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Internal Kinematics of Modelled Isolated and Interacting Disc Galaxies

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Abstract. We present a systematic investigation of the velocity fields of both isolated and interacting spiral galaxies in combined N-body/hydrodynamical simulations. Closely mimicking the procedures applied in observations of distant, small, and faint galaxies we extract rotation curves (RCs) and compare the results of the simulation directly to observations. Irregularities in the velocity field reflect disturbances in the gravitational potential of the galaxy. They can be used to trace the recent interaction history of a galaxy and give possible clues to the type of the respective interaction. In addition, identifying disturbances in the RCs is important for Tully-Fisher studies in order to accurately derive the maximum rotation velocity.

Keywords. galaxies: kinematics and dynamics

1. Results

We find that RC parameters are affected by the observational setup, especially the relative slit width and the slit misalignment (Kapferer *et al.* 2006). Standard geometrical corrections are not sufficient to correct for these effects. The virial velocity, which is usually used by semi-analytic models can differ significantly from typical fit parameters inferred from RCs. This complicates comparisons of measured with modelled Tully-Fisher relations especially at higher redshifts.

Depending on the interaction geometry, galaxy mergers and fly-bys are able to cause distortions of different strength in the velocity fields of galaxies (Kronberger *et al.* 2006). Galaxy-galaxy mergers and fly-bys significantly disturb the velocity fields of the interacting galaxies, leading to asymmetries and distortions in the RCs. We find that the velocity field settles again to a relatively undisturbed equilibrium state in less than about 1 Gyr and a strong dependence of the RC shape and asymmetry on the viewing angle.

References

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