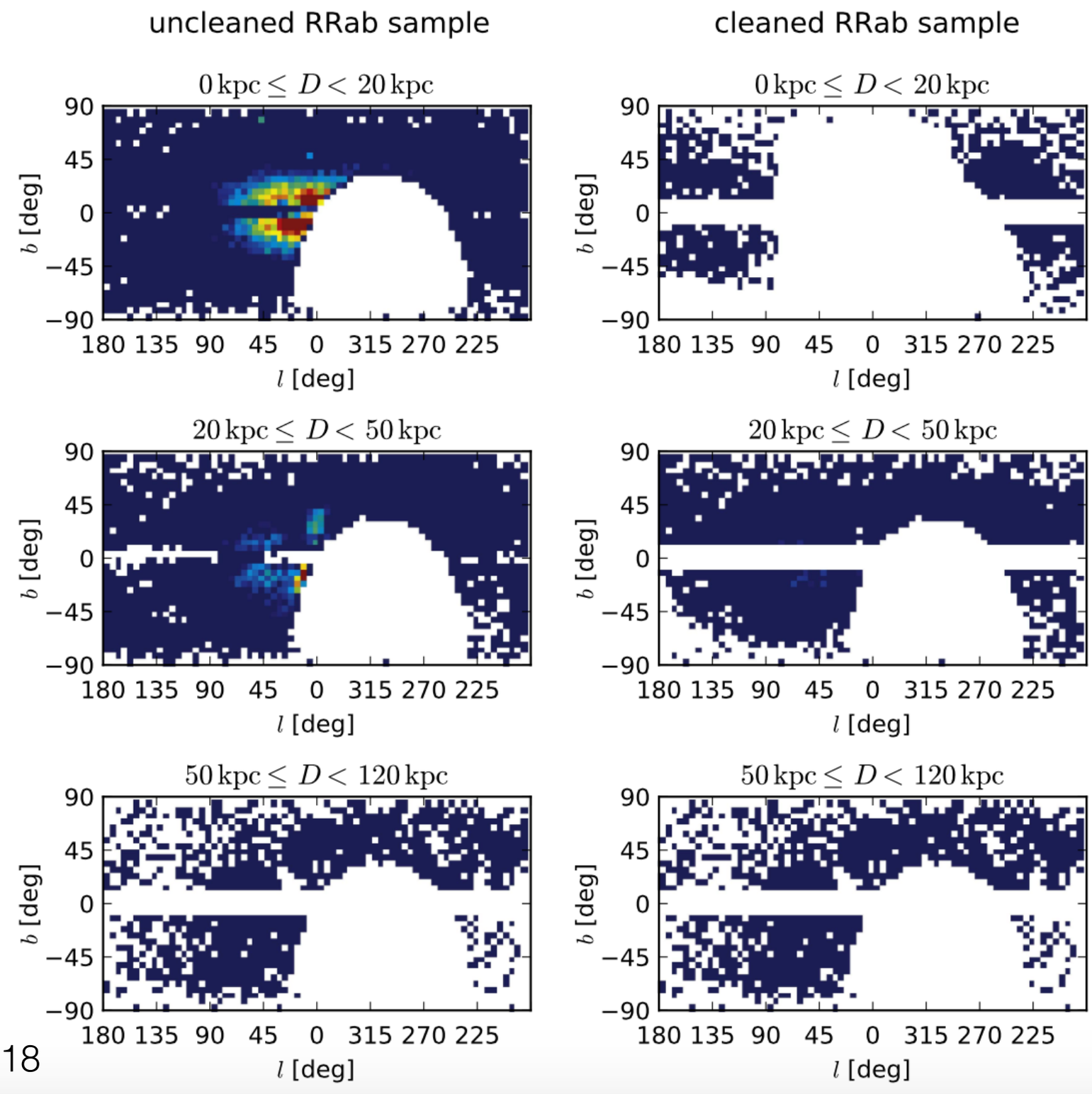
Figure 5. Histogram of V_{gsr} of the combined sample of RR Lyrae stars in the Pisces overdensity. The shaded histogram includes only stars observed in this work. The bin size is 20 km s^{-1}, and is slightly larger than the largest radial velocity error (18 km s^{-1}). The distribution of observed velocities seems to be bimodal, with two velocity peaks centered on $\langle V_{gsr} \rangle = -52$km s^{-1} and $\langle V_{gsr} \rangle = 50$ km s^{-1}, respectively. See the text for a discussion of statistical significance of this bimodality.

