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Report on the doctoral thesis of Vaclav Pavlík,

Report doctoral thesis entitled “Perturbed Stellar Motion in Dense Star Clusters” by Vaclav Pavlík to acquire the degree of doctor at the Astronomical Institute of Charles University.

The manuscript is 139 pages long with 6 main chapters, about 160 references and an impressive appendix with published papers, discusses the formation and evolution of star clusters with compact objects, in particular black holes and neutron stars. New results are presented in three of the 6 chapters, in particular in chapter 3, 4 and 5. The final chapter (#6) contains more a vision on future work. Near the end of the thesis, copies of several of the published scientific manuscript to which the author contributed are included. These include The black hole retention fraction in star clusters, Do star clusters form in a completely mass-segregated way?, The hunt for self-similar core collapse, published in *A&A*, Neutron stars and millisecond pulsars in star cluster published in *MNRAS* and *A MODEST review*, published in computational astrophysics and cosmology.

The introductory chapter (chapter 2), three scientific chapters (3, 4 and 5), the overview chapter (6) and in particular the attached scientific papers present a clear view of the author’s activities and his keen interest in the topic.

The thesis chapters, though a bit skinny, appear to be meant more of an addition to the publications attached in the appendix, rather than as stand alone research. Though interesting, they describe the fundamental processes in star cluster dynamics at a rather basic level. This view is supported by the relative simplicity of the attached figures, which would do well with some additional editing and maybe a further consideration on what it is exactly the candidate desires to show or not show. Also the presentation of the results could see some improvement by spending some time thinking about its purpose and the story to convey with the scientific findings. Overall is well compensated, in my opinion, by the high quality of the attached publications.

Personally, I am most impressed with the detailed overview presented in the attached scientific papers, which reflect the broader context of the thesis chapters. The transparent way in which the thesis presents problem and then addresses a possible solution is interesting to read and shows the authors knowledge base in the matter.

The chapters themselves as well as the scientific papers are well written and demonstrate the detailed expertise as well as the broad interest of the author. The wide range of literature references, and the broad view they reflect is impressive and indicates that the authors has a keen understanding and an extended know-how of the field.

The thesis presents very interesting new results, which are described clear and transparently. I have no doubt that this thesis proves the author ability for creative scientific work. I recommend that the defense of the thesis should go ahead in front of the jury. I warmly re comment Vaclav Pavlík to be granted the doctoral degree.

Yours sincerely,
Simon Portegies Zwart