Star formation history written in spectra
Ellerbroek, L.E.

Citation for published version (APA):
Ellerbroek, L. E. (2014). Star formation history written in spectra

General rights
It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations
If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: http://uba.uva.nl/en/contact, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.
# Contents

1 Introduction 1
   1.1 The nebular hypothesis 1 2
   1.2 Observations of star formation 1 3
   1.3 Accretion: from cloud to star 1 6
   1.4 Jets and outflows 1 8
   1.5 Star formation towards higher masses 1 11
   1.6 Accretion variability 1 15
   1.7 Observations: the new generation 1 16
   1.8 This thesis 1 18

2 RCW 36: characterizing the outcome of massive star formation 21
   2.1 Introduction 21 23
   2.2 Observations and data reduction 21 27
   2.3 Results from photometry 21 30
   2.4 Results from spectroscopy 21 31
   2.5 The star formation history of RCW 36 21 44
   2.6 Conclusions 21 46
   2.4 Classified sources in RCW 36 21 47

3 08576nr292: Discovery of a disk-jet system 55
   3.1 Introduction 3 57
   3.2 Observations and data reduction 3 58
   3.3 Results 3 59
   3.4 Discussion 3 62
   3.4 X-shooter spectrum of 08576nr292 3 66

4 The outflow history of HH 1042 and HH 1043 71
   4.1 Introduction 4 73
   4.2 Observations and data reduction 4 75
   4.3 Analysis of the emission line spectra 4 76
   4.4 Physical properties of the jets 4 85
   4.5 Kinematics analysis 4 92
**CONTENTS**

4.6 Discussion .......................... 100  
4.7 Summary ........................... 106  
4.A Additional materials .................. 108

5 Relating jet structure to photometric variability: HD 163296  
5.1 Introduction ........................ 113  
5.2 Observations, data reduction and archival data ............... 114  
5.3 Results: the jet ..................... 117  
5.4 Results: variability of the central source .................. 128  
5.5 Discussion .......................... 134  
5.6 Summary and Conclusions .............. 140  
5.A Additional materials .................. 142

6 First firm spectral classification of an early-B PMS star: B275 in M17  
6.1 Introduction ........................ 147  
6.2 VLT/X-shooter observations of B275 ...................... 148  
6.3 Results ................................ 149  
6.4 Discussion .......................... 152

7 A resolved, AU-scale gas disk around the B[e] star HD 50138  
7.1 Introduction ........................ 156  
7.2 Observations and data reduction ...................... 158  
7.3 Results: spectroscopy .................. 160  
7.4 Results: AMBER interferometry ............... 164  
7.5 Geometric modeling .................... 169  
7.6 Discussion .......................... 175  
7.7 Summary and Conclusions .............. 179  
7.A AMBER: observations .................. 181  
7.B AMBER: observations and models ............ 182  
7.C Line visibility ....................... 183  
7.D Visibility of a Gaussian distribution .......... 184

Bibliography ................................ 185

Publications ................................ 199

Summary .................................. 203

Samenvatting ............................ 209

Dankwoord ................................ 215