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Supervisor's report on doctoral thesis by Mgr. Petr Fatka "Identification methods of genetically related asteroids"

One of the most interesting topics studied by us in the Asteroids team here at the Astronomical Institute AS CR in Ondřejov, in collaboration with prof. David Vokrouhlický of the Charles University in Prague, during the recent years has been young pairs and clusters of asteroids that consist of members on separate, but highly similar heliocentric orbits. Their properties provide us important information on how asteroids form and evolve. The PhD thesis by Petr Fatka is devoted to one specific sub-topic of our study: identification of members of asteroid pairs and clusters.

Petr Fatka has started with asteroid pair and cluster identification methods that we developed before: The statistical significance method and the backward orbital integration method. Subsequently he has further developed the later method using the most recent asteroid orbit integration tools. He applied his developed tools to confirm the membership proposed from the statistical significance method for more than 10 asteroid clusters and nearly 100 asteroid pairs as part of the papers Pravec et al. (2018, 2019) and Moskovitz et al. (2019), where he became the second author. Finally he focused on one particularly interesting feature that we observe in some asteroid clusters: cascade asteroid disruptions. The results of this most recent work have been published in Fatka et al. (2020).

As the supervisor of Mgr. Fatka and the leader of Asteroids team here at the Astronomical Institute AS CR, I have particularly appreciated his ability to work on a scientific problem in concentrated way, getting to the root of it, solving it with his programming skills and working with me and other team members collaboratively on other aspects such as interpretations of obtained data and comparing them to theories. His contribution to our new results was significant and he has become a very valuable member of our team. His work has already become well known within the asteroid research community and received very good responses from our colleagues over the world.

In summary, Petr Fatka proved, in my opinion, his ability to perform independent scientific research and obtain new scientific results. I therefore suggest to grant him the PhD title.

Mgr. Petr Pravec, Dr.
supervisor

Ondřejov, 2020 March 1

Note: References in this report are the same as in the thesis.