

Erratum: Phase spirals in cosmological simulations of Milky Way-sized galaxies

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This is an erratum to the paper ‘Phase spirals in cosmological simulations of Milky Way-sized galaxies’ published in MNRAS, 2022, 510, 154–160. In the original version, due to a transformation error, we used a reference frame that is not the most suitable for the problem we want to study. We corrected this and use now a reference frame where the young stellar/gaseous discs rotate at the circular velocity derived from the potential. This correction only affects the azimuthal location of the panels showing projections of the phase space and the description of the propagation of the phase spiral (detailed below). Our conclusions remain totally unchanged.

In particular, now we use a right-handed system where the galactocentric cylindrical coordinates ϕ and V_ϕ are negative in the direction of rotation (the galaxy rotates clockwise). Thus, the azimuth of the region selected for figs 1 and 3 in the published paper is 330° in the new system and 150° for fig. 4. Also, we update figs 2 and 5

of the published paper with the correct reference system (Figs 1 and 2 in this document). The change of the colour bar of V_ϕ in this new Fig. 1 is also applicable to the rest of the figures with the same colour scheme.

In the two top rows of Fig. 2 (which replaces fig. 5 in the published paper) we notice thin $m = 1$ bands going in the direction of rotation (downgoing) with a period of 300 Myr in the case of density and spirals weighted by V_ϕ . These bands are compatible with the rotation period at the range of 10–12 kpc in radius (250–320 Myr). Most notably, we see thicker bands (upgoing, thus, retrograde) with a longer period (~ 1 Gyr). As in the previous version, the origin of these bands is still under investigation.

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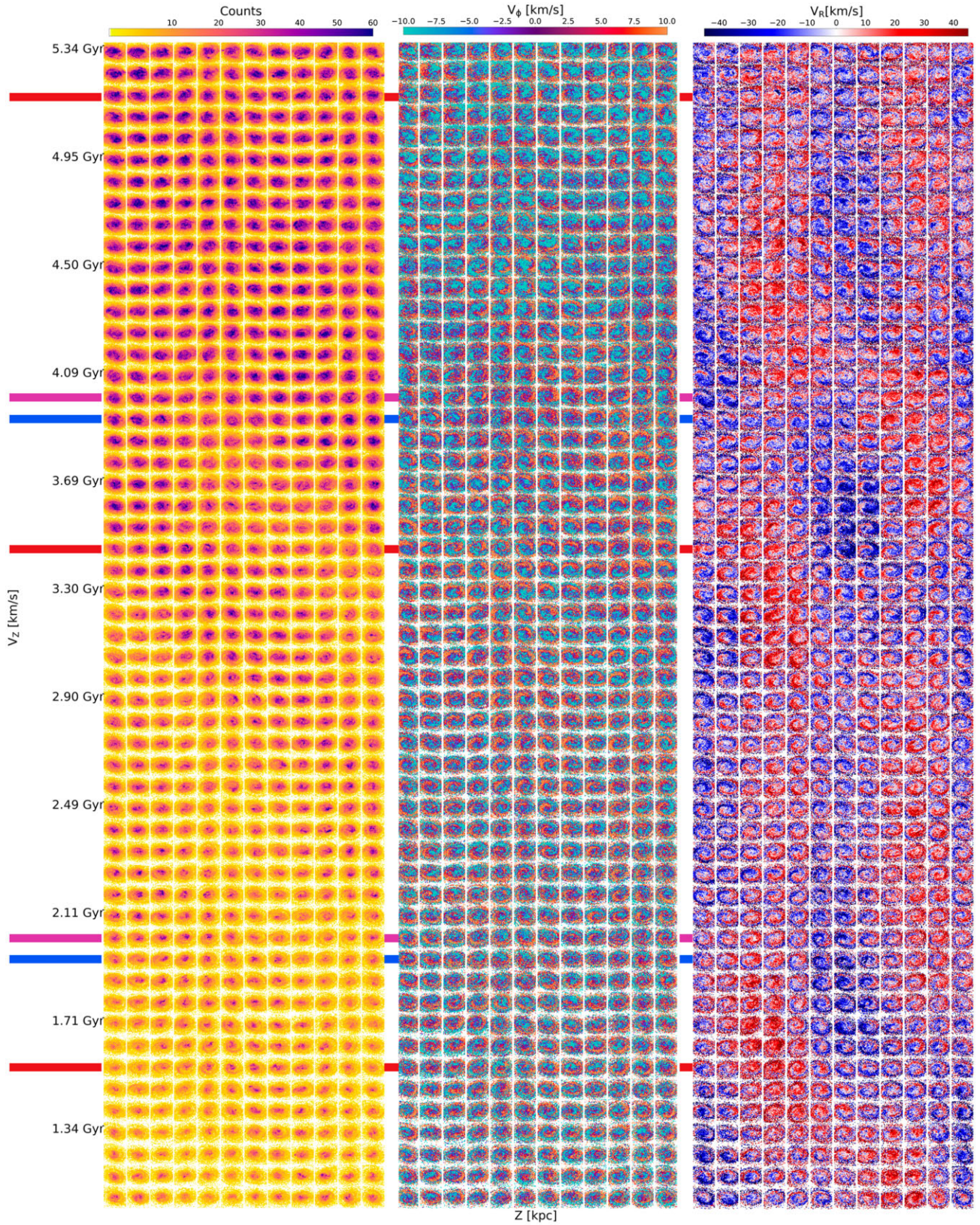


