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## To Whom It May Concern

I have read the habilitation thesis of Dr. Daniela Korčáková with great interest. My own field of research is related to hot massive stars which is quite close to the topic Daniela's thesis. Furthermore, I have been working on radiative transfer models as well as on the non-LTE stellar atmospheres. Therefore, these aspects of the thesis are of great interest to me.

I find that the thesis is devoted to a very timely topic. At present, searching and studying the products of binary evolution is at the frontiers of stellar astrophysics. In her thesis and related publications, Daniela argues that enigmatic stars belonging to the FS CMa class are resulting from binary star mergers. These findings have broad significance allowing to probe current binary star evolutionary models. The thesis succeeds in convincingly showing that the merger scenario is a credible one, and in outlining further research avenues in this field.

In her thesis, Dr. Korčáková provides a broad review of B[e] stars, and specifically of the FS CMa subtype. This approach demonstrates breadth of Dr. Korčáková's scientific approach to the topic. The structure of the thesis is logical, starting with a broader overview of the B[e] phenomenon and gradually zooming in to more specific aspects of the FS CMa subtype. The thesis is written in English, may be in some cases grammar checks would be in order. In my view, the thesis reflects on and includes references to the current relevant research literature. This allows to place Daniela's and her collaborators work in an international context. To me, it is clear that Dr. Korčáková is among the top international leaders in this field.

The first chapter considers the place of FS CMa stars among broader class of B[e] stars. After the topic is introduced, the main observational properties of FS CMa stars and the prevailing explanations are discussed. In my view it would have been useful to show in this chapter a Hertzsprung-Russell diagram (HRD) with the positions of FS CMa stars and compare it with the evolutionary tracks of single (and may be binary) stars. Table A.1. provides a useful list of the FS CMa stars but their fundamental

parameters are not given, therefore it is difficult to imagine their location on the HRD. The first chapter also introduces the merger scenario which is clearly favored by the author. The recent study by Korčáková' et al. (2021) has indeed detected the presence of magnetic field on one of the FS CMa star, which makes a significant breakthrough in our understanding of these objects. Does Korčáková et al. model predict that *all* FS CMa stars are strongly magnetic? Could this be verified observationally?

The second chapter details with the observed properties of the FS CMa stars and contains observations obtained by the author using the instruments at the Ondřejov Observatory. The spectroscopy in optical and the UV is discussed, highlighting the non-LTE nature of atmospheres and envelopes of the FS CMa stars. Especially interesting is the detection and discussion on Li I lines in the FS CMa star spectra. Upon reading this part of the thesis, I was wondering, what is the Li abundance in this types of stars - is the in accordance with the primordial abundance predictions, or is it enhanced? And the follow-up question, can the determination of Li abundance be used to constrain the evolutionary status of FS CMa star? The chapter continues by discussing various spectroscopic features and their time variability. It is shown that the envelopes of FS CMa stars are highly dynamic, with various diagnostics indicating the bulk motions of matter. What is the underlying time scale of the spectral variability? Does it relate to stellar rotation, or rather to the wind dynamic time scale?

The third chapter presents the modeling and analysis results. The so-called BPT diagrams show that FS CMa stars occupy a distinct position, and make a useful diagnostic tool to distinguish these stars from other astrophysical objects. It would have been interesting to apply a photoionization code in an attempt to reproduce the nebula spectra of FS CMa stars. In section 3.4, the analysis of various temporal variations is presented. The section demonstrates the large work done on investigating the spectral and photometric variability. Interestingly, the slow rotation velocity of FS CMa stars is explained by the magnetic braking. It would have been useful to estimate time needed to slow down the rotation, and thus place constraints on the time elapsed from the moment of the merger. I concur with the Dr. Korčáková assessment of difficulties involved in measuring realistic mass-loss rates in such complex situation as found in the FS CMa-type stars. The chapter ends with presenting a phenomenological model of matter distribution around a FS CMa-type star. I am curious about a possible origin of dust in these systems, e.g. why and how dust could be created during the merger process?

The final, fourth, chapter, presents new ideas on the nature of the FS CMa stars. The various arguments are discussed to refute the binary hypothesis on the nature of the FS CMa stars, and to support their merger origin. The central argument is the presence of the magnetic field. I would be interested in more detailed clarification of this point. A large number of strongly magnetic ApBp-type stars are known, but these have distinct properties from the FS CMa stars. So, I would be interested to know Daniela's opinion on why ApBp stars do not show FS CMa phenomenology? What makes the latter different?

Clearly, Dr. Korčáková's contributions to the field are quite significant. Furthermore, as evident from the provided "Author contribution to the field" section, Daniela has supervised a number of students who made interesting and valuable contributions. Overall, I would like to praise the (1) the high quality of the habilitation thesis; (2) the numerous publication of the author; and (3) Dr. Korčáková work and engagement in student supervision.

The checks show that this habilitation thesis is an original work. Some duplications with the previous publications by the author are unavoidable because the thesis is partly based on these publications. The thesis provides a clear citations to the original publication each time when there is an overlap with or a reference to previous works.

Sincerely,  
Lidia Oskinova  
24 May 2022, Potsdam

