

Jury Member Report – Doctor of Philosophy thesis.**Name of Candidate:** Vadim Prokofev**PhD Program:** Mathematics and Mechanics**Title of Thesis:** Integrable hierarchies of nonlinear differential equations and many-body systems**Supervisor:** Professor Anton Zabrodin**Name of the Reviewer:**

Andrey Marshakov

I confirm the absence of any conflict of interest

(Alternatively, Reviewer can formulate a possible conflict)

Date: DD-MM-YYYY

21-02-2022

The purpose of this report is to obtain an independent review from the members of PhD defense Jury before the thesis defense. The members of PhD defense Jury are asked to submit signed copy of the report at least 30 days prior the thesis defense. The Reviewers are asked to bring a copy of the completed report to the thesis defense and to discuss the contents of each report with each other before the thesis defense.

If the reviewers have any queries about the thesis which they wish to raise in advance, please contact the Chair of the Jury.

Reviewer's Report

Reviewers report should contain the following items:

- Brief evaluation of the thesis quality and overall structure of the dissertation.
- The relevance of the topic of dissertation work to its actual content
- The relevance of the methods used in the dissertation
- The scientific significance of the results obtained and their compliance with the international level and current state of the art
- The relevance of the obtained results to applications (if applicable)
- The quality of publications

The summary of issues to be addressed before/during the thesis defense

The PHD thesis of Vadim Prokofev is devoted to study the dynamics of poles of the singular solutions of integrable hierarchies of KP-Toda type. It was shown that this dynamics is isomorphic to dynamics of particles in many-body integrable systems, and sometimes this equivalence was uplifted to the on the level of hierarchies. However, such connection between two different types of integrable systems in generic elliptic case has been known for a long time only as a conjecture. In the thesis of Prokofev this conjecture is strictly proven for KP, 2D Toda lattice and Matrix KP hierarchies in the most general elliptic case. The thesis is based on five published papers, is clearly written, comprehensible, and contains original scientific results competitive at the international level. I am sure that the thesis should be defended since Vadim Prokofev has fully justified his qualification of a very good PHD-level researcher.

Provisional Recommendation

I recommend that the candidate should defend the thesis by means of a formal thesis defense

I recommend that the candidate should defend the thesis by means of a formal thesis defense only after appropriate changes would be introduced in candidate's thesis according to the recommendations of the present report

The thesis is not acceptable and I recommend that the candidate be exempt from the formal thesis defense