

UNIVERSITY of CALIFORNIA  
SANTA CRUZ

**INHIBITION OF CONVECTION DUE TO FORMATION OF STABLE  
WATER CONDENSATION ZONES IN THE ATMOSPHERE OF  
URANUS AND ITS IMPACT ON THERMAL EVOLUTION**

A thesis submitted in partial satisfaction of the  
requirements for the degree of

BACHELOR OF SCIENCE

in

ASTROPHYSICS

by

**Robert Schroder**

27 November 2020





# Contents

List of Figures	v
List of Tables	vi
Dedication	vii
Acknowledgements	viii
<b>1 Introduction</b>	<b>1</b>
1.1 Background: Thermal evolution of giant planets . . . . .	1
1.1.1 Background: Condensation inhibited convection . . . . .	1
1.1.2 Open Questions . . . . .	2
1.1.3 A subsection on tables . . . . .	2
1.1.4 Graphics with pgfplots . . . . .	3
<b>2 Previous Work</b>	<b>5</b>
<b>3 Conclusion</b>	<b>7</b>
<b>A Some Ancillary Stuff</b>	<b>9</b>

# List of Figures

1.1	Transverse Scans at difference Temperatures at $H = 11$ T . . . . .	2
1.2	This graphic was generated using the pdfplots package, which is a wrapper for a more fundamental LaTeX package called "tikz". . . . .	3
2.1	Rabbit or duck? . . . . .	6

# List of Tables

1.1	A normalsize table. This would be the normal size that you would make a table, so that it is most readable, unless it's hard to fit everything in. Some journals (like Physical Review) use captions at the bottom of tables that can be as wordy as the caption to a figure, like this one. If your thesis is in physics or applied physics, rather than astrophysics, you should use this convention.	3
1.2	A small table. <sup>a</sup> . . . . .	3







# 1

## Introduction

The first part of the introduction will describe the goal of the research being done wrt condensation inhibited convection in the atmosphere of Uranus.

### 1.1 Background: Thermal evolution of giant planets

Will review current understanding of solar system giant planet thermal evolution here, referencing work done by Fortney, et al., and others. Not sure how far back I want to go here, but will probably mention when, and by who, thermal evolution modeling began, and then quickly get into the thermal evolution background from fortney papers.

#### 1.1.1 Background: Condensation inhibited convection

This section will contain theory surrounding condensation in hydrogen rich atmospheres, citing LeConte, Friedson, others.

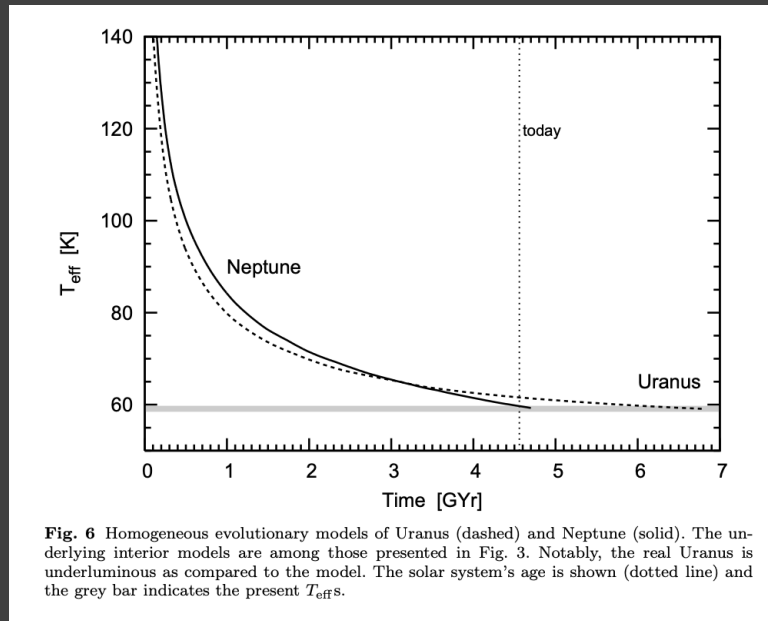


Figure 1.1: bobloblaw

### 1.1.2 Open Questions

### 1.1.3 A subsection on tables

Not only do I give two examples on tables here, I show you how to force tables (or other "floating" environments like figures) to appear close to where you want them.

When I first compiled this, the tables meant for this section appeared during the following one. LaTeX is just trying to arrange things well and avoid blank space, but if you want to prioritize having something appear about where you put it in the LaTeX code, put the notation "[!htb]" as shown at the start of the tables here. The "h" stands for "put it here," The "h" stands for "here," the "t" for "top," the "b" for "bottom," and the "!" for something like, "really, darnit, override some rules if you have to. You can use "b" or "t" alone or with the "!" if you like to see all your figures at the top of a page (common) or at the bottom (rare).

