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Unveiling an optimum method for modeling cluster S0 galaxies

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Galaxies and galaxy clusters provide hidden secrets of the formation and evolution of the universe. Lenticular or S0 type galaxies are defined as transitional galaxies between ellipticals and spirals. The formation of S0 galaxies is still an unsolved problem in extragalactic astronomy. Modeling galaxies can help to resolve this problem by extracting accurate parameters unique to S0 galaxies. In view of the aforementioned point, a sample of cluster S0 galaxies was selected from Dressler's 1980 galaxy cluster catalogue. Images of selected S0 galaxies were filtered from observed images taken at the Kitt Peak National Observatory (KPNO) using the 0.9 m telescope with 2048 x 2048 pixel T2K CCD. Each S0 galaxy was modeled using the two-dimensional image decomposition program called GALFIT and a newly developed python code. SAOImage DS9 application and Image Reduction Analysis Facility (IRAF) were used to visualize and crop cluster galaxies. From the available galaxy profiles in GALFIT, a Sérsic profile was used with different concentration parameters for modeling. The quality of the model was concluded by observing residual images. This was also confirmed using reduced χ^2 (χ^2_ν) values of models. Hence, generated models are applicable to study the nature of cluster S0 galaxies.

Keywords: S0 galaxies, galaxy modelling, GALFIT, reduced χ^2, sérsic profile

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