Follow-up with BHB stars

Nie et al 2015

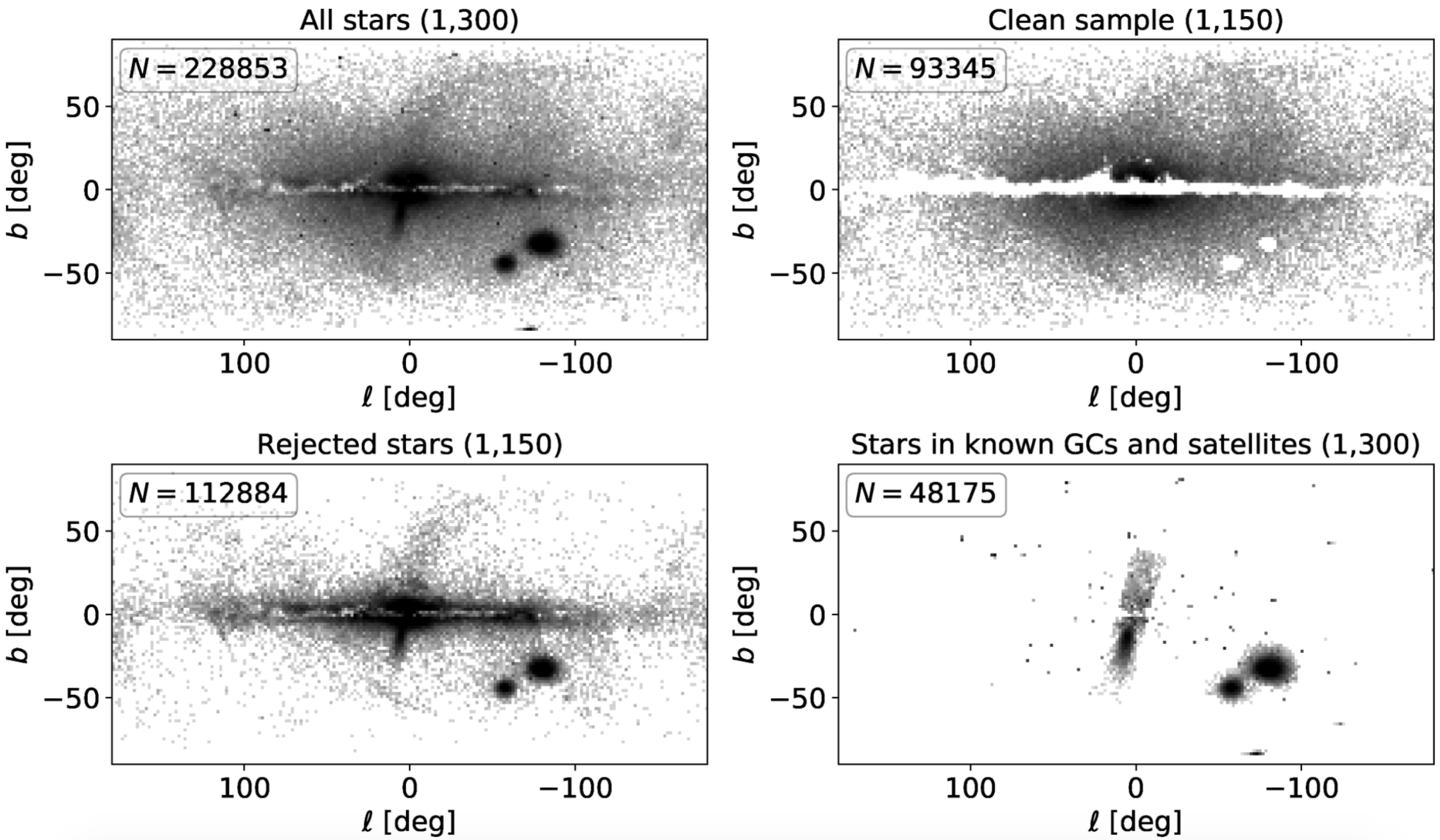


RR Lyrae in PS1



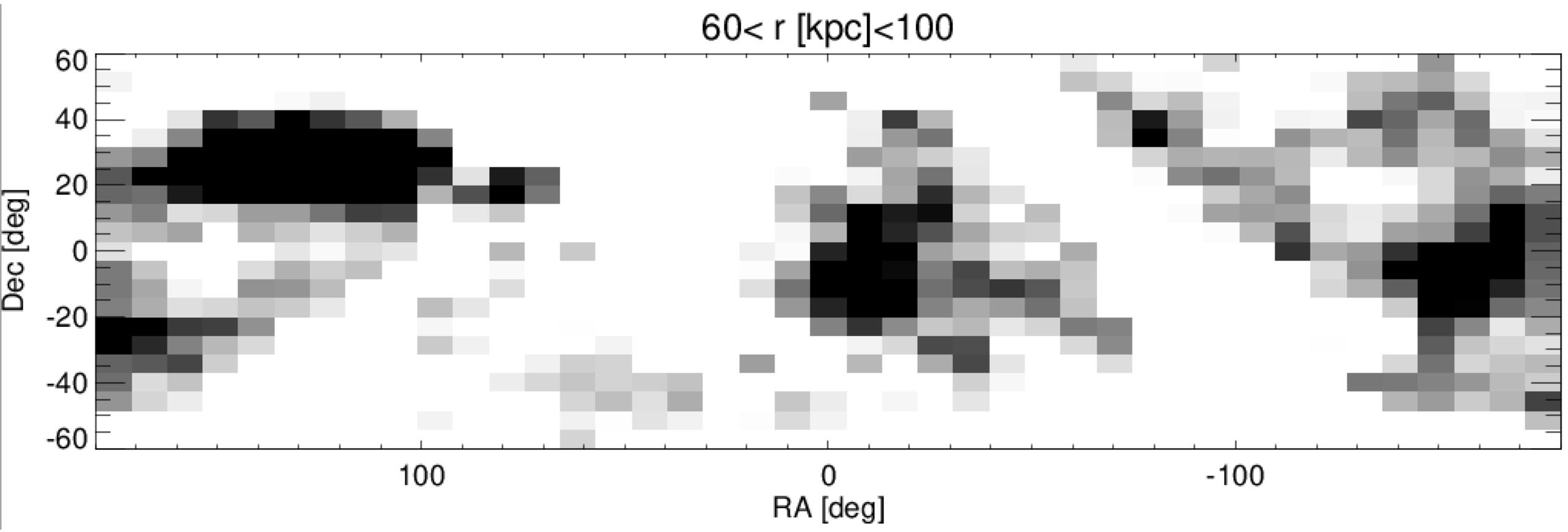
Hernitschek et al 2018

RR Lyrae in Gaia DR2

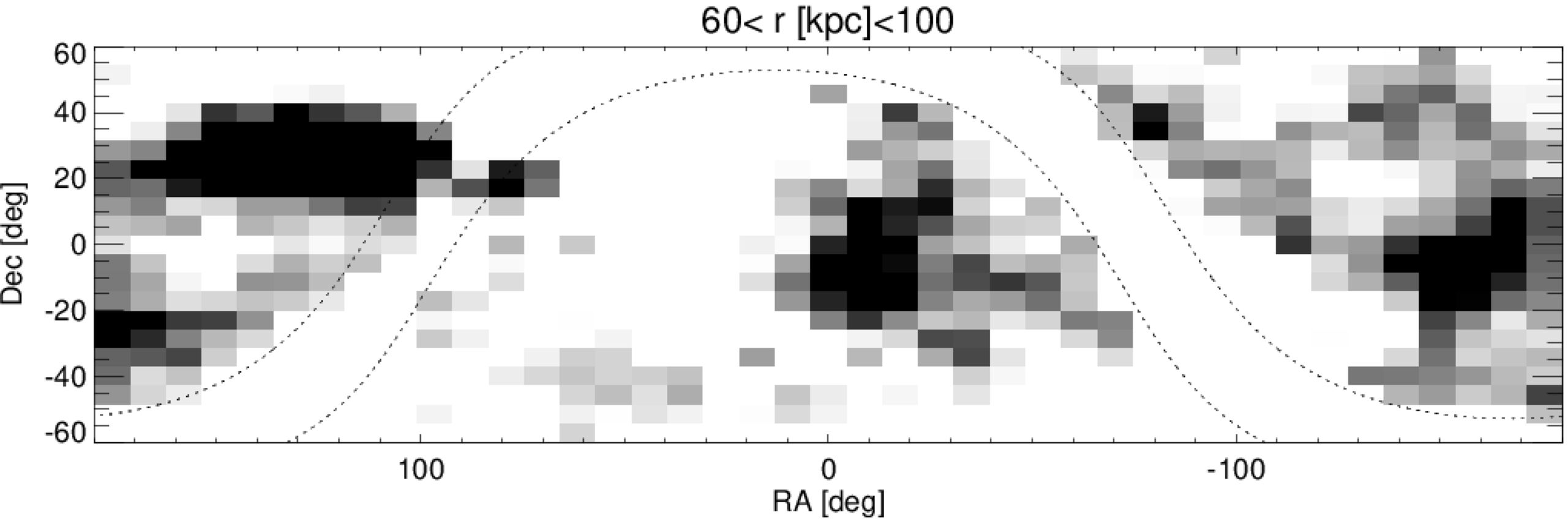


Iorio & Belokurov 2018

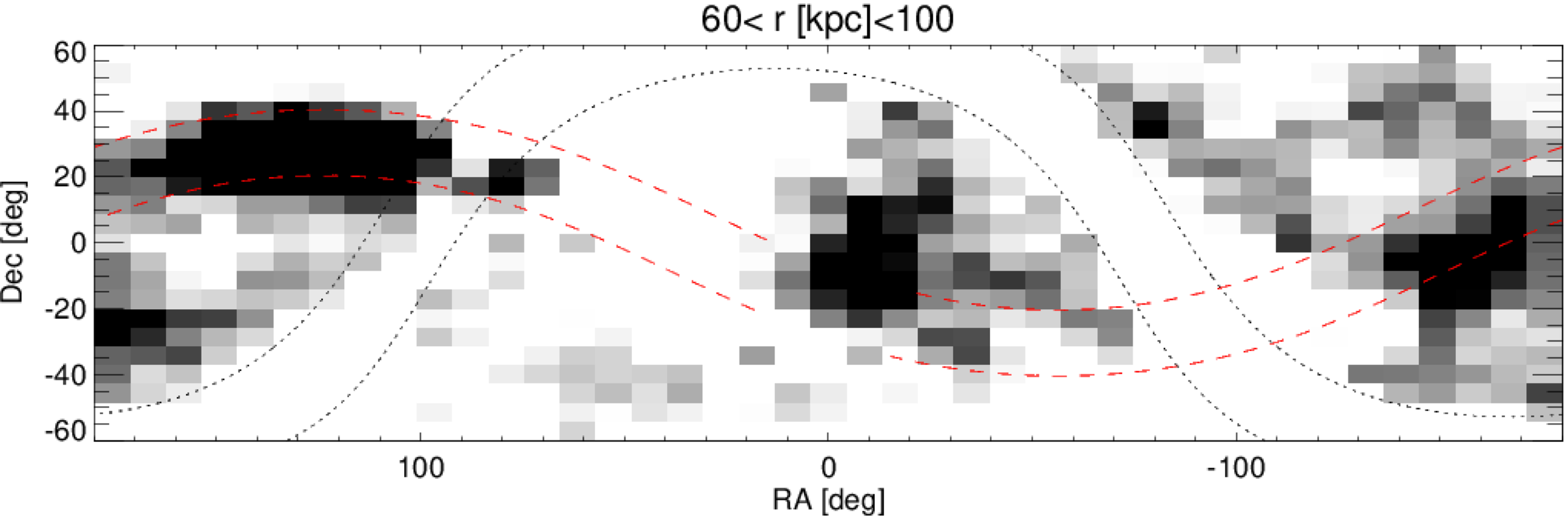
Distant RR Lyrae in GDR2+PS1



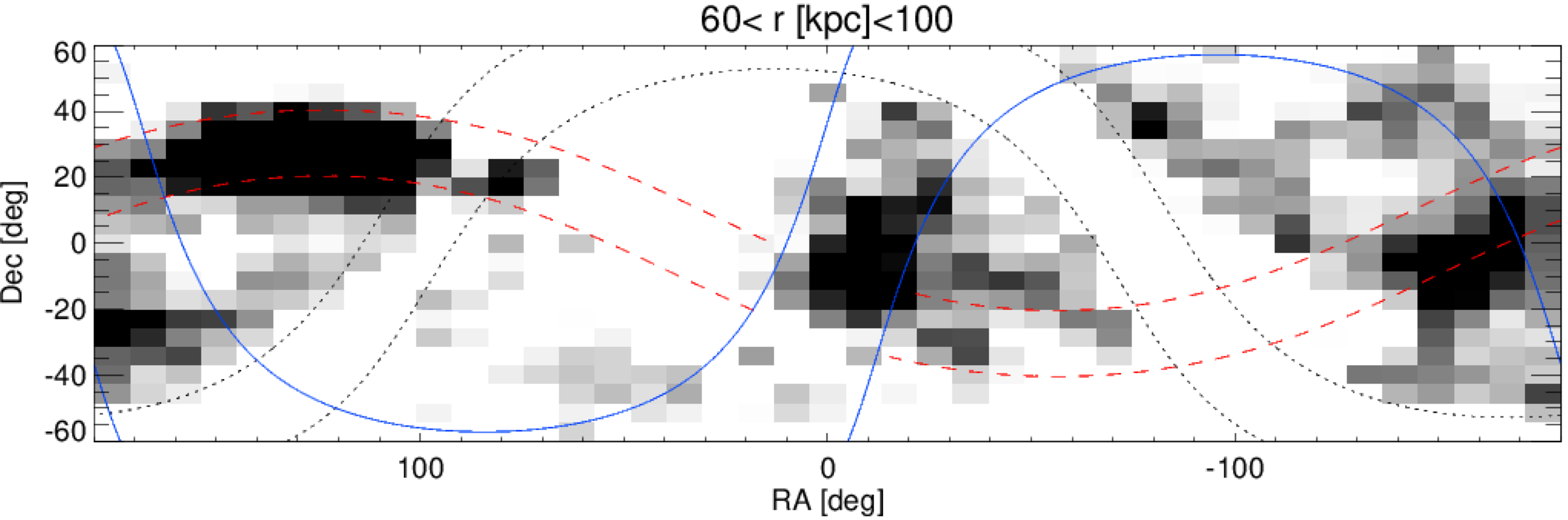
Distant RR Lyrae in GDR2+PS1



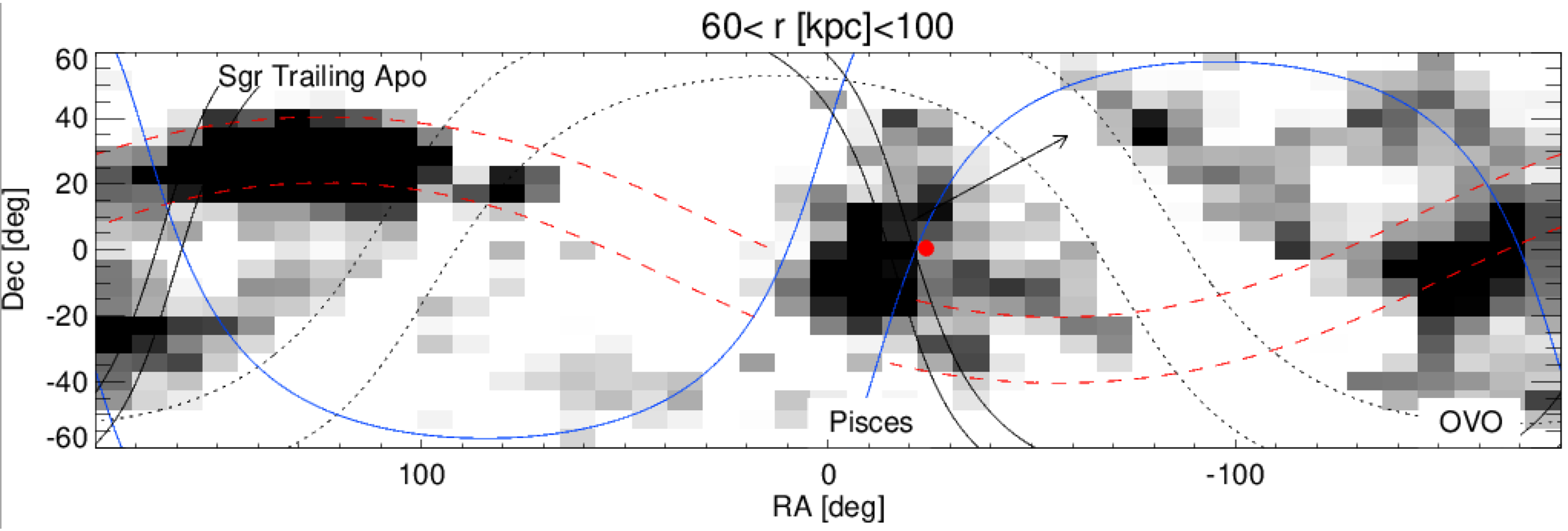
