Gargiulo, ID, Monachesi, A, Gómez, FA, Grand, RJJ, Marinacci, F, Pakmor, R, White, SDM, Bell, EF, Fragkoudi, F and Tissera, P

The prevalence of pseudo-bulges in the Auriga simulations

Monthly Notices
of the
ROYAL ASTRONOMICAL SOCIETY

MNRAS **493,** 496 (2020) doi:10.1093/mnras/staa210

Erratum: The prevalence of pseudo-bulges in the Auriga simulations

by Ignacio D. Gargiulo,[1,2]★ Antonela Monachesi ,[1,2] Facundo A. Gómez,[1,2] Robert J. J. Grand ,[3] Federico Marinacci ,[4] Rüdiger Pakmor ,[3] Simon D. M. White ,[3] Eric F. Bell,[5] Francesca Fragkoudi[3] and Patricia Tissera [6,7]

[1]*Instituto de Investigación Multidisciplinar en Ciencia y Tecnología, Universidad de La Serena, Raúl Bitrán 1305, La Serena, Chile*
[2]*Departamento de Física y Astronomía, Universidad de La Serena, Av. Juan Cisternas 1200 Norte, La Serena, Chile*
[3]*Max-Planck-Institut für Astrophysik, Karl-Schwarzschild-Str. 1, D-85748, Garching, Germany*
[4]*Department of Physics and Astronomy, University of Bologna, via Gobetti 93/2, 40129 Bologna, Italy*
[5]*Department of Astronomy, University of Michigan, 1085 S. University Avenue, Ann Arbor, MI 48109, USA*
[6]*Departamento de Ciencias Físicas, Universidad Andrés Bello, Fernandez Concha 700, Santiago, Chile*
[7]*Millennium Institute of Astrophysics, Fernandez Concha 700, Santiago, Chile*

Key words: errata, addenda – methods: numerical – galaxies: bulges – galaxies: formation.

This is an Erratum to the paper "The prevalence of pseudo-bulges in the Auriga simulations" (Gargiulo et al. 2019). We noticed an error in the code involved in the calculation of the degree of ordered rotation, section 3.3 of the aforementioned paper. As a consequence, fig. 4. of the original paper is incorrect and needs to be replaced by Fig. 1 of this Erratum. In the original paper the degree of ordered rotation of all simulated bulges was higher than all observed pseudo-bulges of the comparison sample. With the corrected velocities (V) and velocity dispersions (σ), the kinematic signature at a given ellipticity (ϵ) of many of the bulges still indicates a high rotational support, albeit a group of simulated bulges appears in a region of the V/σ diagram that is populated by both classical and pseudo-bulges, making the kinematic classification into pseudo and classical bulges more difficult. To quantify the level of rotational support, we computed the anisotropy parameter defined as $(V/\sigma)^* = (V/\sigma)/\sqrt{\epsilon/(1-\epsilon)}$ (Kormendy & Illingworth 1982). Values of this parameter > 1 indicate rotational support, while values ≤ 1 point to oblate bulges with flattening due to rotation or anisotropy. We found that 77 per cent of the Auriga bulges have $(V/\sigma)^* > 1$. An exceptional case is Au29, highlighted in Fig. 1 with a black edge around the symbol, that clearly shows anisotropy, with a value of $V/\sigma \approx 0$. The conclusions of the original paper remain unchanged, except for the following bullet-point:

(i) Auriga bulges show a high degree of ordered rotation and low ellipticities in the $V/\sigma - \epsilon$ diagram, well above the region occupied by observed classical bulges.

This conclusion item involves a claim affected by the incorrect calculation of velocities and must be replaced by the following one:

(i) Auriga bulges show a degree of ordered rotation consistent with pseudo-bulges in 77 per cent of the cases. Of the remaining 23 per cent only one case, Au29, shows to be clearly supported by velocity dispersion and can not be classified as a pseudo-bulge.

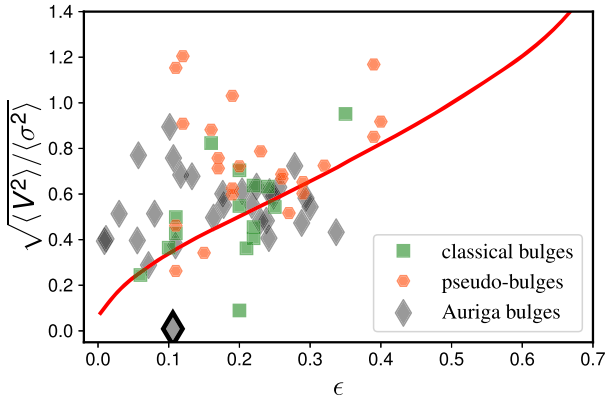

Figure 1. *Left panel:* $(V/\sigma, \epsilon)$ diagram for our sample of Auriga bulges shown in black diamonds. Red hexagons and green squares are observational data from Fabricius et al. (2012). The red line indicates the oblate line that describes oblate spheroids that are isotropic and flattened only by rotation. The bulge of Au29, highlighted with a black edge around the symbol, shows no signs of rotational support.

In the abstract of the published article we claim that none of our bulges can be classified as a classical bulge. However, based on the corrected kinematical properties of the simulated bulges, Au29 cannot be considered to host a pseudo bulge, regardless of the flat surface brightness profile with $n_{\rm sersic} = 1.2$.

REFERENCES

Fabricius M. H., Saglia R. P., Fisher D. B., Drory N., Bender R., Hopp U., 2012, ApJ, 754, 67
Gargiulo I. D. et al., 2019, MNRAS, 489, 5742
Kormendy J., Illingworth G., 1982, ApJ, 256, 460

★ E-mail: ignacio.gargiulo@gmail.com

This paper has been typeset from a TEX/LATEX file prepared by the author.