

Cover Page



Universiteit Leiden



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Lasers, lenses and light curves:

adaptive optics microscopy
and peculiar transiting exoplanets

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Cover: noun. a thing which lies on, over, or around something, especially in order to protect or conceal it.

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adaptive optics microscopy
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Alles is veel voor wie niet veel verwacht.

— J. C. Bloem, *de Dapperstraat*, 1945

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Preface

I started my PhD project in Utrecht in 2009, where I worked on implementing adaptive optics in a microscopy setting, collaborating with the Molecular Biophysics group at Utrecht University and the Delft Center for System and Control at Delft University. With my background in the application of adaptive optics in astronomy, this sounded like an interesting challenge, and proved to be an environment where I would learn many new things. Later, I got involved in developing adaptive optics for the *Extreme Polarimeter*, an instrument for exoplanet imaging developed in Utrecht, to improve the resolution in the presence of seeing. After our move to Leiden Observatory, my interests diverged and I got involved in two projects where we investigated peculiar transiting exoplanets, one planet disintegrating under the influence of its host star, the other showing signs of a ring structure never seen before.

Since these topics are after all quite different, this thesis is split in two parts. Part I deals with the implementation of adaptive optics in microscopy, part II considers two peculiar exoplanets we have investigated. To acknowledge the difference between these subjects, the introduction is also split in two, one for each part of this thesis.

Tim van Werkhoven, May 2014

