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Internal dynamics of the NGC 3603 young cluster

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Abstract. Starburst clusters are spectacular young and dense stellar systems containing copious numbers of massive O-type and Wolf–Rayet stars. These objects depict a stellar population comprising stars over the entire mass range, making them ideal objects to study cluster formation and evolution as well as to test and calibrate stellar evolutionary models. Among the Galactic spiral-arm starburst clusters, NGC 3603 Young Cluster (YC), which is located in the Carina spiral arm, is the youngest and most compact one. Galactic starburst clusters also serve as templates for extragalactic super star clusters as observed, e.g., in the Antennae galaxies. Based on two epochs (obtained 10 yr apart) of high-quality astrometric *HST*/WFPC2 observations, we derive individual proper motions for several hundred stars. The proper motions enable us to distinguish cluster members from field stars, and to derive a first estimate of the internal cluster dynamics. Photometry of the clean sample of cluster stars allows us to create color–magnitude diagrams (CMDs) that are not contaminated by field stars, and to compare the sequence of cluster members with different sets of theoretical isochrones and evolutionary tracks. We clearly identify a lower-mass pre-main-sequence and a higher-mass main-sequence stellar population in NGC 3603. A particular focus of our comparison with theoretical isochrones is the exact shape and extent of the pre-main-sequence/main-sequence transition region in NGC 3603 YC. The proper motions also contain dynamical information. From this, we derive a velocity dispersion, which leads to the first dynamical mass estimate of the NGC 3603 cluster. We also investigate whether or not NGC 3603 YC is virialized, and study evidence for primordial versus dynamical mass segregation. Past and future evolution of NGC 3603 YC can be studied and will tell us about the clusters 'fate' and its long-term survival chances.

Keywords. astrometry, Hertzsprung–Russell diagram, stars: kinematics, stars: pre–main-sequence, open clusters and associations: individual (NGC 3603 YC)

The full poster (in pdf format) is available at
`http://www.astro.iag.usp.br/~iaus266/Posters/pRochau.pdf`.