

Title: Modelling the Orion Nebula Cluster

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Abstract: Young star clusters are widely discussed from the point of view of their evolution and structure. In this work we focused our attention on studying a typical representative of these objects — the Orion Nebula Cluster (ONC, M 42) — based on the observational data, including their confrontation with N -body models from Šubr et al. (2012). These numerical models were inspired by the recently proposed evolutionary scenario, according to which the star clusters begin their evolution from very dense initial conditions. From the analysis of the X-ray sources we revealed that the ONC is likely to be rotationally symmetric in the inner area ($\lesssim 0.7$ pc). Further analysis including also optical and IR observational data led us to the conclusion that the ONC is elongated from the North-East to the South-West on large scales (up to 2 pc). We also compared radial profiles of different mass groups of stars and we discovered a possibly inverse mass segregation between stars with masses in the interval $(1 ; 5) M_{\odot}$ and the stars less massive than $0.5 M_{\odot}$ in the range from 0.5 pc to 1.5 pc. This result does not correspond to the theoretical expectations (neither to the results from the numerical models) and it deserves further investigation.

Keywords: methods: N -body simulations, methods: data analysis, star clusters: individual (ONC), stars: dynamics