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Modeling the kinematics and star formation history of Andromeda II by a gas-rich major merger of dwarf galaxies

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Abstract. We present an evolutionary model for the origin of Andromeda II, a dwarf spheroidal satellite of M31. The model is an extension of the scenario proposed by Łokas *et al.* (2014) involving a major merger between two gas-rich disky dwarf galaxies.

Keywords. galaxies: dwarf, evolution, Local Group, structure, stellar content, kinematics and dynamics

1. Main observational properties of Andromeda II

Andromeda II (And II) is a dwarf spheroidal (dSph) galaxy at a distance of 185 kpc from M31. Ho *et al.* (2012) have discovered that And II, in contrast to other Local Group dSphs, has an unusual rotation ($\pm$ 10 km/s) around its major axis. In addition, del Pino *et al.* (2016) confirm the presence of two stellar populations in the galaxy: an old (9-13 Gyr) extended one, and an intermediate-age (5-8 Gyr) more concentrated one. And II, as other dSphs, does not have HI gas. We explain these properties by a major merger between two gas-rich disky dwarf galaxies and an interaction of the remnant with M31.

2. Model and simulation to reproduce Andromeda II

The simulation traces the evolution of two gas-rich disky dwarfs galaxies, initially placed on a radial orbit towards each other with their angular momenta inclined by 90 degrees (Fouquet *et al.* 2016). The gas-rich major merger triggers the formation of the second stellar population younger than the primordial one, mainly in the center of the dwarf galaxy, as observed, because the gas is dense enough to form stars. After a few Gyr, the merger remnant forms a stable spheroidal galaxy with a rotation around the longest axis as seen in the observations. Then, we take into account the interaction between the remnant of the major merger and M31. This could explain the lack of gas in And II by a quick gas stripping episode 5 Gyr ago and thus the sudden stop of the star formation at this epoch.

References

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