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REVIEW
by the foreign scientific advisor
on the dissertation work of Gabitova Ilfa Azamatovna
«Structure and evolution of circumstellar matter in Be stars»
for the PhD degree in the educational program
«8D05307 – Physics and Astronomy»

The dissertation work of Ilfa Gabitova is centered on investigating the structure and evolution of circumstellar matter in Be stars through the example of two binary systems: κ Draconis and HD 698. Both objects show clear evidence of a disk asymmetry and variability linked to the presence of a companion. The work is based on an extensive multi-epoch, high-resolution spectroscopy and applies a broad range of analysis techniques: radial-velocity measurements of absorption and emission lines, periodogram calculations, profile decomposition, and, most importantly, Doppler tomography. The latter is a well-versed method, but new for classical Be binaries, allowing to reconstruct velocity-space maps of their disks and to identify structures directly linked to companion interaction.

The results obtained are significant. For κ Dra, the study demonstrates that the Hα V/R ratio remained phase-locked to the orbital period throughout the entire cycle of the disk dissipation that lasted nearly a decade. For HD 698, the work identifies and characterizes not just a region influenced by the companion, but a distinct narrow Hα emission component co-moving with the secondary star. Furthermore, the combined tomographic and radial velocity analysis resulted in the first direct, self-consistent constraints on the companion's mass, ruling out the black-hole scenario and supporting the interpretation of a stripped, expanded secondary.

The scientific novelty of this dissertation lies in the systematic application of Doppler tomography to Be binaries, in the demonstration of persistent orbitally

forced variability in κ Dra even through the disk loss, and in the discovery of a companion-linked emission component and mass constraints in HD 698. The work thus provides both methodological and astrophysical advances: it establishes tomography as an efficient, reproducible, and model-independent technique for the study of circumstellar disks, and it delivers new insights into the role of binarity in shaping Be-star environments.

The results of the dissertation are reliable, ensured by multi-instrument observations, reproducible measurements, independent detection of orbital periods in both RV and V/R data, and internal consistency of orbital solutions and tomographic reconstructions. The outcomes are supported by publications in international peer-reviewed journal indexed in Scopus (Q2), and the results were presented at relevant international conferences.

In my opinion, the dissertation work of Ilfa Gabitova fully achieves its stated goals and tasks, makes an original contribution to the study of Be stars and binary–disk interaction, and meets the requirements for the award of the PhD degree in the specialty «8D05307 – Physics and Astronomy».

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