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I declare that I have written the submitted dissertation independently and without unauthorized help, that I have not used any literature other than that cited in it and that I have identified all text passages that have been adopted in whole or in part as well as graphics, tables and AI-generated content used. Furthermore, I declare that digital illustrations only contain the original data or that there is clear documentation of the type and extent of image processing that changes the content.

Having completed my Ph.D. thesis, I have used AI (artificial intelligence):

yes no

If "yes" (which programs, for what purpose and to what extent):

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In case of „yes“ (please specify the sort of service and the volume of service):

No aids other than those specified were used. I also confirm that the dissertation submitted by me (electronic and printed version) is a completely identical copy and that the dissertation has not been submitted and assessed elsewhere in this or a similar form as a doctoral thesis.

The dissertation was prepared in accordance with the doctoral degree regulations and the supervision agreement.

Bochum, the

(Signature)