

# Hydrodynamical Simulations of the Barred Spiral Galaxy NGC 1097

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NGC 1097 is a nearby barred spiral galaxy believed to be interacting with the elliptical galaxy NGC 1097A located to its northwest. It hosts a Seyfert 1 nucleus surrounded by a circumnuclear starburst ring. Two straight dust lanes connected to the ring extend almost continuously out to the bar. The other ends of the dust lanes attach to two main spiral arms. To provide a physical understanding of its structural and kinematical properties, two-dimensional hydrodynamical simulations have been carried out. Numerical calculations reveal that many features of the gas morphology and kinematics can be reproduced provided that the gas flow is governed by a gravitational potential associated with a slowly rotating strong bar. By including the self-gravity of the gas disk in our calculation, we have found the starburst ring to be gravitationally unstable which is consistent with the observation in Heish et al. (2011). Our simulations show that the gas inflow rate is 0.17 solar mass per year. into the region within the starburst ring even after its formation, leading to the coexistence of both a nuclear ring and a circumnuclear disk.