Figure 1. Phase spirals in the vertical phase space at different azimuths and times of the GARROTXA simulation. We consider particles at radius between 10 and 12 kpc and with ages younger than 5 Gyr. From top to bottom we show the evolution between 5.3 and 1 Gyr in lookback time. From left to right, the first set of 12 columns show the vertical phase space in 12 azimuthal equispaced regions (30 deg). The next 12 columns show the $V_\phi - \langle V_\phi \rangle$ weighted maps, where $\langle V_\phi \rangle$ is the mean for each region. The last set shows the V_R weighted maps. The horizontal thick lines indicate the pericentres of the three main satellites (Arania in blue, Grillo in red, and Mosquito in magenta).

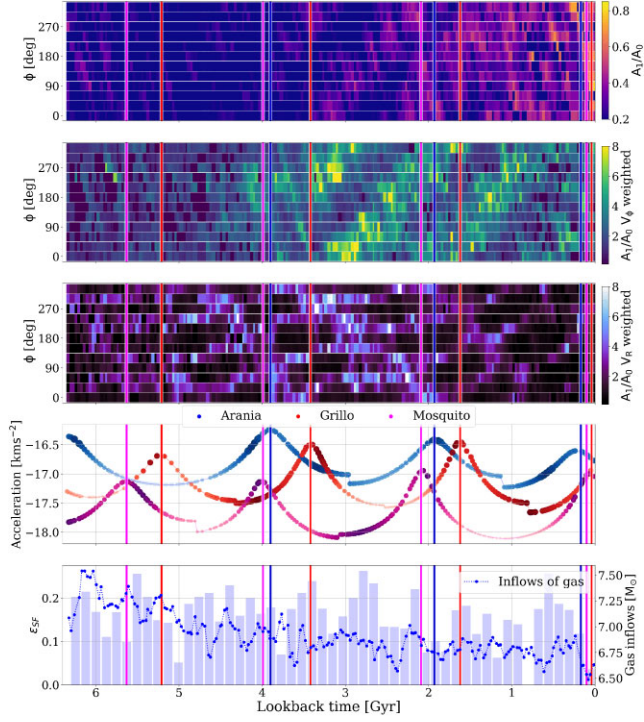


Figure 2. Amplitude of the phase spiral with time and relation with satellite orbits and star formation. First three panels: $m = 1$ Fourier amplitude in the Z – V_Z space, for the same regions and ages as in Fig. 1, computed for the density, V_ϕ -weighted, and V_R -weighted, respectively. Fourth panel: acceleration on to the disc by the main satellites with darker colours indicating a lower vertical distance above/below the disc plane. Here, the small discontinuities are artificially caused by our re-calculation of the tidal radius at apocentres. Bottom panel: star formation efficiency (histogram) and gas inflow histories (blue dots and line). Coloured vertical lines indicate the times of pericentres.

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