A LaTeX template for an astronomy/astrophysics thesis[1]

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[1]This is just a very basic cover page produced by LaTeX – when the thesis is done you can get a more formal cover page from Eva Jurlander.

(this page will contain some more official information in the final version)

Abstract

The abstract is a short summary describing the content of the main text. This should give enough information about the contents to decide for the intended audience whether further reading will be useful. The size should be about half a page, best written at the end, after most of the thesis is written.

Populärvetenskaplig beskrivning

När vi letar efter exoplaneter finns det ett antal olika metoder för att hitta dem. Den mest framgångsrika är transitmetoden där ljusstyrkan hos en stjärna studeras under en längre tid. När en planet passerar mellan sin stjärna och en observatör kan en minsking i stjärnans ljusstyrka ses. Uppreras detta i regelbunda intervall kan slutsatsen att det finns en planet runt stjärnan. Genom att studera minskningen i ljusstyrka kan storleken på planeten beräknas vilket kombinerat med massan som fås av andra metoder ger en insikt i hur och vad planeter är uppbygd av. En transit är detta fenomen då en planet passerar mellan stjärnan och en observatör.

Genom att jämföra tiden mellan varje transit för en planet kan ibland variationer ses. Detta beror på att det finns fler planeter runt stjärnan som med hjälp av gravitationskraften accelererar eller decelerera planeten som bevakas. Detta resulterar i att det är möjligt att hitta planeter som i andra metoder är osynliga.

Keplerteleskopet är ett rymdbaserat teleskop som använder transitmetoden för att hitta exoplaneter. Det har sedan 2009 hittat över 1000 bekräftade exoplaneter vilket gör den till det hittils mest framgångsfulla upgradet i jakten på exoplaneter. TESS, vilket står för Transiting-Exoplanet Survet Satellite, är ett teleskop som ska skjutas upp under våren 2018 och använda transitmetoden för att hitta exoplaneter. TESS kommer bli den första rymdbaserade teleskopet att studera hela himlen och kommer observera över 200 000 stjärnor under uppdragets upsrungliga längd på två år.

Detta projekt kommer använda data från Keplerteleskopet och simulera data från TESS för att sedan använda den datan för att leta efter TTV. Detta ska ge en uppfattning om hur många system har fler än en planet och resultatet kommer kunna ses som en katalog över multi-planet system vilket kan underlätta framtida forskning där en katalog av detta slag kan vara till användning.

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Chapter 1

Introduction

This document is meant as a technical tutorial for writing an astronomy/astrophysics thesis in LaTeX. Detailed rules about the *contents* of the thesis (Bachelor's thesis or Master's thesis) can be found at the course websites.

1.1 TESS

The Transiting Exoplanet Survey Satellite, TESS, is a satellite due to launch spring 2018. The satellite is equipped with four cameras which will study the brightness of over 200 000 stars over a two year period. It is the first all-sky transit survey taking place in space.

TESS will cover the whole sky by splitting it into 26 sectors which are observed for 27 days each. An illustration of this can be seen in figure 1.1 where the number of times TESS will observe each sector is shown.

1.2 Transits

A planet in orbit around it's host star may sometimes cross the line of sight of an observer. When this happens a slight decrease in the stars brightness can be measured. This is called a transit and is today used as a main method to discover exoplanets. From transits the radius of the planet can be determined but it can also be used to find additional planets around the host star which may not be transiting. This will be discussed in section 1.2.1. With the radius known from the transit method and the mass obtained from different methods as the radial velocity method the density of the planet can be calculated. The density is important to understand

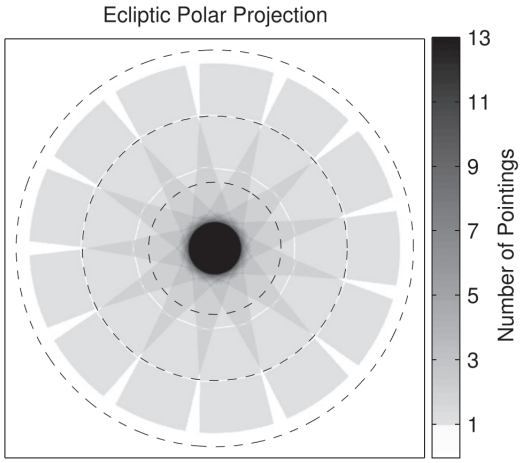

Figure 1.1: Illustration of the number of times TESS will observe each sector in the sky.
Source: Sullivan et al. (2015)

what the planet is made of and the structure of it.

