SMASHING THE SMALL MAGELLANIC CLOUD

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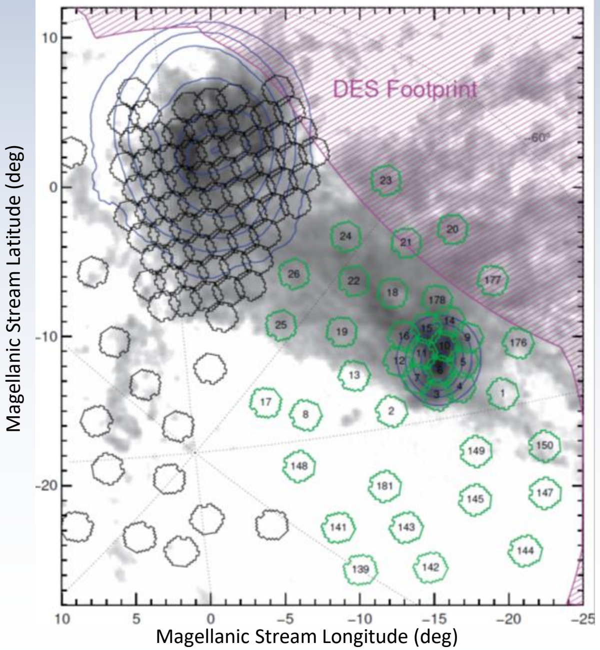
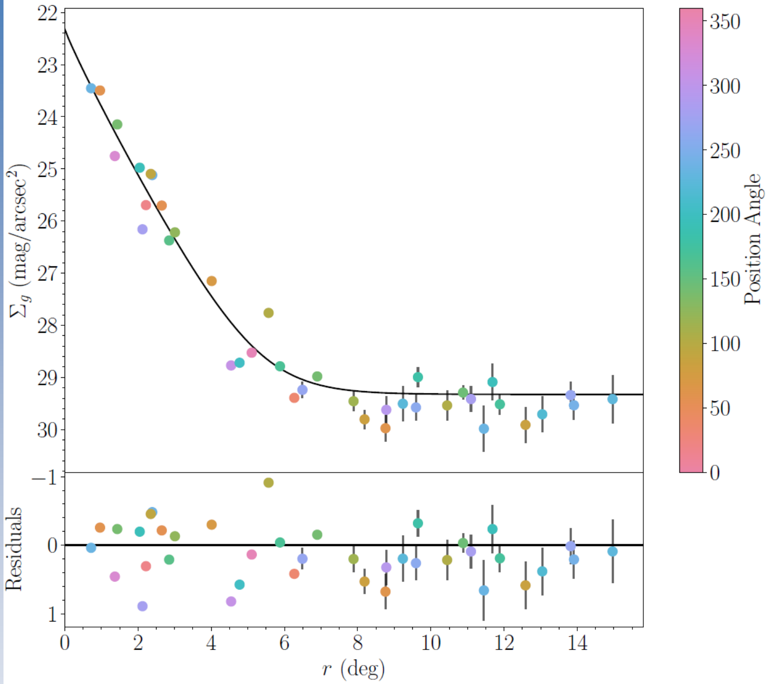
1. Introduction and motivation

Our closest interacting pairs, the Magellanic Clouds (MCs), are excellent workplaces to address the faint outskirts of galaxies. In particular, the SMC shows evident signs of interactions with the LMC in its outskirts. This suggests that galaxy edges might be of great advantage to study recent galaxy interactions. Here, we present an analysis based on unprecedented deep colour-magnitude diagrams (CMDs), constructed using resolved stellar populations from the Survey of the MAgellanic Stellar History (SMASH; Nidever D. L., et al., 2017, AJ, 154, 199).

The figure below shows the spatial distribution of the SMASH fields around the MCs. The observed HI column density of the Magellanic Stream system is shown in grey scale, while the dark blue contours around the SMC and LMC represent red giant branch star counts from 2MASS. The hexagonal polygons represent the SMASH fields. The green ones show the 39 Fields included in this study, covering an area of more than 100 deg^2.





2. SMC Surface brightness profile

The figure above shows the surface brightness profile of the SMC up to 15 degrees from its centre. The convention for the Position Angle (PA) is the following: 0° 360° is North, 90° is East, 180° is South and 270° is West. Each of the SMASH fields also has a radial extent of ±1 degree from its centre. The LMC in this coordinate system lies in the North-East direction. The black line shows a fit of a Sérsic profile with the following parameters: $n = 1.16 \pm 0.03$ and scale length $h = 0.63 \pm 0.04\,°$. It hits the background at around 8 degrees from the centre of the galaxy in this polar coordinates. Assuming a distance to the centre of the SMC of 63.4 kpc (Ripepi V., et al., 2016, ApJS Series, 224, 21), this means that the debris of the SMC can go at least as far as ~8.5 kpc away from its centre.

Considering the very small error bars in the inner part of the profile, the data is suggesting that a circular fit for the SMC is not appropriate given the **very disrupted nature of the galaxy**.

3. Debris comparison and SMC mass

To better understand the stellar density distribution in the outskirts of the SMC we compared our results with in house simulations (Belokurov V., et al., 2017, MNRAS, 466, 4711) of the SMC's disruption taking the present 6D positions of the LMC and the SMC, rewinding them for 3 Gyr in the presence of each other and the Milky Way, and then disrupting the SMC until the present day.

The figure below shows the comparison between the tidal debris produced by the simulation (background histogram) and the surface brightness extracted from the SMASH fields (foreground octagons). Only the fields with SMC stars have been coloured according to their stellar count. White octagons represent fields for which no SMC contribution has been detected. **The best match is found using a mass for the SMC of 10^9 $M_\odot$.**