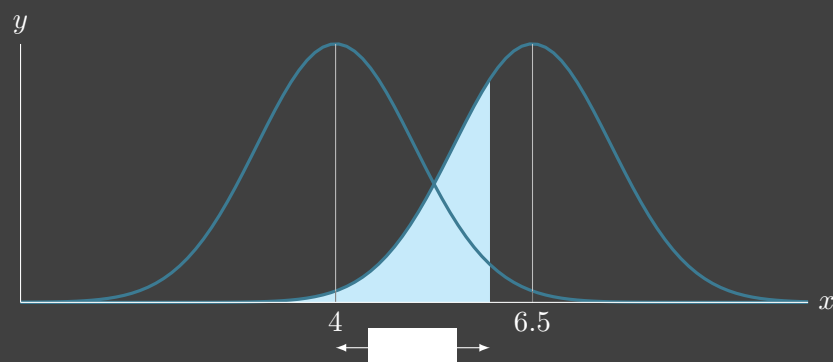


Figure 1.2: This graphic was generated using the pdfplots package, which is a wrapper for a more fundamental LaTeX package called "tikz".

Note that if your placement choices end up generating a lot of whitespace, that whitespace will not count toward the minimum page count of your thesis.

Title	Author
War And Peace	Leo Tolstoy
The Great Gatsby	F. Scott Fitzgerald

Table 1.1: A normalsize table. This would be the normal size that you would make a table, so that it is most readable, unless it's hard to fit everything in. Some journals (like Physical Review) use captions at the bottom of tables that can be as wordy as the caption to a figure, like this one. If your thesis is in physics or applied physics, rather than astrophysics, you should use this convention.

Table 1.2: A small table.<sup>a</sup>

Title	Author
War And Peace	Leo Tolstoy
The Great Gatsby <sup>b</sup>	F. Scott Fitzgerald

<sup>a</sup>In astrophysics, the table title is usually short and always at the top, and other information is put into table footnotes like this.

<sup>b</sup> A much shorter read than War and Peace.

#### 1.1.4 Graphics with pgfplots

In this subsection I show an example of how to create plots *within* LaTeX, using a package called "pgfplots". I have verified that it works in Overleaf. If you are compiling





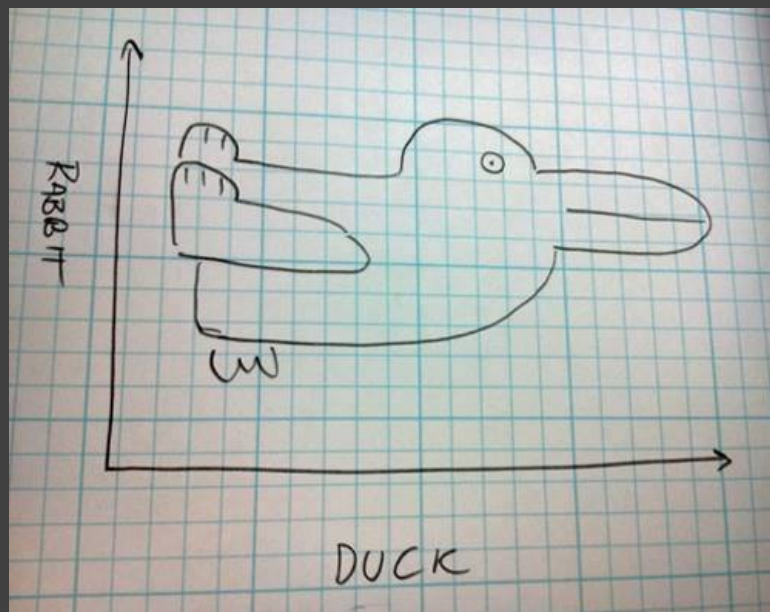


Figure 2.1: An image that looks like a rabbit one way, and a duck another. Your caption should describe everything that the reader sees looking at the figure, but *interpretation and significance* should be left for the main text.

This is where a conclusion would go. This is where a conclusion would go. This  
is where a conclusion would go. This is where a conclusion would go. This is where a  
conclusion would go. This is where a conclusion would go. This is where a conclusion





## Appendix A

### Some Ancillary Stuff

Ancillary material should be put in appendices. The guidelines are not clear whether bibliography comes before or after the appendices, but they *suggest* appendices come first. Ancillary material should be put in appendices. The guidelines are not clear whether bibliography comes before or after the appendices, but they *suggest* appendices come first. Ancillary material should be put in appendices. The guidelines are not clear whether bibliography comes before or after the appendices, but they *suggest* appendices come first. Ancillary material should be put in appendices. The guidelines are not clear whether bibliography comes before or after the appendices, but they *suggest* appendices come first. Ancillary material should be put in appendices. The guidelines are not clear whether bibliography comes before or after the appendices, but they *suggest* appendices come first.

## Bibliography