University of St Andrews

School of Physics and Astronomy

North Haugh, St.Andrews, KY16 9SS, United Kingdom

Dr Martin Dominik, Reader in Physics & Astronomy

Tel: +44-1334-463068 FAX: +44-1334-463104 E-mail: md35@st-andrews.ac.uk

Charles University
Faculty of Mathematics and Physics
Ke Karlovu 3
121 16 Praha 2
Czech Republic

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Report on the habilitation thesis by Dr David Heyrovský

Dear colleague,

it was a pleasure for me to see the habilitation thesis by Dr David Heyrovský. It constitutes an impressive manifestation of innovative original work that provides most relevant solid ground for the further advancement of gravitational lensing

The thesis is framed around six peer-reviewed publications, all of which are first-authored by PhD students of Dr David Heyrovský, namely Kamil Daněk, Lukáš Ledvina, and Michal Karamazov. The presented work is mostly theoretical: three publications with Kamil Daněk extensively discuss key properties of n-point-mass lenses (and in more detail triple lenses specifically), two publications with Michal Karamazov investigate gravitational lensing by a massive object in a Dark Matter halo, and only the research with Lukáš Ledvina on X-ray line profile variations during quasar microlensing addresses a specific application, but also does not include any observational data.

It is difficult to assess to what extent the student or the supervisor contributed to the presented research articles, but it is apparent that all of them are held together by the mastery of intricate mathematics, which I would consider a core signature of Dr David Heyrovský.

Turnitin unsurprisingly recognises that the habilitation thesis includes published work by Dr David Heyrovský and co-authors, but otherwise it only marks widely used generic phrases that do not constitute specific intellectual property of others. In fact, I have no doubt about the originality of the presented work, Dr David Heyrovský is well known as being a leading innovator on various aspects of gravitational lensing theory.

I confess that I might be somewhat biased, but I am clearly most impressed by the work on triple and n-point-mass lenses, given that in my opinion this successfully addresses a much harder problem than the other studies, and this is where Dr David Heyrovský has really shown to excel, providing answers where others in the field did not get further than speculations. It follows on from and goes far beyond the seminal detailed studies by Schneider & Weiß (1986; Astron. Astrophys. 164, 237) and Erdl & Schneider (1993; Astron. Astrophys. 1268, 453) on binary lenses. The latter is widely recognised as a masterpiece for in particular realising that the general binary-lens case inherits its topological features from the equal-mass binary-lens case. It is nothing short of amazing that Daněk and Heyrovský could similarly identify key properties of triple lens systems, finding

equivalences within parameter space as well as a classification scheme that holds the potential to be further generalised to n-point-mass lenses, given that it is built on the identification of key building blocks and therefore might permit proofs by induction. Few people in the scientific community have realised the full potential of these studies yet and others are still to catch up, which reflects innovation at the very forefront of knowledge. This work will have a lasting place in the scholarly record and will be a key reference for at least many decades, much in contrast to the vast majority of scientific publications which will be superseded or forgotten on time-scales less than 15 years (regardless of the amount of initial excitement).

Summarising, I can only most strongly recommend Dr David Heyrovský. He is an outstanding leader and innovator in the field, advancing it through deep understanding rather than presenting the scientific community with a shallow agglomeration of facts.

Best regards,

Dr Martin Dominik