1.2.1 Variations

When measuring the time of one transit one may discover variations in the period which are called Transit-Timing Variations or TTVs. These variations arise from another planet in the system whose gravitational pull accelerates or decelerate the observed planet which results in increased or decreased transit times. An advantage of studying transits in search for TTVs is that planets which does not transit their star can be discovered through TTVs. As most planets does not transit their star this can increase the number of known exoplanets drastically.

1.3 Simulation of TESS objects

1.4 TTVFast

1.5 Analyzing results from TTVFast

Chapter 2

Results

2.1 Simulated TESS objects

2.2 TTV signals from TESS objects

Table 2.1: Example table from template

Id of star	I	V	Var.?
1234	15.6	17.3	No
5677	13.4	12.3	Yes

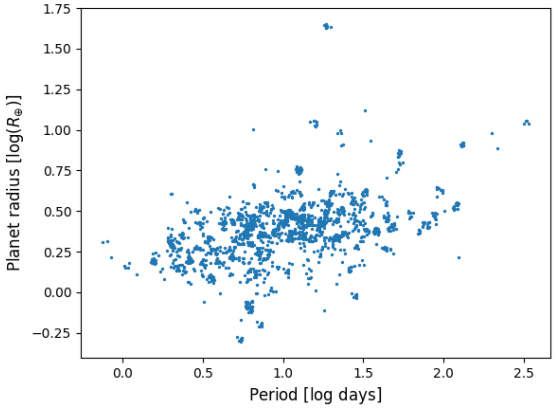

Figure 2.1: Diagram with the radius distribution as a function of period for the simulated TESS objects.

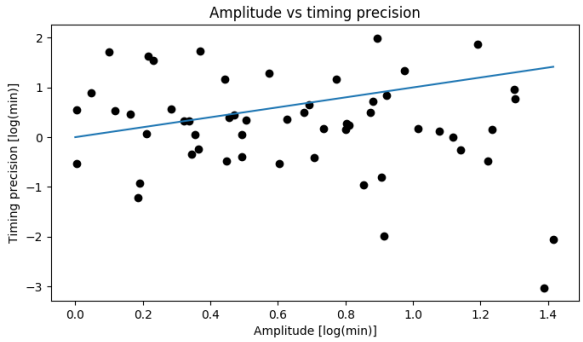

Figure 2.2: Diagram with the position of each observed objects color-coded to show the number of times the object is observed.

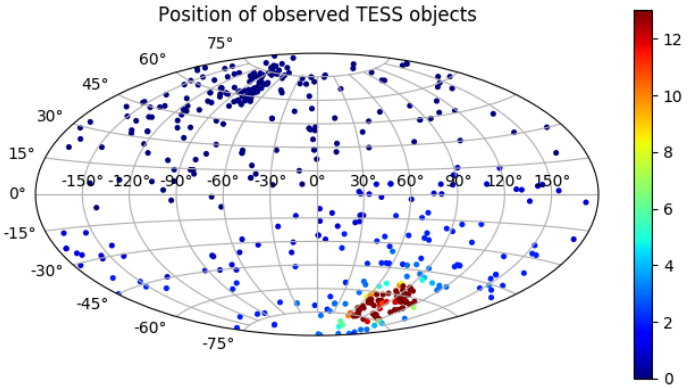

Figure 2.3: Diagram with the position of each observed objects color-coded to show the number of times the object is observed.

Chapter 3

Conclusions

Acknowledgements

There is no acknowledgements section in the regular LaTeX, but you can easily make one yourself.

Bibliography

Sullivan, P. W., Winn, J. N., Berta-Thompson, Z. K., et al. 2015, ApJ, 809, 77

Appendix A

This is an appendix

You can put long mathematical derivations or tables in appendices.

Appendix B

This is another appendix