

# Laser and synchrotron spectroscopic studies of molecular hydrogen



VRIJE UNIVERSITEIT

**Laser and synchrotron spectroscopic studies of  
molecular hydrogen**

ACADEMISCH PROEFSCHRIFT

ter verkrijging van de graad Doctor aan  
de Vrije Universiteit Amsterdam,  
op gezag van de rector magnificus  
prof.dr. L.M. Bouter,  
in het openbaar te verdedigen  
ten overstaan van de promotiecommissie  
van de faculteit der Exacte Wetenschappen  
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De Boelelaan 1105

door

Gareth David Dickenson  
geboren te Kaapstad, Zuid Afrika

promotor: prof.dr. W.M.G. Ubachs  
copromotor: dr. E.J. Salumbides

for friends and family

*Every honest researcher I know admits he's just a professional amateur. He's doing whatever he's doing for the first time. That makes him an amateur. He has sense enough to know that he's going to have a lot of trouble, so that makes him a professional.*

Charles Franklin Kettering (1876-1958) U. S. Engineer and Inventor.

*Theory guides. Experiment decides.*

An old saying in science, seen attributed to many different persons.

This thesis was reviewed by the members of the reviewing committee:

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The work described in this thesis was performed as part of the research program of the “Stichting voor Fundamenteel Onderzoek der Materie” (FOM) and was carried out at the LaserLaB in Amsterdam.

The cover depicts a typical measurement day in the laboratory of the LaserLaB in Amsterdam through time-lapse photography. Edcel Salumbides, Mingli Niu and the author were carrying out precision spectroscopic measurements on molecular hydrogen. The central image on the front and back are of the synchrotron SOLEIL in Paris, France, taken during a measurement campaign in 2009.

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