Distant RR Lyrae in GDR2+PS1



Distant RR Lyrae in GDR2+PS1

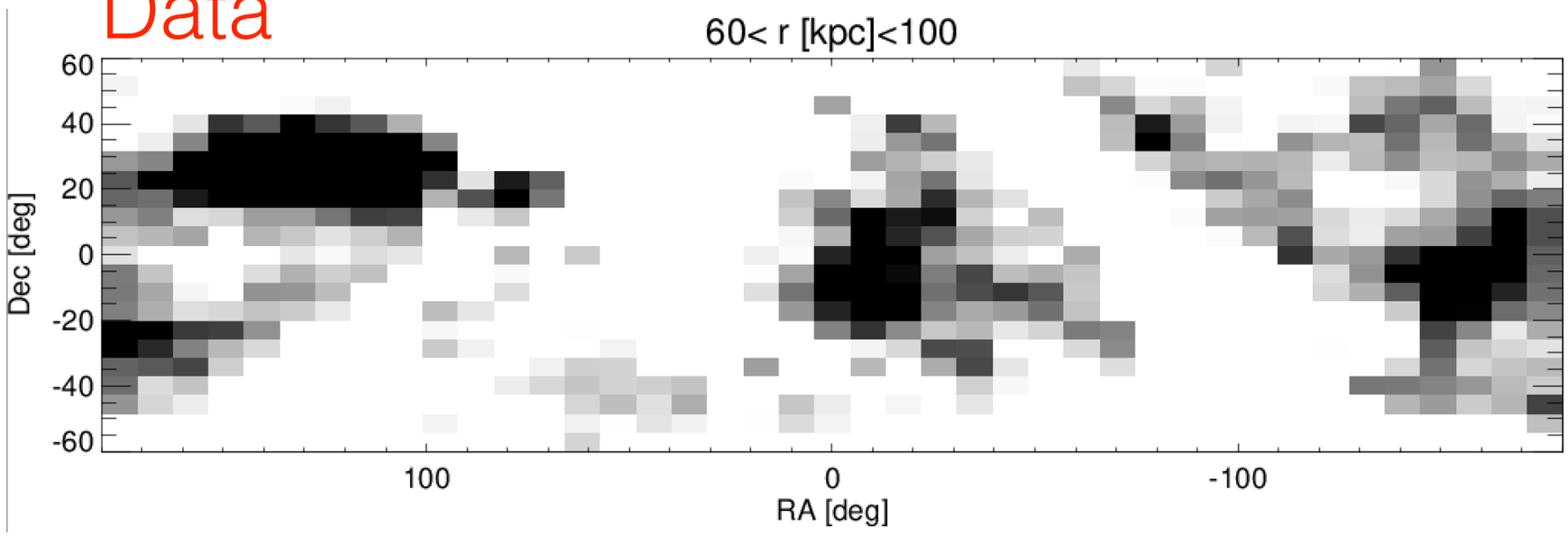


Distant RR Lyrae in GDR2+PS1

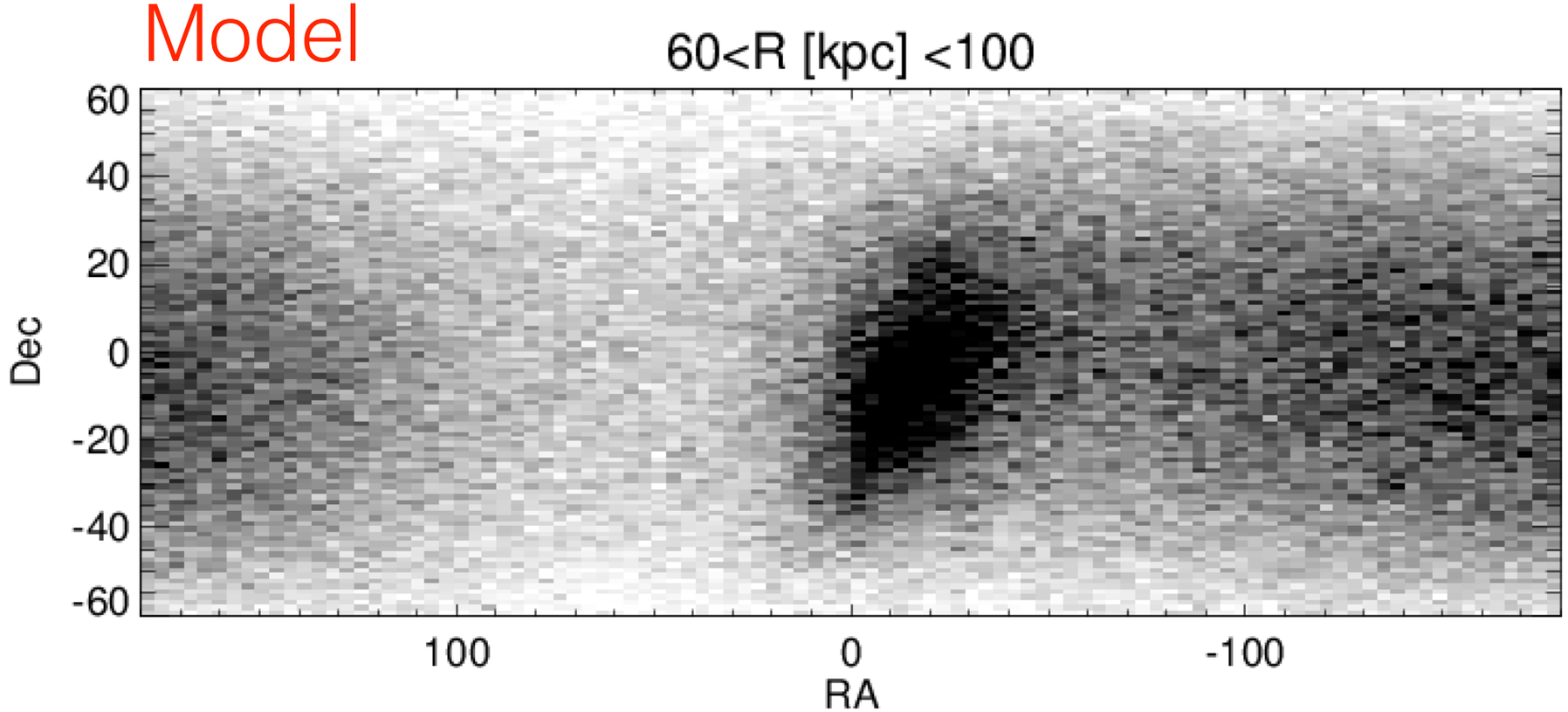


Data-model comparison

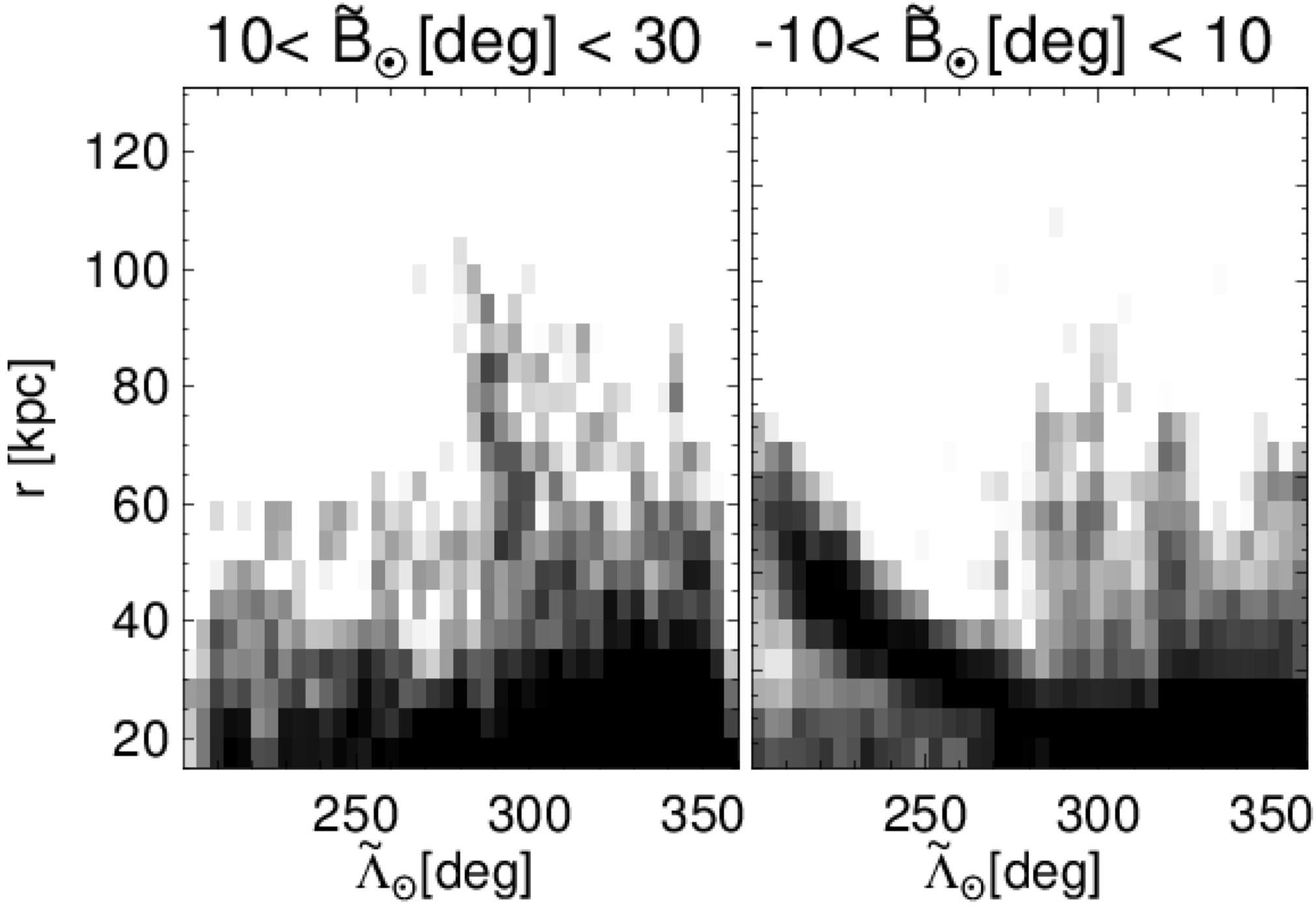
Data



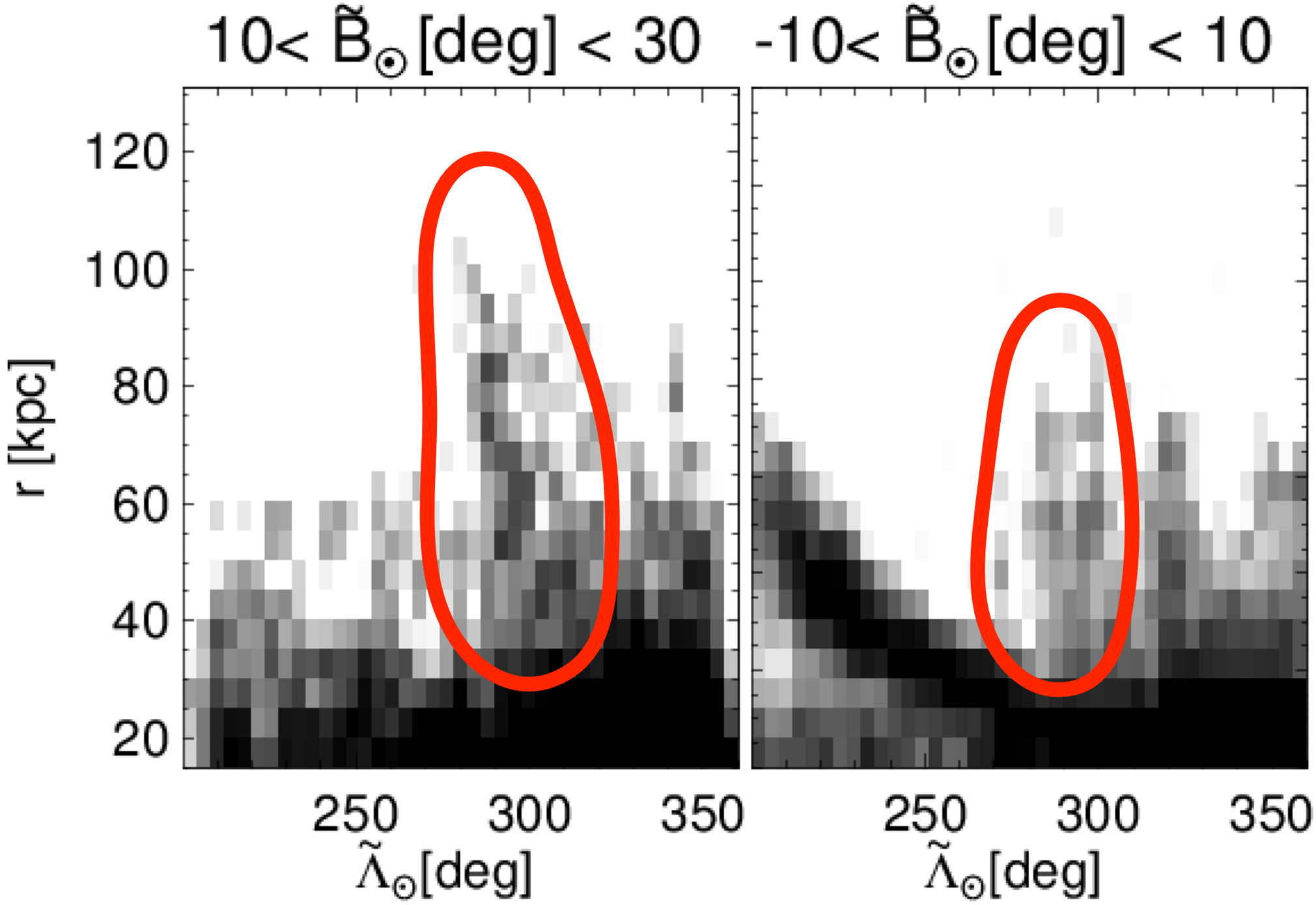
Model



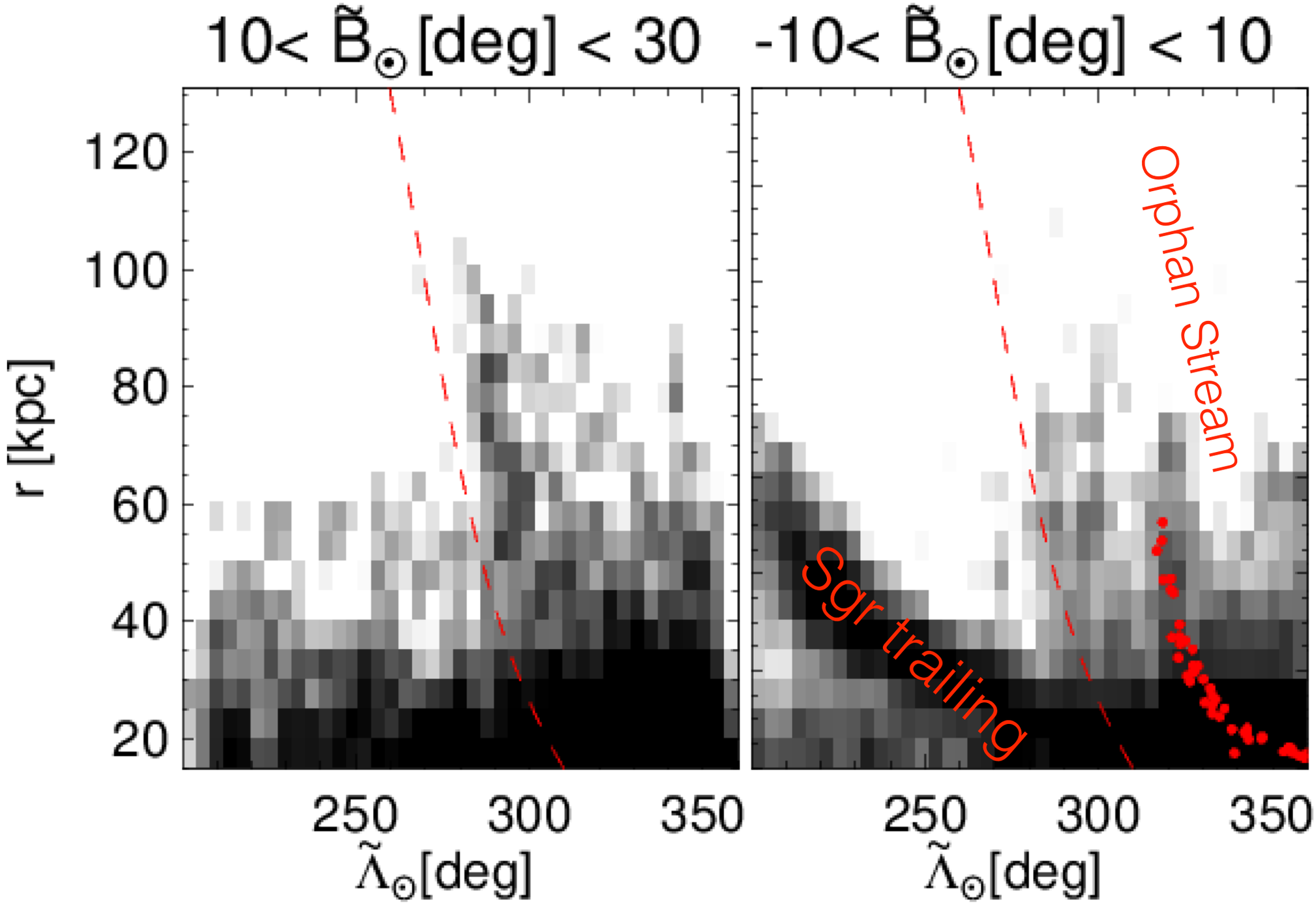
Line-of-sight distribution



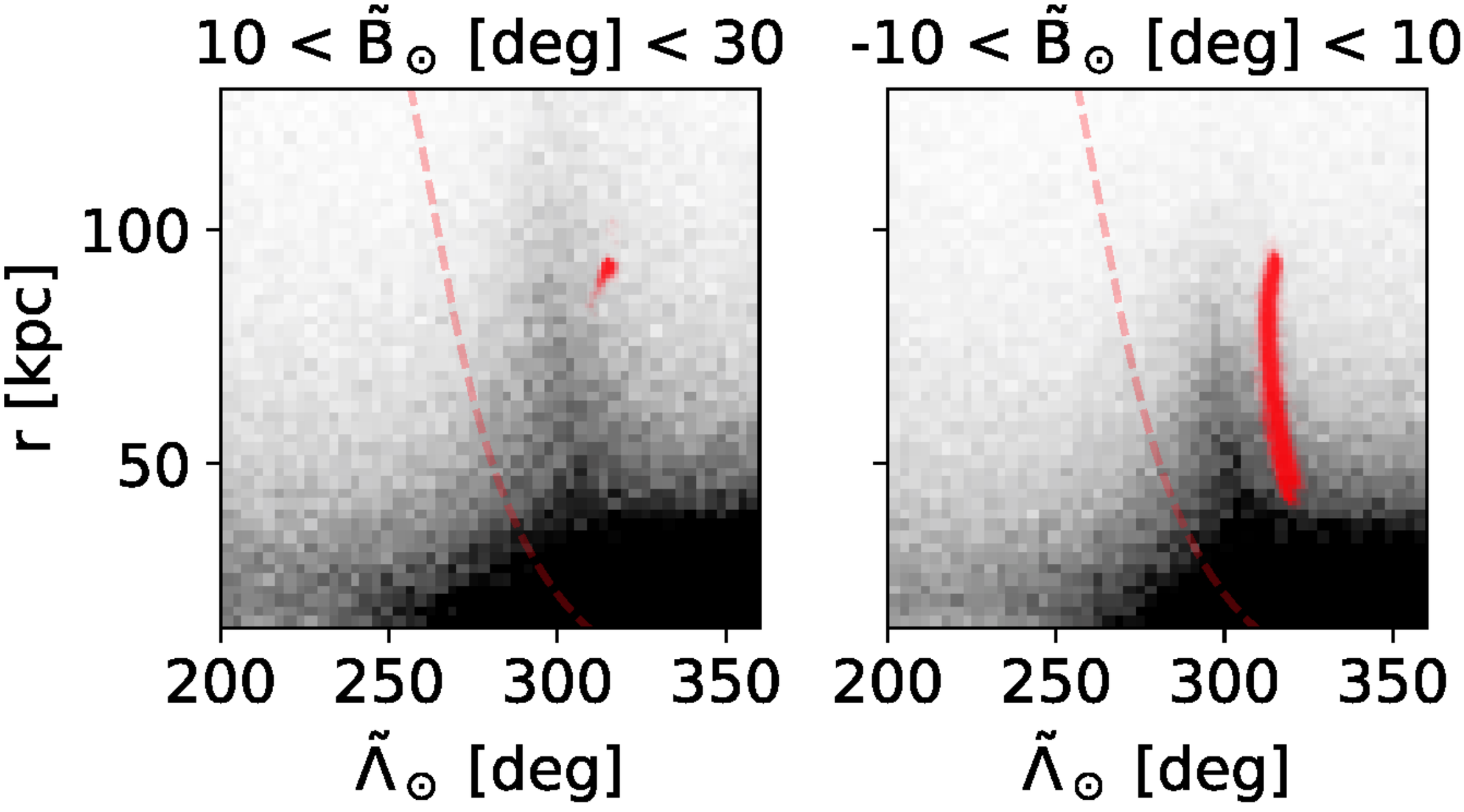
Line-of-sight distribution



