[S09-2] Jeans and Parker Instabilities in the Self-gravitating, Magnetized, Gaseous Disk under an External Gravity

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Linear stability analyses have been performed onto an infinitely extended, magnetized, gaseous disk, which is under the influence of both external and self-gravities. We approximate the initial equilibrium density structure of the disk by a two-parameter function of vertical distance z from the disk mid-plane. One of the parameters is fixed essentially by the relative importance of the self-gravity to the external one, and the other by the magnetic-to-gas pressure ratio. Since the latter turns out not to change much, we varied the former only and examined how the existence of an external gravity would modify the interplay between the Parker and the Jeans instabilities in the Galactic ISM disk. The resulting interaction renders to the dispersion relation two distinct maxima of growth rate, which are consistent with the observed features of HI super-clouds and of giant molecular clouds, respectively.

[S09-3] Jeans Instability of the Self-gravitating Gaseous Disk under an External Gravity

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Linear stability analyses have been performed onto an infinitely extened, non-magnetized, isothermal gaseous disk, which is under the influence of both external and self-gravities. We approximate the initial equilibrium density structure of the disk by a single parameter function and let the relative importance of the self-gravity to the external one fix the parameter value. By varying the parameter we examined how increasing strength of the external gravity would modify the dispersion relation of the pure Jeans gravitational instability. In the case of the Milky Way the stars in the Galactic planerenders to the instellar matter (ISM) much stronger acceleration than the self-gravity of the ISM itself. The resulting modifications to the Jeans instability are not so much on the minimum length scale as on the maximum growth rate. An implication of this study for HI superclouds in spiral galaxies will be briefly discussed.