

# NOTES OF STELLAR PHYSICS

version 1.0

Giacomo Pannocchia

a.y. 2025-2026



*For those who come after*



## PREFACE

Not long ago, it occurred to me how cool it is when someone unexpectedly releases a very detailed and all-comprehensive version of their notes, especially when dealing with a course that has a handful of really different topics often interacting together in unpredictable, yet fascinating, ways—as it's the case for the Astrophysical Processes class.

These notes will be mainly based on *my* own notes of the lectures by Professor Walter del Pozzo and Professor Marco Crisostomi during the academic year 2025-2026. However, since I take little to no pride in my messy notes, I'll be using more often than not some of the many references you can find on the course catalogue page or in the bibliography of this humble collection.

You can report errors (whatever their nature might be) and suggestions for additions at [g.pannocchia3@studenti.unipi.it](mailto:g.pannocchia3@studenti.unipi.it) or through whatever convoluted way (conventional or not) you prefer<sup>1</sup>.

Without further ado, we'd better not lose much more time on a preface and get started with it.

*There was Eru, the One, who in Arda is called Ilúvatar; and he made first the Ainur [...] But for a long while they sang only each alone, or but few together, while the rest hearkened; for each comprehended only that part of the mind of Ilúvatar from which he came, and in the understanding of their brethren they grew but slowly.*

*Yet ever as they listened they came to deeper understanding, and increased in unison and harmony.*

*Ainulindalë, "The music of the Ainur",  
Silmarillion, J. R. R. Tolkien*

---

<sup>1</sup> I'd like, however, not to see my house stormed by homing pigeons.



# CONTENTS

- I Part 1
  - 1 Chapter 1 3
    - 1.1 Introduction 3
- II Part 2
  - 2 Chapter 2 7
- III Part 3
  - 3 Chapter 3 11
  - Bibliography 15





Part I

PART 1



# 1

## CHAPTER 1

### 1.1 INTRODUCTION

Dummy citation so that L<sup>A</sup>T<sub>E</sub>X doesn't cry [1].



Part II

PART 2



# 2 | CHAPTER 2





Part III

PART 3



# 3 | CHAPTER 3



## ABOUT ME

Hi there, I'm Giacomo, sometimes known as Cael by a very small niche of people, the author of the notes you just finished reading.

I'm a Bachelor-graduate student at the University of Pisa now in the process of undertaking a major (Master degree) in Astronomy and Astrophysics at the same university. In my (meager) free time I'm an avid reader, gamer, anime-enthusiast as well as an independent author in the very process of publishing his first novel.

For those of you that may be interested I'll leave both the link to the novel's page as well to my instagram profile in the QRcodes right below.

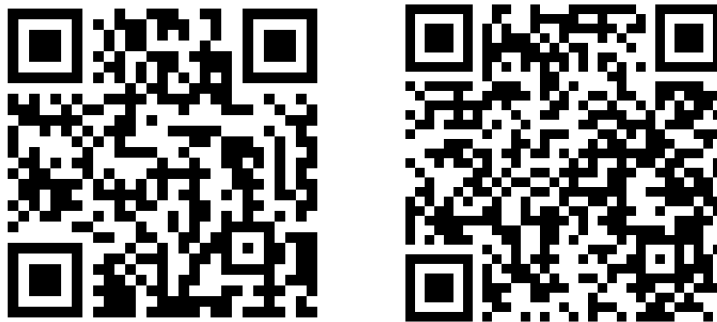


Figure 1: On the left is the link to my instagram profile, on the right the one to my novel's page (Python really has a library for anything, huh?).

Come say hi if you fancy action-fantasy stories with magic, swords, some comedy to garnish and a lot of other stuff :)

At last but not the least, I want to thank all my colleagues and fellow students that helped (and hopefully will help me again) during the drafting of this text, pointing out errors and occasions for further expansion.

If you'd like your names to be included and take your fair share of credits, feel free to contact me and I'll add your name right away in the few lines that are left of this page.

I hope my understading of the complex interplayings going on in our Universe has managed to facilitate your own understading.

If not, well... oopsie.

*See you, space cowboys...*

Giacomo



## BIBLIOGRAPHY

- [1] S. Navas et al. Review of particle physics. *Phys. Rev. D*, 110(3):030001, 2024.