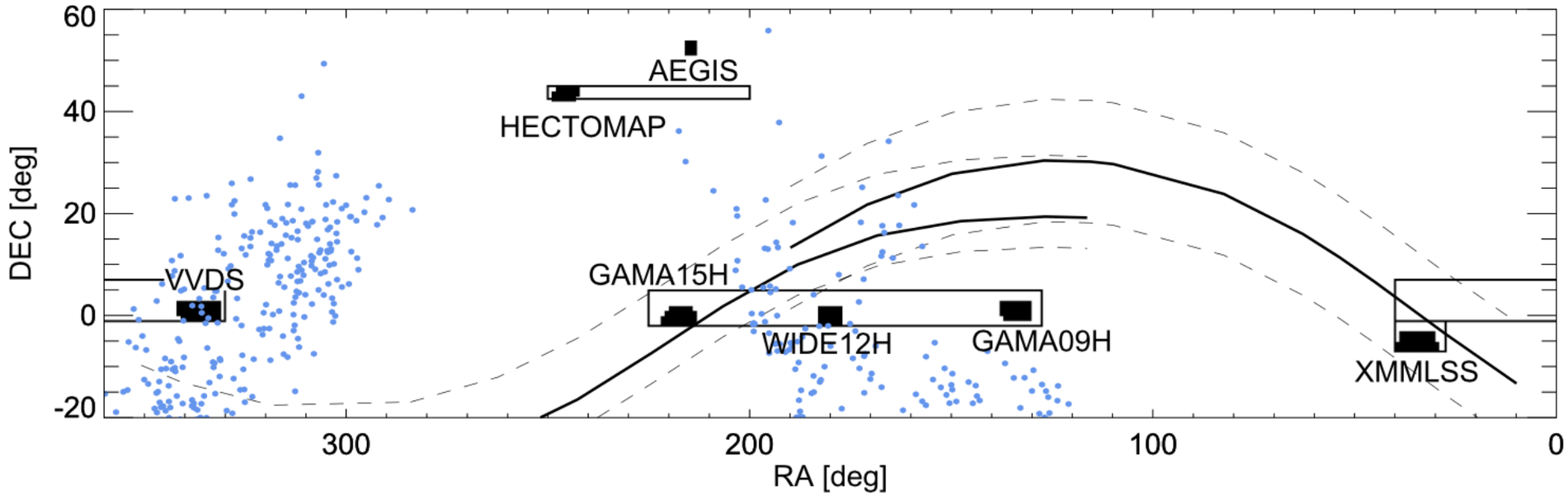
Line-of-sight distribution



LOS density in simulation



Pisces Overdensity with BHB stars



To the Galactic Virial Radius with Hyper Suprime-Cam

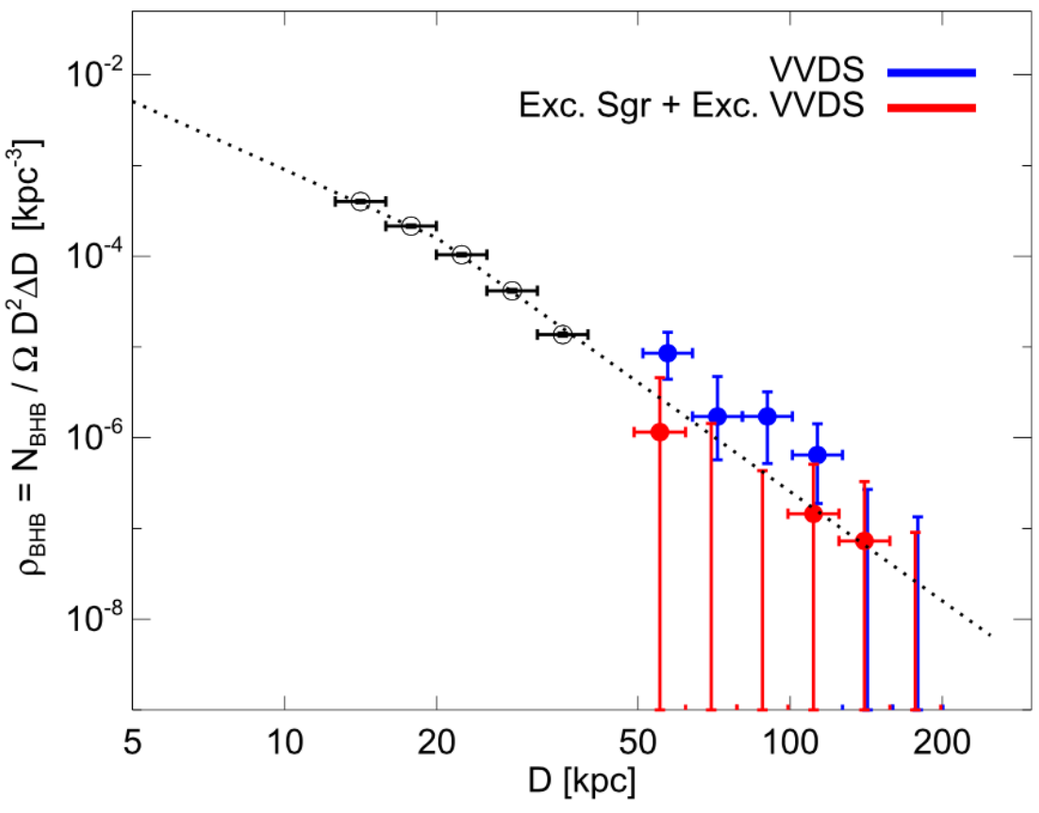
Alis J. Deason[1], Vasily Belokurov[2,3], and Sergey E. Koposov[2,4]

[1] Institute for Computational Cosmology, Department of Physics, University of Durham, South Road, Durham DH1 3LE, UK; alis.j.deason@durham.ac.uk
