

Supervisor's report on the work
“Perturbed Stellar Motions in Dense Star Clusters”
submitted by RNDr. Václav Pavlík for the degree PhD

The submitted Thesis covers a scientific work of Mr. Pavlík over the past approximately three and half years. It is a compilation of four topics results of which have been published in refereed journals. Mr. Pavlík is the first author of three of these papers. Formally, the Thesis is divided to two main parts: the first one is a relatively standalone text which briefly summarises results that are presented in more detail in the second part which consists of reprints of five papers. (One of these papers is a scientific report of the MODEST17 conference which was put together by ten co-authors and does not present results of Mr. Pavlík's own research; on the other hand, it shows his ability to join a large team and contribute to quite a non-trivial review.)

I feel that it is not necessary to rephrase the results presented in the Thesis, nor to evaluate them by parts – this has been done already by referees of the individual papers and will supposedly be also done independently by the referees of the Thesis. Let me rather try to make some general comments on Mr. Pavlík's work during his PhD studies and express my impression of his current research status. As I have written above, the submitted Thesis covers approximately three and half years of his scientific work, while the PhD study started five years ago. This indicates that the start was not fluent, perhaps due to the difficulty of the original project that was supposed to be solved, i.e., the evaluation of the size (both in the spatial extent and the number of involved stars) of stellar sub-structures acting in dynamical formation of hard binaries in star clusters and the estimation of characteristic time-scale of this process. This project remains still open, being only partly covered in the work on “The hunt for self-similar core collapse”. Neither the alternate project on search for a massive black hole in the Orion nebula cluster that was formulated during the first year of his PhD studies was driven to usefull scientific results. I have to admit that at that time, I was quite unhappy with the pace of Mr. Pavlík's work. The change came with his three weeks stay in Edinburgh where the new topic on self-similarity of core collapse of self-gravitating star clusters was suggested by prof. Douglas Heggie. During the work on this topic in which I was involved, a clear progress in Mr. Pavlík's skills could have been observed. While at the beginning, Mr. Pavlík was suggesting incorrect statements due to insufficiently critical attitude to his own work, during the (relatively lengthy) review process of the relevant paper, he was able to search independently for well established arguments. At that time, he was already working on another quite unrelated branch of his research with different co-workers. Since then, his productivity continuously grows and Mr. Pavlík has produced valuable scientific results within two additional sub-projects. Hence, even though the original project that was formulated five years ago remains

unfinished, Mr. Pavlík has done a lot of high quality work. He has shown that his strength lies in the ability to open new scientific topics both of his own as well as those motivated by more experienced colleagues. I highly value this ability and consider it more important than the fact that some problems that were formulated in the past remained unsolved. Mr. Pavlík has also shown a great ability to work in parallel on several loosely related topics with disjunct teams of co-workers which is also very useful quality in the contemporary research.

In summary, In my opinion, the submitted Thesis is of high quality and I definitely support it to be accepted and the author to be awarded the degree PhD.

Praha, August 1st, 2019

Ladislav Šubr