

STABILITY AND SECULAR HEATING OF GALACTIC DISCS

Alessandro B. ROMEO
SISSA – International School for Advanced Studies
Strada Costiera 11
I-34014 Trieste
Italy

The secular evolution of galactic discs, of which the increase of the stellar velocity dispersion with age is the most striking expression from a kinematical point of view, is closely related to their stability properties because of the collective nature of such systems. In this context, however, the *crucial* role of collective effects is often underestimated or not properly taken into account.

We propose a *global collective* heating mechanism leading to a self-regulation process of the kind suggested by the spiral structure theory, when both the linear effects of wave-wave interactions and the *quasi-linear* effects of wave-particle interactions at the relevant resonances are taken into account. The internal excitation and feedback mechanisms invoked for the maintenance of global spiral modes are expected to play a *crucial* role in ensuring *self-regulation* together with the cold interstellar gas. As a result, the planar and vertical components of the stellar velocity dispersion are expected to have a *different* age-dependence, as some recent observational surveys suggest. For more information see Romeo (1987, 1989b, 1990); see also Romeo (1985, 1988, 1989a), Bertin and Romeo (1988); and references cited therein.

References

- Bertin, G. and Romeo, A. B. (1988), "Global Spiral Modes in Stellar Disks Containing Gas", *Astron. Astrophys.* **195**, 105.
- Romeo, A. B. (1985), *Tesi di Laurea*, Università di Pisa, Italy.
- Romeo, A. B. (1987), "Stability and Secular Heating of Galactic Disks", *M. Phil. Thesis*, SISSA, Trieste, Italy.
- Romeo, A. B. (1988), "Stability of Two-Component Galactic Disks", *Preprint, SISSA Astro. 167*, Trieste, Italy, to appear in *Dynamics of Astrophysical Disks*, Manchester (Dec 1988), England.
- Romeo, A. B. (1989a), "The Cold Interstellar Gas and the Stability of Galactic Disks: Finite-Thickness Effects", *Preprint, SISSA Astro. 94*, Trieste, Italy, to appear in *Chemical and Dynamical Evolution of Galaxies*, Elba (Sept 1989), Italy.
- Romeo, A. B. (1989b), "Stability and Secular Heating of Galactic Disks", *Preprint, SISSA Astro. 105*, Trieste, Italy.
- Romeo, A. B. (1990), "Stability and Secular Heating of Galactic Disks", *Ph. D. Thesis*, in preparation, SISSA, Trieste, Italy.