[2] Institute of Astronomy, University of Cambridge, Madingley Road, Cambridge CB3 0HA, UK
[3] Center for Computational Astrophysics, Flatiron Institute, 162 5th Avenue, New York, NY 10010, USA
[4] McWilliams Center for Cosmology, Department of Physics, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213, USA

Received 2017 October 20; revised 2017 November 22; accepted 2017 November 22; published 2018 January 12

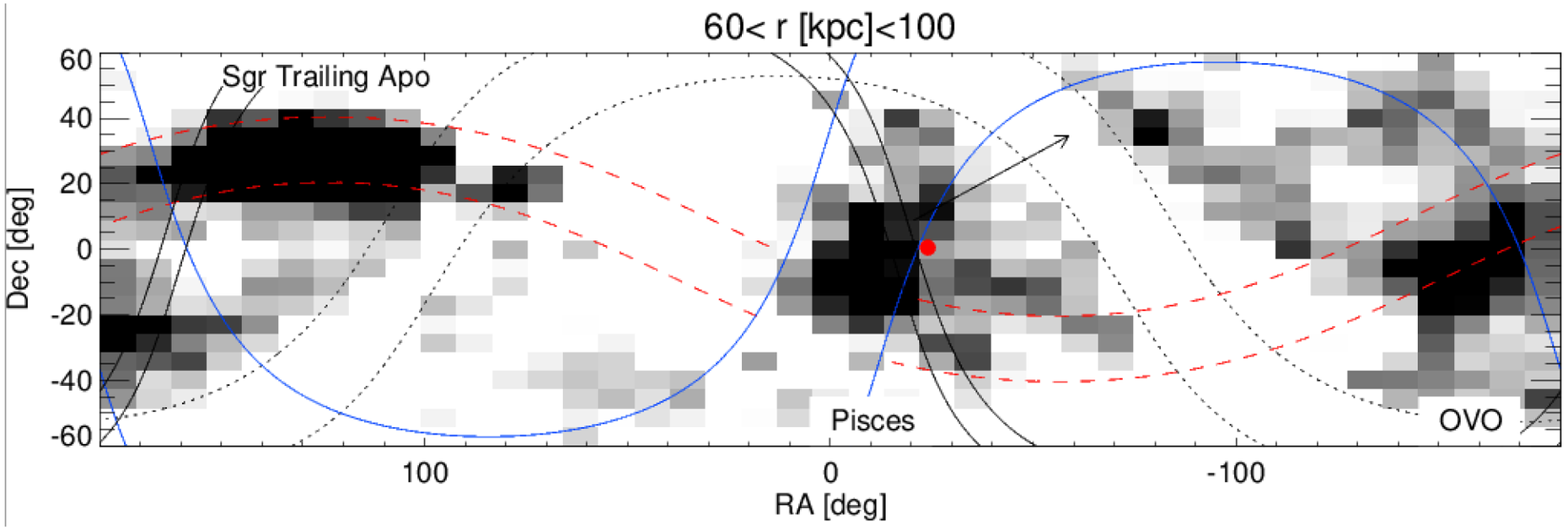
Abstract

We exploit the exquisite, deep Hyper Suprime-Cam (HSC) imaging data to probe the Galactic halo out to 200 kpc. Using the ∼100 square degree, multiband photometry of the first HSC Wide survey data release, we identify blue horizontal branch (BHB) stars beyond 50 kpc in the halo. The presence of the Sagittarius (Sgr) stream in the HSC fields produces a notable excess of stars at the apocenter of the leading arm (∼50–60 kpc). For fields excluding Sgr, the BHB counts are consistent with a continuation of a −4 power law from the inner halo. However, we find that the majority of the non-Sgr BHB stars beyond 50 kpc reside in one 27 square degree HSC field called "VVDS." Curiously, this field is located close to the Magellanic plane, and we hypothesize that the excess of stars between 50 and 200 kpc could be associated with distant Magellanic debris. Indeed, without the VVDS, there are very few BHBs in the remaining portions of the Galaxy probed by the HSC. Accordingly, this scarcity of tracers is consistent with a significant decline in stellar density beyond 50 kpc, with a power law of −4 or steeper.



Distant BHB stars selected using deep Subaru HSC data

Kinematics in the VVDS field



VLT FORS spectroscopy of the BHB candidates