Report on the manuscript for PhD by Grzegorz GAJDA

I have read with great interest the manuscript entitled « Tidally induced bars in dwarf galaxies ». It is well written with a very comprehensive Table of contents. The two first Chapters after the Introduction correspond each to a published article, while Chapter 4 is original for the moment. Grzegorz GAJDA is first author of 4 papers and co-author of 4 other articles, which show productivity well above what is normally expected for a young researcher.

The above work together with this manuscript is sufficient for obtaining the PhD grade. However it let open several questions perhaps towards a better understanding of the astronomical context. The manuscript is very descriptive and one may require more conclusions on, e.g., what is the nature of the bar in dwarf galaxies tidally affected by the MW potential.

This concerns also the Introduction, which could describe more the properties of dwarf galaxies surrounding the MW (e.g., their gas content) including why some possess bars and some do not. To understand the simulations in Chapters 2 to 4 it would be essential to provide a Figure with the orbit(s) relative to the Milky Way disk, since the latter may affect dwarf properties for pericenters as low as 20-24 kpc. Are orbits perpendicular to the MW disk or do they have other orientations? The Introduction also describes quite well the nature of bars, though one needs to see some Figures showing/illustrating the main orbital families of bars as well the "buckling" of the bar after secular evolution. By the way, z=1 corresponds to a look-back time of 7.8 Gyr instead of 6 Gyr.

Chapter 2 describes the orbits of stars in the central regions (+/- 0.8 kpc) while the bar extent is claimed to be 1.8 kpc (see P. 23). Why this choice especially when Figures 2.9 to 2.11 reveal important changes in the outskirts? Even if orbits are more difficult to catch at large radii, a discussion of the potential effect of neglecting particles in the outskirts is needed, especially for the statistics of orbits shown in P.29. The result (similarities between orbits in the tidal and isolated case) of this Chapter could be better demonstrated: why not having chosen to use cylindrical coordinates if many studies have been done in this system? How relevant is it to compare giant disks (in Valluri+16) with dwarfs affected by the MW potential? In P20 it would be nice to define Ax & Ay (amplitudes).

Chapter 3 presents how the bar is affected by changing the orbits. It is certainly the section that is the most relevant and useful to understand the nature of the tidally induced bars in dwarf galaxies. For example Fig. 3.10 evidences that bar mode increases towards the outskirts. This property added to the absence of buckling, the relation between A2 profile peaks and tidal features, let open the question of whether the bar properties could be only related to the dominant tides caused by the Milky Way. Alignments between dwarf PAs and an axis perpendicular to the MW disk (see Sanders and Evans, 2017) could be an indication of this, but this possibility is not really addressed in the manuscript. How the radial velocity dispersion in the manuscript compares to the observed line of sight dispersion (e.g., Walker et al., 2009)? Recall that the later is one factor founding the dark-matter content of these galaxies. This latter point is crucial since simulations are well placed to reveal what belongs to the Milky Way and what belongs to the galaxy (dark and baryonic) mass. In summary, this Chapter provided important matter for understanding dwarf galaxies surrounding the Milky Way.

Chapter 4 is perhaps the most problematic for a reviewer since it leads to configurations that are never been observed, up to my knowledge. As mentioned in the manuscript, this is

essentially due to the assumed absence of hot gas in the MW halo, which is evidenced by HI studies of the Magellanic Stream HVCs (Kalberla & Haud, 2006), by the Magellanic Stream filamentary structure (Hammer et al. 2015) and the shrunk of the LMC disk (e.g., Nidever, 2013). Besides the (more massive) Clouds, all dwarfs within ~300 kpc from the MW center are gas-devoid, and then it seems not realistic to perform simulations that by construction do not reproduce this important feature. Knowing that the Clouds have lost at least half of their gas mass (Fox et al. 2014) within a first passage with a pericenter of ~ 50 kpc, how a much smaller galaxy would have kept its gas after passing at even smaller pericenters (see Table 3.1)? By the way one may like to see a Table providing all parameters of the simulations, including pericenters etc..

It would be useful if the above points/questions can be addressed during the defence, as well as a discussion of the results by Katzanzidis et al (2017) who found a much lower bar fraction when considering the transformation between gas-rich dwarfs into dSphs, after accounting for ram-pressure effects.

The subject of dwarf galaxies is mostly concentrated to the MW environment for observational reasons, which is a good motivation for this work. Understanding them is very important in the frame of the cosmology and can lead to important controversies about the nature of these objects. This manuscript brought important knowledge in the understanding of internal structures caused by tidal effects in dwarf galaxies and reveals a considerable amount of work for a PhD student. It is then fully eligible to obtain the grade of Doctor in Sciences (PhD).

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