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Cosmological N-body+hydro simulations of spiral galaxies and dark matter detection

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We study three high resolution cosmological hydrodynamical simulations of Milky Way-sized halos including a comparison with the corresponding DM-only runs performed with the adaptive mesh refinement code RAMSES. We analyse the stellar and gas distribution and find one of our simulated galaxies with interesting Milky Way like features with regard to several observational tests. Thanks to consistently tuned star formation rate and supernovae feedback, we manage to obtain an extended disk and a flat rotation curve with the circular velocity and the dark matter density in the solar neighbourhood in agreement with observations. With a careful look at the derivation of the stellar-to-halo mass ratio, we also obtain competitive values for this criterion. Concerning the dark matter distribution, we explicitly show the interaction with the baryons and show how the dark matter is first contracted by star formation and then cored by feedback processes. In this consistent framework, we also study dark matter detection phenomenology which will be the subject of subsequent papers.

References

[1] Pol Mollitor, Emmanuel Nezri, Romain Teyssier, Baryonic and dark matter distribution in cosmological simulations of spiral galaxies. http://arxiv.org/abs/1405.4318

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