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Orion's Dragon and other stories: Feedback by massive stars

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Citation
Pabst, C. H. M. (2021, March 18). *Orion's Dragon and other stories: Feedback by massive stars*. Retrieved from https://hdl.handle.net/1887/3147353

Version:	Publisher's Version
License:	Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden
Downloaded from:	https://hdl.handle.net/1887/3147353

Note: To cite this publication please use the final published version (if applicable).

Cover Page

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The handle http://hdl.handle.net/1887/3147353 holds various files of this Leiden University dissertation.

Author: Pabst, C.H.M.
Title: Orion's Dragon and other stories: Feedback by massive stars
Issue date: 2021-03-18

Publications

1st author:

[1] Pabst, C. H. M., Goicoechea, J. R., Teyssier, D., Berné, O., Higgins, R. D., Chambers, E. T., Kabanovic, S., Güsten, R., Stutzki, J., Tielens, A. G. G. M.
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Curriculum Vitae

I was born on September 18, 1989, in Marburg, Germany. My parents and me soon moved to Munich. I was raised alternatingly there and in Walnut Creek, California. When I was five years old, my parents settled in the municipality of Wolfenbüttel. From an early age, I was fascinated by stars and the larger universe. In high school, my passion altered slightly to atomic physics and quantum physics. This was kindled in earnest in 2007 by my participation, facilitated by my earlier physics teacher Herr Kloppe, in a 10-day workshop on Bose-Einstein condensation of the JGW-Schülerakademie under the direction of Christian Hagendorf and Steffen-Patrick Rath, at that time two PhD students at the École Normal Supérieur in Paris, France. The workshop treated both theoretical and experimental aspects, but I was mainly drawn towards theory. I spent my last high-school year deepening my knowledge of theoretical physics and math, encouraged by my maths and physics teachers Herr Wesche and Herr Genther.

In 2008, I went to Göttingen to study physics. My interests were mainly in theoretical physics and my Bachelor thesis, under the supervision of Dr. Manfred Requardt, treated typical microstates of macrosystems, also known as Canonical Typicality and Normal Typicality (the latter is a concept introduced by John von Neumann). After graduating with a Bachelor degree from the Georg-August-Universität, I moved to Leiden to pursue a Master degree in theoretical physics in 2012. I graduated from the Master program at Leiden University in 2015 with a thesis on pp-waves in General Very Special Relativity, a modification of general relativity on a Finsler-type geometry, under the supervision of Prof. Dr. Ana Achúcarro and Dr. Andrea Fuster. However, I was becoming increasingly dissatisfied with the hypotheticality of theoretical research and longed for something more tangible. I applied for a PhD position at the Sterrewacht and was lucky enough to get hired by Prof. Dr. Xander Tielens. He offered me the freedom to choose whatever topic would fascinate me, but due to my inability to choose, he set me to work on the topic on which he just had submitted a SOFIA proposal: the [CII] emission from the Orion Nebula. I began studying the [C II] emission from the Horsehead Nebula and adjacent molecular cloud as preparation. Xander made sure that I would be onboard SOFIA when the observations of the large Orion Nebula map were taken, which was in November 2016 and February 2017. After learning a lot about data reduction, the scientific analysis could begin, which to this date has lead to the four papers that constitute this thesis.

While the large data set of the [C II] emission from the Orion Nebula invites for more and more detailed studies, SOFIA has also obtained [C II] observations of the Tarantula Nebula in the Large Magellanic Cloud (a satellite galaxy of our Milky Way). During the next year, I will study this data set in combination with SOFIA/HAWC+ measurements of the polarization of interstellar dust grains. This will teach us something on the importance of magnetic fields in regulating stellar feedback.

Acknowledgements

There are too many people that have helped pave my way and I am bound to forget at least some of them. I hope that I will be forgiven.

First of all, I wish to thank Xander Tielens for offering me the opportunity to develop into a real astronomer (although I try to keep true to my inclinations towards theoretical physics and mathematics). The path has been very muddy and I am very much indebted to his patience and confidence in me.

Javier Goicoechea has been a great co-supervisor, always keen on offering feedback and bearing new insights. Of course, I am also indebted to the other members of the C+SQUAD, without whom this thesis would not exist; it has been a great honor to be admitted as the only sailor on a ship full of captains.

I am grateful to all who operate SOFIA and who have allowed me a glimpse of its intricacies. I am particularly grateful to the GREAT team, who explained the working of the instrument and the data pipeline to me and assisted in the data reduction and the ensuing data analysis. In particular, Ronan Higgins did a wonderful job and we would have been lost in the thickets of the wilderness without him.

During the past year, Bob O'Dell shared his lifelong passion and his expertise on the Orion Nebula with me. I thank him for many fruitful discussions, not only on the Orion Nebula, but on Nietzsche, Heidegger, and Camus, as well.

I would not have been able to write this thesis without the constant support of Tjerk Oosterkamp. He helped me to navigate the deep seas of writing a PhD thesis. He never tired of throwing a life buoy when I was about to drown. His wife Jannette Prins, and pastors Pieter Kleingeld and Bram Dijkstra provided food on the journey untiringly.

After the disastrous event in December 2017, and during the journey through hell that followed, the community of the NGK Oegstgeest never wavered in their sympathy and care. I thank all of them with all my heart. In particular, I am grateful for many shared meals to Carin, Jan, Janneke, Wouter, and Annemarie. Our kerngroep also shared many meals together and many a gezellige evening: I thank Femmy, Aline, Jelle, Hester, Kees, Anna, Simon, Coriëtte, Marijke, Anne-Marije, and Gertjan.

My debts to Alexandra Schouten-Voskamp and Caroline de Bruin have grown immense. I will not be able to pay them back in bakery. I thank both for their unerringly wise advise and undiminishing patience. Kimberly Emig has been a loyal sister-in-arms at the Sterrewacht. I thank her for her friendship and support, especially in the form of baked goods and other food and recipes.

Gesa, Steffi, and Britta have been loyal companions for shorter or longer periods of my life. All of them have helped me to battle the monsters and thorny bushes that blocked the way occasionally. We have shared many sweet moments (with pie and cookies) and I am very thankful for their friendship. Also much valued were the infamous Christmas dinners and the friendship of Matthijs, Lennart, Tom, Mark, and Henk, all of whom have known the sorrows of a PhD student. I thank Frank for sharing his enthusiasm about all things in nature, in particular the starry sky, and his profound reflections. Anne and Micha have been steadfast friends, as well. Esther Heizmann-Linder continued to offer advice and new perspectives. Ana Achúcarro and Andrea Fuster never lost confidence in my abilities. I am grateful to know them and for their friendship.

I also thank my family, who went through the ups and downs with me. Of course,

I would not be here without my parents. I thank them for their unrelenting love and support. They and their spouses did the most humanly possible to get me to the end of this trajectory.